COGNITIVE AND SOCIO-EMOTIONAL DEVELOPMENTAL COMPETENCE IN PREMATURE INFANTS AT 12 AND 24 MONTHS: PREDICTORS AND DEVELOPMENTAL SEQUELAE.

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ABSTRACT

Premature infants’ development is influenced not just by being born too soon, but also by the quality of care they receive from their parents and the socio-demographic environment. Although these contextual variables have been studied as predictors of infant development, we have less understanding of the processes by which contextual and biological variables influence cognitive and socio-emotional development among premature infants. The present study examined the linkages between the predictors including parenting (i.e., maternal sensitivity), maternal state of mind regarding attachment, socio-demographics and infant medical risk, and preterm infant cognitive and socio-emotional developments at 12- and 24-month using a sample of 173 low-income African American families that participated in a home visiting intervention program aimed at promoting infant development. Additionally, the study examined the association between socio-emotional and cognitive development across time, between 12- and 24-months. Path analyses revealed that maternal sensitivity serves as an intervening variable between the predictors and 12-month infant attachment security, cognitive outcome and behavior problems, and between the predictors and 24-month infant attachment security. At 12 and 24 months, the linkage between maternal sensitivity and infant attachment security was stronger than any other outcomes. Maternal state of mind regarding attachment became a significant direct predictor of infant attachment security at 24 months. For all outcomes except infant attachment security, the 12-month outcome predicted the corresponding 24-month outcome. The present study also found “crossover” linkages between cognitive and socio-emotional outcomes. Twelve-month socio-emotional competency predicted 24-month cognitive outcome, and 12-month cognitive outcome predicted 24-month infant attachment security. Twelve-month socio-emotional competency significantly predicted all 24-month outcomes except behavior problems. The findings suggest the importance of quality of parenting especially for the earlier
development of premature infants. Moreover, the results call attention to the need for further work addressing the complex linkages and their mechanisms between 12- and 24-month outcomes, in particular cross-over longitudinal linkages between different developmental domains.
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Chapter 1:

Introduction

The increasing number of premature birth (< 37 weeks gestation) in the U.S. has led to renewed interest in understanding the ways by which premature birth puts infants at-risk for developmental delay. Premature infants’ development is influenced not just by being born too soon, but also by the quality of care they receive from their parents and the socio-demographic environment. These contextual variables have been studied as predictors of infant cognitive and socio-emotional development. Nevertheless, we have less understanding of the processes by which contextual and biological variables influence cognitive and socio-emotional development among premature infants. The present study examines the linkages between predictors such as socio-demographics, parenting (i.e., maternal sensitivity) and infant medical risk, and preterm infant developmental outcomes including cognitive and socio-emotional development at 12- and 24-month using a sample that participated in a home visiting intervention program aimed at promoting infant development (see Figure 1). Additionally, the study will examine the association between socio-emotional and cognitive development across time, between 12- and 24-month.

In the following sections, I will discuss premature infants’ vulnerability to developmental delay in socio-emotional and cognitive developmental domains, and some theoretical mechanisms that may account for that. Then, I will discuss the three major predictor variables and related theoretical mechanisms considered in the present study (i.e., quality of parenting, infant medical risk, socio-demographic factors). Lastly, I will discuss the importance of intervening in promoting premature infants’ socio-emotional and cognitive development.

Premature infants’ vulnerability to developmental delay
Ninety-five percent of infants born less than 28-week gestational age (GA) and under 1250 grams survive; however, less than 50% of infants born less than 26-week GA are discharged free of major disabilities (Als & Butler, 2008). Premature birth is a known risk factor for both short- and long-term developmental outcomes. Premature infants often require medical assistance to achieve autonomic stability including respiration, temperature and digestion, smoothness of movements, state organization, and alertness (Als, Butler, Kosta, & McAnulty, 2005). In addition, premature infants often have difficulty coming into alertness because of their poor differentiation of subsystems (i.e., autonomic, motor, state, attention/interaction) (Als et al., 2005).

Mechanisms that are associated with premature infants’ vulnerability to developmental delay, particularly their neurodevelopmental outcomes, could be understood using the models of pathogenesis. The models of pathogenesis include “changes due to developmental disruptions and injury, the magnitude and type of change influenced by the infant’s age, and central nervous system recovery and reorganization (Aylward, 2005, p. 427).” Changes could arise from either preterm birth itself, which is associated with potential disruption of typical and spatial organizational development of brain structures, or perinatal insults such as intraventricular hemorrhage (IVH) or hypoxic-ischemic encephalopathy (HIE) (Aylward, 2005). Between 29 and 41 weeks GA, there is a 2.7 times increase in brain volume, 4 times increase in cortical gray matter, and 5 times increase in myelinated white fiber. The disruptions could occur during critical phases of brain development such as the neural cell migration (3-5 months GA), organization/differentiation (6 months GA to year 3), and myelination (6 month GA and onward) (Aylward, 2005). Additionally, the blood-brain barrier is less efficient at <27 weeks GA, which enables toxins to enter the infant’s brain, and there is an absence of endogenous protectors.
against cell death that are provided by the mother and that cannot be synthesized by the fetus
(Aylward, 2005). These factors place premature infants at risk for neurodevelopmental
dysfunctions that are difficult to prevent. Risk of neurodevelopmental dysfunctions increases
when there is injury such as maternal infections, HIE, periventricular hemorrhage (PVH), and
IVH. Among premature infants, HIE causes cell death deeper within the brain compared to full
term infants, and is associated with spasticity, neurosensory and motor problems (Aylward,
2005). Importantly, areas of injury are associated with specific neurobehavioral functions, for
example injury to basal ganglia, negatively impacts modulation of attention and regulation of
behavior, and cognitive and motor development; reduced gray matter and cerebellar volume also
have impacts on cognitive functions (Aylward, 2005).

Although premature birth is associated with negative neuroanatomic outcomes, it is
important to note that due to brain plasticity, both recovery and reorganization may occur in
premature infants. As discussed above, premature birth has direct influence on premature infants’
vulnerability to developmental delay. In addition, premature birth puts infants at risk by
disrupting the environment in which infants develop. As soon as premature infants are born, they
are subject to external stimulation/stressors including medical procedures and caregiving that are
necessary for the infants’ survival. Premature infants who receive prolonged intensive care show
marked increase in stress hormone concentration, and early acute or chronic stress/trama could
have negative long-term impact on development (Peters, 1999). For example, Smith et al. (2011)
found a positive linkage between the number of infant’s exposure to stressors in the NICU and
regional alterations in brain structure and function. Similarly, Gruneau et al. (2009) found a
negative association between the number of neonatal pain from birth to term, and cognitive and
motor outcomes at 8- and 18-month. Importantly, the authors also found that lower parenting
stress buffered the negative effect of neonatal pain exposure and cognitive development at 18-month (Gruneau et al., 2009). The impact of caregiving on infant development is demonstrated by early interventions that focus on developmental care. One of the prominent developmental care interventions is the Newborn Individualized Developmental Care and Assessment Program (NIDCAP).

NIDCAP is a program that includes behavioral observations of infants and formulations of individualized developmental care based on the observations (Als & Butler, 2008; VandenBerg, 2007). NIDCAP originated in the 1980s based on the Synactive Theory of Development, which conceptualizes development as a process of continuous differentiation, reintegration, and modulation of subsystems that are continuously in interaction with environment (Als & Butler, 2008). The theory posits that infants’ ability to regulate and control behavior, as well as their own developmental goals, are expressed through five interdependent and interrelated subsystems including autonomic/physiology, motor, state, attention/interaction, and self-regulation (Als & Butler, 2008; VandenBerg, 2007). The five subsystems are mature, integrated, and smoothly synchronized in healthy full-term infants whereas premature infants may show over-reactive responses and poor tolerances to environmental inputs (VandenBerg, 2007). Based on the observation, specific care recommendations are made including adaptations of the infant’s NICU environment (e.g., atmosphere and ambience of nursery space, layout, timing of care, nurturance), the immediate environment (e.g., bedding, tubes, linens, positioning), and the social environment (i.e., support and nurturance of parents and family including skin-to-skin holding, family comfort, collaborative care) (Als & Butler, 2008; Als, 1997). The three major goals of NIDCAP are improvement of long-term family and child outcomes, reduction in discrepancy between the stimulation and inputs infants experience in the womb and NICU, and
creation of the relationship-based and developmentally supportive care environment for premature infants and their families (Als & Butler, 2008).

Studies have shown the positive benefits of NIDCAP for both premature infants and their parents including reduced stress in infants; promotion in infants’ cognitive, motor, and emotional functioning up to 6 years; improved infant lung function, feeding, and growth; fewer days of hospitalization and reduction in hospital charges ranging from $4,000 to $120,000 per infant; improved infant neurostructural development, and neurobehavioral and neurophysiological functions; improved infant auditory process and speech; fewer behavioral problems and improved mother-child communication at 6 years; increased infant survival rate without a major developmental disability such as mental retardation and attention deficits; lower parental stress; and increased parenting confidence (see reviews by Als & Butler, 2008; Wallin & Eriksson, 2009). Positive effects of NIDCAP on premature infants’ development including cognitive and socio-emotional outcomes underscore the impact of early caregiving on premature infants’ development. Additionally, the above findings underscore that the impact of prematurity could arise from premature birth itself, as well as the care infants receive immediately after birth when their brains are undergoing rapid development.

Even after discharge from NICU, premature infants continue to show vulnerabilities in long-term neurodevelopmental, cognitive, and socio-emotional outcomes. Hüppi et al. (1996) found that preterm infants at term (40 weeks postconceptual age) show a structural and functional delay in brain development compared with full-term infants. Despite the lower incidence (less than 25% of premature infants) of major disabilities such as cerebral palsy, mental retardation, deafness or blindness among premature infants (Aarnoudse-Moens, Weisglas-Kuperus, van Goudoever, & Oosterlaan, 2009; VandenBerg, 2007), up to 50-70% of
very low birth weight (VLBW; less than 1500g) infants show more “subtle”
neurodevelopmental dysfunctions such as learning disabilities, behavioral problems, ADHD,
executive function, poorer verbal frequency, and cognitive flexibility (Aarnoudse-Moens et al.,
2009; Aylward, 2005; VandenBerg, 2007). Among extremely low birth weight (ELBW; less than
1000g) and VLBW infants, the prevalence of ADHD is 2.6-to-4 times greater compared to full-
term infants (Aylward, 2005). Children with ADHD who were born prematurely show fewer
comorbid behavioral disorders, which underscores the biological basis of ADHD among these
children (Aylward, 2005). Even without early brain injury, premature infants have smaller brain
volumes compared to full-term infants, which may impact the development of brain areas that
are associated with regulation of attention and arousal, cognitive functions, visuospatial and
semantic processing, verbal performance, and memory functioning (Aylward, 2005). For
example, Peterson et al. (2000) found an association between preterm birth and regionally
specific, long-term reduction in brain volume, which in turn was associated with poorer
cognitive outcomes at 8 years. Due to the effect of premature birth on neurodevelopment,
premature-born children require more early intervention and special education services compared
to children who were born full-term (McAnulty et al., 2009). Specifically, more than 50% of
children who were born VLBW, and 60-70% of children who were born ELBW require special
assistance in school (Aylward, 2005).

The short- and long-term impact of premature birth on infants’ development emphasize
the importance of understanding the mechanism in which premature infants’ cognitive and socio-
emotional development are influenced by their prematurity and surrounding factors that will be
discussed next.

Predictors of cognitive and socio-emotional development
Theoretical Mechanisms. Infant development occurs in an ecological context, which could be viewed in multiple levels. Multiple levels of ecological context are described in two theoretical models including ecological and transactional models. Bronfenbrenner’s (1977) ecological model provides a guide in understanding the influence of context and environment on developmental processes, and it is composed of microsystems, mesosystems, exosystems, and macrosystems. The microsystem is the immediate setting of a child in an environment such as home and school. The mesosystem is the relationship between the major settings for the child such as between home and school. The exosystem is the environment that has no direct relationship to the child, but has influence on his/her closer settings, for example parents’ workplace. The macrosystem overarches the above three systems, and it includes economic, social, political, and cultural systems of the child’s environment. The four systems are thought to process in a synchronized manner in influencing the development of a child. In addition to the four systems, Bronfenbrenner (1986) added a chronosystem, which examines the effect of environmental changes (i.e., change in the four other systems) on a child’s development overtime.

The ecological model is a detailed description of the environmental organization or the environtype, which is a part of the transactional model of development (Sameroff & Suomi, 1996). The transactional model is based on the idea that a child’s development is a product of continuous dynamic interaction between the child and his/her experience in the family and social contexts (Sameroff & Fiese, 2000). The model is composed of three systems: genotype, phenotype, and environtype. Genotype is the biological regulation and organization of a child, and environtype includes the regulations that originate from a child’s surrounding contexts most strongly from his/her immediate environment (i.e., family). Phenotype is the individual person whose developmental status is determined by the transaction between the genotype and
environtype. Continuity is maintained by the equilibrium in the three systems; however, disturbances occur in both normal and abnormal developmental processes when one of the systems undergoes a change (Sameroff & Fiese, 2000).

Ecological and transactional models describe the mechanisms in which proximal and distal variables could affect infant development. Proximal variables (e.g., parenting quality, infant medical status) are factors that affect infant on a daily basis, and that could have more direct effects on his/her developmental outcomes whereas distal variables (e.g., socio-demographic factors, parental developmental history) are factors that could impact infant development, but the direction of influence could be intervened by proximal variables. Importantly, proximal and distal variables are constantly in transaction; the present study examines the paths by which distal variables affect infant development through their effects on proximal variables, and by which a proximal variable affect another proximal variable to influence infant development. In the sections below, predictors of socio-emotional and cognitive development will be discussed in the order of proximal to distal variables, and how distal variables could influence infant development through their effect on proximal variables.

**Parenting Quality.** During the past four decades, parental sensitivity has been touted as a construct that is highly relevant to an understanding of quality of parenting for infants and young children (Teti & Huang, 2005). Maternal sensitivity has been studied extensively as a major predictor of infant-mother attachment. Ainsworth, Blehar, Waters, and Wall (1978) conducted the first examination of the link between parental behavior and attachment security. From the observation of 26 middle-class mother-infant dyads, and the assessment of infants’ security of attachment using the Strange Situation, Ainsworth et al. (1978) found that the maternal sensitivity in perceiving (i.e., awareness and accurate interpretation), and promptness
and appropriateness of her responses to the infants’ attachment signals were crucial predictors of attachment security.

Following the finding by Ainsworth et al. (1978), studies examined the relationship between sensitivity and attachment. Whereas the effect size of the association between sensitivity and attachment was $r(21) = .78$ in the Ainsworth et al.’s (1978) study, a meta-analysis by De Wolff and van IJzendoorn (1997) found a combined effect size of $r(1097) = .24$. Although the association was considered moderately strong, De Wolff and van IJzendoorn (1997) concluded that sensitivity could not be considered as the exclusive and most important factor in the development of attachment. In addition, De Wolff and van IJzendoorn (1997) found that the sensitivity-attachment association was weaker in lower class and clinical samples where the environment might have been unstable in terms of childrearing arrangement, parental stress level, and parental clinical conditions (also see Sagi et al., 1997). Considering De Wolff and van IJzendoorn’s findings, it is important to examine the sensitivity-attachment link among families with premature infants; these families experience non-normative caregiving processes especially in the beginning of infants’ lives due to their birth status.

Effects of premature birth on parenting quality. Consideration of maternal sensitivity may be particularly important for the families with premature infants. Compared to the parents of full-term infants, the parents of premature infants may be more likely to interact less sensitively with their infants due to the infants’ difficulty in coming into alertness (Als et al., 2005), and maternal emotional states following delivery (e.g., guilt, self-blame, difficulty expressing affection, difficulty developing feelings of attachment) (see review by Teti, O’Connell, & Reiner, 1996). Studies show that mother-infant interactions among premature infants are often characterized by greater activity and stimulation by mothers, lower infant responsiveness and
interactional competence, and lower enjoyment and positive affect by dyad compared to the mother-infant dyads of full-term infants (Boyce et al., 2008; Wolke, 1998). In a study by Minde, Whitelaw, Brown, and Fitzhardinge (1983), a significant interaction between maternal reaction to premature birth and infant illness on maternal behavior was found that a mother’s favorable experience of the pregnancy, positive social condition of the family, and fewer past psychological events were associated with positive maternal interaction (looking at infant, smiling, touching, vocalizing) for the mothers of premature infants who were relatively healthy and had relatively short-term illnesses; this association was not significant for the mothers of infants with long-term illnesses who showed low rate of interaction regardless of their background factors (Minde et al., 1983). Consideration of maternal reaction to premature birth is important because of its’ impact on mothers’ perception of their infants. Korja et al. (2010) found that balanced maternal representations of their infants (perceptions and subjective experience of infant’s characteristics, and relationship with infant) were associated with better quality of mother-infant interactions among the mother-infant dyads of both premature and full-term infants. Studies show that more premature and more severely ill premature infants are likely to be rated difficult in temperament and lower in adaptability compared to full-term infants. In a study by Langkamp, Kim, and Pascoe (1998), mothers of premature infants and full-term infants completed the Early Infancy Temperament Questionnaire (EITQ), which contains two sets of items measuring their overall perception of infant temperament (e.g., average, difficult, easy) and their ratings of the frequency of specific infant behavioral reactions related to temperament (six-point Likert scale ranging from “almost never” to “almost always”). The authors found that the mothers of premature infants perceived their infants to be more difficult in temperament than the actual ratings of infant behavior (Langkamp, Kim, & Pascoe, 1998). The gap between rating and
perception is important provided that parental perception of infant characteristics and behaviors are likely to be more predictive of mother-infant interaction than any other assessment (Goldberg, 1977), and maternal perception of infant difficult temperament was found to be more predictive of later behavioral problem compared to a maternal rating (Langkamp, et al., 1998).

**Effects of social environment on parenting quality.** In addition to infant characteristics such as prematurity, another variable that could influence maternal sensitivity is the broader family ecology. For example, marital distress is one of the major stressors that impact parental attitude and family interactions, which in turn disrupt parenting behaviors (see review by Gable, Belsky, & Crnic, 1992; Webster-Stratton, 1990). In a study by Gray, Edwards, O’Callaghan, and Cuskelly (2012) using mothers of preterm and mothers of full-term infants, it was found that marital satisfaction was one of the independent risk factors for high parenting stress levels for both mothers. In addition, marital conflicts may pose negative effects on security of infant attachment by disturbing the emotional relationship between the parent and child, decreasing parent involvement, and role reversal whereby parents depend on the child for emotional support and dependency (Davies & Cummings, 1994). On the other hand, a supportive couple relationship is associated with parenting that predicts attachment security (Belsky & Fearon, 2008). Das Eiden, Teti, and Corns (1995) examined the associations among maternal working models of attachment, marital adjustment, and child attachment security. In addition to the significant association between maternal attachment representation and child’s attachment, marital adjustment was significantly associated with attachment security (Das Eiden et al., 1995). Maternal working models and marital adjustment also had an interactive association with child security that insecure mothers who had high marital adjustment had children who were significantly more secure than insecure mothers who reported low marital adjustment (Das Eiden
et al., 1995). Das Eiden et al. (1995) suggested that high marital adjustment may lead a mother to reevaluate the current working models, which in turn increases maternal sensitivity. High perceived marital quality was also found to be associated with interdependence of sensitive parenting behavior in mothers and fathers of infants during a free-play (Barnett, Deng, Mills-Koonce, Willoughby, & Cox, 2008). Moreover, Cox, Owen, Lewis, and Henderson (1989) found that when the parents are in close/confiding marriages, mothers are warmer, more sensitive and hold positive attitude, and fathers show positive attitude toward their 3-month-old infants even when their psychological adjustment was taken into account. Significance of marital adjustment particularly when the family is facing a challenging infant was found in a study by Schoppe-Sullivan, Mangelsdorf, Brown, and Sokolowski (2007), which examined infant temperament, marital quality and parenting behavior among couples with 3.5-month-old infants. Schoppe-Sullivan et al. (2007) found that couples with high marital quality showed more optimal co-parenting behavior when they had infants who were rated as unadaptable by observers, but couples with low marital quality showed less optimal co-parenting behavior when they had challenging infants. Marital quality, therefore, is an important factor that contributes to parenting stress and quality.

Other possible social-contextual influences on maternal sensitivity are parental life stress and social support. Crnic, Gaze, and Hoffman (2005) examined the effect of cumulative parenting stress across the preschool period (age 3 to 5) and its relation to maternal parenting and child behavior at age 5. The authors found that cumulative stress including parenting daily hassles and major life stress was negatively associated with parenting behavior and quality of parent-child interaction (Crnic et al., 2005). Similarly, among mother-infant dyads with full-term and premature infants, Crnic, Ragozin, Greenberg, Robinson, and Basham (1983) found that
stress predicted lower maternal sensitivity; on the other hand, social support especially intimate support was related to positive maternal attitudes and behavior. Studies show that well-supported mothers exhibit better parenting behaviors than those who do not have support, and support is also related to the quality of parent-child relationships, parenting efficacy and competency (Belsky & Fearon, 2008; Lamb, Bornstein, & Teti, 2002). Isabella (1994) found that high social support predicted high maternal role satisfaction, which in turn affected caregiving behaviors and attachment security. Gelfand, Teti, and Radin Fox (1992) examined sources of parenting stress for depressed and non-depressed mothers of 3 to 13 months old infants. Gelfand et al. (1992) found that depressed mothers had lower levels of marital harmony and social support, and greater numbers of daily problems and parenting stress compared to non-depressed mothers. Importantly, a significant inverse association between parental stress and maternal competence was found among depressed mothers whereas only similar trends were found among non-depressed mothers (Gelfand et al., 1992). In addition to marital harmony and social support, larger sibship size is also likely to have an effect on parental stress, maternal sensitivity, and mother-infant interaction pattern (Brooks-Gunn & Duncan, 1997; Cohen & Beckwith, 1977; Feldman, Eidelman, & Rotenberg, 2004). Feldman et al. (2004) studied development of triplets, twins, and singletons. The authors found that parents of triplets scored significantly higher on parenting stress compared to parents of twins and singletons; triplets received lower maternal sensitivity between 3 and 12 months, and scored lower on cognitive competency at 1 year compared to twins and singletons. Importantly, Feldman et al. (2004) found that most medically compromised infant among the triplets received the lowest maternal sensitivity, which directly and indirectly associated with lower infant cognitive outcome. Considering the above findings, maternal sensitivity might be an intervening factor in the link between social-contextual factors
and infants’ socio-emotional and cognitive development. In fact, Candelaria, Teti, & Black (2011) found that psychosocial and socio-demographic risks negatively related to infant attachment security among African-American preterm infants, and both were mediated by maternal sensitivity.

The findings on the effects of infant characteristics and social environment on maternal sensitivity, and the influence of maternal sensitivity on infant development suggest that parenting quality serves as a conduit of effect in which other proximal and distal variables affect infant outcomes. Thus, it is imperative to examine the intervening role of maternal sensitivity on the association between infant characteristics/ medical risk and infant cognitive and socio-emotional outcomes, and between infants’ social environments and the infant outcomes. These two intervening paths will be examined in the present study.

**Parenting quality and cognitive development.** In addition to sensitivity-attachment link, several studies examined the influence of maternal sensitivity and parenting quality on infants’ cognitive development. For example, Lemelin, Tarabulsy, and Provost (2006) found that psychosocial risk and maternal sensitivity accounted for significant variance in predicting children’s Mental Developmental Index (MDI) at 36-month. In addition, the authors found that maternal sensitivity partially, but significantly, mediated psychosocial risk and cognitive development, suggesting that the association between the environmental conditions and preschooler’s cognitive development is partially explained by the environment’s effect on maternal sensitivity (Lemelin et al., 2006). Similarly, other studies show the importance of parenting quality and cognitive development. Wacharasin, Barnard, and Spieker (2003) examined maternal factors that influence toddler cognitive development among low-income families. The authors found that maternal supportiveness during mother-child interaction
predicted child cognitive competence, and maternal knowledge of child development and maternal stress influenced child cognitive competence indirectly through maternal supportiveness (Wacharasin et al., 2003). A similar finding between maternal attributes and infant cognitive development was found in a study by Beckwith (1971) that combination of low maternal verbal and physical contact, and high maternal restrictiveness of exploration within the home significantly and negatively affected infant intelligence score.

Parenting quality including maternal sensitivity is also shown to mediate the relationship between risk factors and infant cognitive development. For example, Van Bakel and Riksen-Walraven (2002) tested the Belsky’s (1984) process model of the determinants of parenting among 129 families with 15-month-old infants. The authors found that quality of parental behavior mediated the association between parental ego-resiliency and education, partner support and infant social fearfulness, and infant attachment security and cognitive development (Van Bakel & Riksen-Walraven, 2002). Similarly, Burchinal, Vernon-Feagans, Cox et al. (2008) found that the negative association between the severity of exposure to social risk and infant cognitive development was mediated by parenting behaviors.

Studies have also examined the linkage between parenting quality and infant cognitive development among premature infants. Using a sample of 152 two-year-old children who were born very preterm and their parents, Treyvaud et al. (2009) found that after controlling for social risk, parenting behaviors (positive affect, sensitivity) and parent-child synchrony were significantly related to optimal cognitive development and greater socio-emotional competence. Similarly, in a study by Magill-Evans, Harrison, and Burke (1999), it was found that 12-month maternal interaction was predictive of 18-month toddler cognitive score regardless of their birth status (i.e., full-term vs. preterm). Cohen and Beckwith (1979) also found an association between
parent-infant interaction during year one (1, 3, and 8 months) and cognitive development at age 2. In another study by Beckwith and Rodning (1996), it was found that maternal responsiveness (i.e., dyadic verbal reciprocity) was positively associated with children’s language ability at age 3.

The importance of consistent maternal caregiving behavior is reflected in a study by Cohen, Parmelee, Sigman, and Beckwith (1982) who examined development among preterm infants from birth to 5 years. At 5 years, some children had average cognitive development despite their medical complications; the authors found that sick infants who received consistent good caregiving performed well on cognitive assessment, which suggested the beneficial effect of consistent maternal caregiving on infant cognitive development. Beckwith and Cohen (1989) found a similar finding between consistent maternal responsive caregiving and cognitive development among 12-year-old children who were born preterm.

Maternal sensitivity may be especially important for premature infants with high medical risk. Smith et al. (1996) found that maternal sensitivity, specifically the mothers’ use of strategies to maintain infants’ attention, was significantly and positively related to preterm and full-term infants’ cognitive, language, and daily living skills at 6 months. Moreover, this association was stronger for preterm infants compared to full-term infants, and among the preterm infants, the association was stronger for high-risk preterm infants (based on medical complications) compared to low-risk preterm infants (Smith et al., 1996). Similar finding was observed in Landry, Smith, Miller-Loncar, and Swank’s (1997) study that sensitive parenting behaviors predicted greater increase and faster rates of cognitive-language and social development among full-term and very low birth-weight children between 6 and 40 months; this
association was stronger for very low birth-weight children with high medical risk compared to full-term and very low birth-weight children with low medical risk.

Above studies underscore the significant contribution of maternal sensitivity on infant cognitive development. Moreover, studies with premature infants (e.g., Landry et al., 1997; Smith et al., 1996) show the importance of parenting quality on infant cognitive development among premature infants who at higher medical risk.

Infant medical risk. The transactional model emphasizes that infants are active participants in shaping their development (Sameroff & Suomi, 1996). Accordingly, studies have been conducted on examining the contribution of infant characteristics on the development of attachment. Although a premature birth itself is not a determining factor of insecure attachment, a greater biological risk, which is associated with VLBW infants, is found to negatively affect the development of secure attachment (Boyce et al., 2008; Wolke, 1998). The importance of examining attachment and parent-infant relationship in the context of infant medical risk status is underscored by several studies. In a sample of premature infants, Plunkett and Meisels (1989) found that secure attachment was associated with enthusiasm in mastering tasks in a teaching context with a maternal support, and with positive affect toward their mothers regardless of risk status. Security of attachment, however, was not associated with children’s function during a task without a maternal support; instead, children’s function was associated with the health risk status at birth (Plunkett & Meisels, 1989). The children who were high-risk at birth were more likely to be disorganized, poorly focused or passive during the task compared to the low-risk group (Plunkett & Meisels, 1989). Plunkett and Meisels (1989) suggested that secure attachment might lessen the possible vulnerability in resiliency to stress among the high-risk premature infants; however, when they face a challenge without a support (e.g., completing a task without maternal
support), their vulnerability emerges. In Poehlmann and Fiese’s (2001) study, the quality of parent-infant interaction was found to mediate the relation between neonatal risk and cognitive development. Poehlmann and Fiese (2001) found that poor mother-infant interaction predicted lower cognitive score, and high neonatal risk predicted poor mother-infant interaction at 6-month and lower cognitive score at 12-month. Importantly, however, Poehlmann and Fiese (2001) found that the link between neonatal risk and cognitive development was mediated by parent-infant interaction, which showed that the infants who experienced positive relationships with their mothers had better cognitive outcomes regardless of neonatal risk compared to the infants who did not experience positive relationships with their mothers. In addition, Poehlmann and Fiese (2001) found no moderating effect of socio-demographic factors on the association between neonatal risk and cognitive outcome, which suggested that proximal variables (e.g., parent-infant relationship) might be more important factors for cognitive developmental outcomes compared to distal variables (e.g., socio-demographic factors).

Above studies emphasize the importance of considering the level of infant medical risk when studying premature infants. As discussed earlier, premature birth itself puts infant at-risk in developmental delay particularly because premature infants are born when their brains are undergoing a rapid development; between 28-week gestation and term, up to 70% of the neurons in the human cortex undergo apoptosis, and the volume of cortical gray matter increases four-fold from the 30- to 40-week gestation (Westrup, 2007). Poehlmann et al., (2010) examined the effects of infant (neonatal health), family (socio-demographic), and maternal (depressive symptom and anger expressions during play interaction) risk factors on children’s effortful control. The development of effortful control might be particularly at risk for children born preterm because it is related to the development in prefrontal cortex and anterior cingulate cortex
(Poehlmann et al., 2010). Prefrontal cortex develops rapidly in late gestation, and maturation of tissue is incomplete in preterm infants (Poehlmann et al., 2010). Children’s effortful control was measured at 24- and 36-month using a behavioral battery. Poehlmann et al. (2010) found that the effortful control skills improved significantly, and showed an association between 24 and 36 months regardless of birth weight; however, higher neonatal health risks and higher socioeconomic risks were associated with less optimal effortful control at 24-month.

Additionally, it was found that effortful control was associated with concurrent attention problems and early symptoms of attention deficit hyperactivity disorder (ADHD) (Poehlmann et al., 2010). Similarly, Clark, Woodward, Horwood, and Moor (2008) found that between 2-4 years, preterm children showed improvements in emotional and behavioral regulations, but cerebral white matter abnormalities were associated with poorer outcomes. Above results underscore the vulnerability of children born preterm especially for those with high neonatal health risks in facing less optimal cognitive and socio-emotional outcomes compared to children who were born full-term or born preterm without major health risks.

High neonatal health risks affect the trajectory of cognitive development among premature infants. Several studies examined the longitudinal neurodevelopmental and cognitive outcomes of premature infants. Taylor, Minich, Klein, and Hack (2004) examined neuropsychological outcomes (i.e., IQ, language, perceptual-motor skills, memory, attention and executive function) of 7- to 14-year-old children who were born prematurely, and it was found that children with less than 750g at birth had significantly lower scores on all outcomes compared to children who were born full-term. The results showed a possible “catch-up” growth among children born prematurely, but it was mostly among children who were born 750-1499g at birth (Taylor et al., 2004). The impact of low birth weight in interrupting “catch-up” was also
found in Liaw and Brooks-Gunn’s (1993) study, which examined the patterns of low birth weight children’s cognitive development over three years, measured at 12-, 24-, and 36-month. Cognitive development was measured using the MDI at 12- and 24-month, and by the Stanford-Binet Scale at 36-month. Liaw and Brooks-Gunn (1993) found five patterns of cognitive development including high stable (above average scores over the three years), high decline to average (above average declining to average), high decline to below average (above average declining to below average), average decline to below average (average declining to below average), and very low stable (below average over the three years). Liaw and Brooks-Gunn (1993) noted that children who were in the very low stable group was associated with severe illnesses at birth, and had birth weights less than or equal to 1500g, suggesting a link between biological vulnerability at birth and cognitive performance over the long term. In addition, the authors found that the patterns of cognitive development were associated with maternal characteristics (mother’s cognitive ability, home environment), neonatal health status, and participation in the early intervention (Infant Health Development Program; IHDP) (Liaw & Brooks-Gunn, 1993). Specifically, the high stable and high decline to average children were from advantaged socioeconomic environments, had fewer neonatal health problems, and participated in IHDP (Liaw & Brooks-Gunn, 1993). The difference between the high stable and high decline to average children was that the high stable children were more likely to have mothers with higher education and were White, which might be attributed to the relatively more disadvantaged background of Black children compared to White children in this sample (Liaw & Brooks-Gunn, 1993). In addition, Liaw and Brooks-Gunn (1993) found that the declining to below average patterns were associated with disadvantages in more than one dimension, which implied a negative relationship between cognitive development and cumulative risk factors.
An examination of the linkage between infant medical risk, and infant cognitive and socio-emotional development is necessary given that premature birth puts infants vulnerable for developmental delay by affecting their biological structures. Studies also suggest the importance of an additional consideration of environmental factor when examining premature infants’ cognitive and socio-emotional development, which is discussed next.

**Socio-demographic factors.** Considering the effects of socio-demographic factors might be particularly important for the study of premature infants because low socioeconomic resources, low maternal education, and maternal depression are more prevalent in this group compared to the families with full-term infants (Clark et al., 2008). In the present study, socio-demographic factors are defined as broad index of the structure of quality of environment (e.g., socioeconomic status) and the structure of family life (e.g., maternal marital status, partner involvement, family size). Although above factors are correlated, it is important to examine both types of measures because of their conceptual distinction (Duncan & Magnuson, 2005).

A number of studies have examined the association between socio-demographic factors and premature infants’ development. Bradley et al., (1994) examined premature infants’ resiliency (i.e., cognitive competence, behavioral competence, health status, growth status at 3-year) in relation to their caregiving experiences (i.e., density, safe play area, acceptance, learning materials, variety, responsivity) among families living in poverty. Bradley et al. (1994) found that among the 243 infants sampled, only 26 (12%) of them were found to be resilient. As expected, highly resilient children had significantly more protective caregiving factors at both 12- and 36-month (Bradley et al., 1994). It was found that at 12-month, children with 3 or more protective factors were almost 9 times more likely to be resilient than those with less than 3 protective factors, and at 36-month, having 3 or more protective factors was related to almost 3
times likelihood of being resilient (Bradley et al., 1994). Among the six protective factors, four factors were especially related to resiliency at both 12- and 36-month including low density, high levels of acceptance, learning materials and variety, which suggested that presence of stimulation, emotional support, structure and safety were important caregiving mechanisms that lead children to be resilient in the face of poverty and premature birth (Bradley et al., 1994). In a sample of predominantly low-income African mothers and their premature infants, Candelaria, O’Connell, and Teti (2006) examined the association of cumulative psychosocial and medical risks with infant development and parenting stress at 4-month. It was found that the cumulative psychosocial and medical risks independently predicted the early mental development of premature infants (Candelaria et al., 2006). Motor development was predicted only by the cumulative medical risk, suggesting that medical risks are likely to have more influence on motor development at 4-month compared to psychosocial risks (Candelaria et al., 2006). In addition, only the cumulative psychosocial risk was negatively associated with parenting stress; Candelaria et al. (2006) suggested that particularly for this sample of low-income population, premature births might have been more prevalent and “common” that the associated infant medical risks might have been less recognized as actual risks to impact parenting stress.

Poehlmann et al. (2010), and Liaw and Brooks-Gunn (1993) found that among multiple risk factors, socioeconomic risk was an important variable that negatively influenced premature infants’ cognitive and socio-emotional outcomes. Socio-demographic factors including socioeconomic risk, marital status, partner involvement, and family size have been studied as predictors of infants’ cognitive and socio-emotional outcomes.

*Socioeconomic risk.* Socioeconomic risk affects the availability of material resources to promote infant’s development. Studies show that less home-based cognitive stimulation is
associated with lower cognitive score (McLoyd, 1998). Additionally, socioeconomic risk is associated with chaos in the home, which is associated with lower cognitive ability (Petrill, Pike, Price, & Plomin, 2004). In a study by Duncan, Brooks-Gunn, and Klebanov (1994) using the Infant Health and Development Program (IHDP) data, it was found that family income and poverty status significantly predicted IQ and behavior problems at 5-year after accounting for other SES variables such as maternal education, family structure, and ethnicity. Similarly, Ryan, Kalil, and Leininger (2009) found that in a sample of low-income mothers, the availability of private safety nets (i.e., material and instrumental support) was negatively associated with children’s behavior problems, and was positively associated with children’s prosocial behavior at 2-, 3-, and 5-year.

Another important component of socioeconomic risk factor that affects infants’ cognitive and socio-emotional development is parental educational level. As discussed above, Liaw and Brooks-Gunn (1993) found associations between patterns of cognitive development and maternal characteristics including mother’s cognitive ability and home environment. Importantly, infants whose cognitive development were highly stable over three years were more likely to have mothers with higher education compared to infants whose cognitive development showed high decline to average level. Similarly, Wang, Wang, and Huang (2008) found that VLBW infants who had neurological abnormality or low maternal education had a higher risk of displaying delayed cognitive development over two years compared to those without these two risk factors who were more likely to display average-stable cognitive development. In addition, the authors found that the infants with both risk factors had 3- to 11-fold higher risk of displaying delayed cognitive development overtime (i.e., borderline delay-decline to significant delay, significant delay-stable) rather than more favorable trajectory (i.e., average-decline to borderline delay,
borderline delay-catch-up to average) (Wang et al., 2008). Other studies (e.g., Bacharach & Baumeister, 1998; Roberts, Bornstein, Slater, & Barrett, 1999; Siegel et al., 1982) also found that maternal IQ and parental education level were significantly associated with cognitive development among premature infants. Lowe, Erickson, and MacLean (2010) examined the predictors of cognitive outcome (MDI) among the toddlers born VLBW and toddlers born full-term. It was found that the cognitive outcome of toddlers born VLBW was predicted by days on ventilation, maternal education, and C-CARES Child Play scales (sensitivity, affect, communication); interestingly, the cognitive outcome of toddlers born full-term was only predicted by C-CARES Maternal Communication scale, which may suggest a larger impact of socioeconomic risk factors on premature infants’ cognitive development compared to full-term infants (Lowe, Erickson, & MacLean, 2010).

**Marital status and partner involvement.** As discussed earlier, studies (e.g., Belsky & Fearon, 2008; Das Eiden et al., 1995; Isabella, 1994; Lamb et al., 2002) show that social support affects maternal sensitivity, which in turn affects premature infants’ cognitive and socio-emotional development. One of the important social supports for a mother is her partner who may provide a direct (i.e., financial resources) and/or an indirect (e.g., provision of emotional support to the mother) support (Barnett, 2008). Importantly, stability is an important factor in how partners influence mothers and their children. Studies found that maternal relationship instability is associated with negative child socio-emotional outcomes (Barnett, 2008). For example, Duncan et al. (1994) found that persistent, never-married mother or change in structure that leads to mother-headed single parent home negatively impacts children’s behavior problems. Relatedly, Easterbrooks and Goldberg (1984) found that the extent of father involvement particularly the qualitative aspects (attitudes, behavioral sensitivity) compared to the quantitative
aspects (amount of time father spend with his child) were associated with toddlers’ security of attachment to their fathers and mothers at 20-month. Specifically, it was found that high father involvement was significantly associated with secure attachment (Easterbrooks & Goldberg, 1984). In addition, Easterbrooks and Goldberg (1984) found a stronger association between father involvement and children’s problem-solving behavior compared to involvement and attachment, which suggested a stronger influence of father involvement on children’s performance in socio-cognitive task more than socio-emotional development.

As found in Easterbrooks and Goldberg’s (1984) study, in addition to socio-emotional development, father involvement has also been found to influence children’s cognitive development. Using the IHDP data, Yogman, Kindlon, and Earls (1995) examined the effects of father involvement on intellectual and behavioral outcome of low-birth weight premature infants at 3-year. Interestingly, the authors found a differential effect by ethnic group (white/other, black, Hispanic) that only among black ethnic group, higher father involvement was associated with higher cognitive outcome (i.e., higher mean IQ) controlling for family income, neonatal health, intervention status, and paternal age (Yogman et al., 1995). In a study by Bronte-Tinkew, Carrano, Horowitz, and Kinukawa (2008), it was found that father involvement including cognitively stimulating activities, warmth, physical care, and caregiving activities were associated with lower likelihood of negative cognitive outcomes (babbling and exploring objects with a purpose at 9-month). This association was stronger for infants with special needs such as failure to thrive and a heart defect, which suggests higher importance of father involvement in protecting cognitive development for infants with special needs. Studies show that father involvement has a long-term positive influence on children’s cognitive development up to age 10 (Ment et al., 2003; Pougnet, Serbin, Stack, & Schwartzman, 2011).
Number of children at home. Another important socio-demographic factor that impacts infant cognitive and socio-emotional development is number of children at home. Two prominent models that explain the association between family/sibship size and infant development are the confluence model and the resource dilution model. The confluence model shows the negative effect of larger family size; as more children are added to the family, the average absolute intellectual level in the family decreases because the total family intellectual level is divided by the number of family members (Markus & Zajonc, 1977; Zajonc, 1976; Zajonc & Markus, 1975). Another model, the resource dilution model explains that as number of children in the family increases, the proportion of parental resource that could be designated to each child decreases because there is finite amount of parental resource (Blake, 1981, Downey, 1995). Although there are debates against the above two models (e.g., Guo & VanWey, 1999; Lawson & Mace, 2010; Peterson, 2000; Rothenberg, 1970; Velandia, Grandon, & Page, 1978), studies show the negative effects of large family size. For example, Downey (1995), using a sample of 24,599 eighth graders from the 1988 National Education Longitudinal Study, found that interpersonal resources (e.g., parental involvement, parental expectations) and economic resources decreases as sibship size increases. In addition, it was found that interpersonal and economic resources mediate the association between sibship size and children’s educational outcomes, which shows that parental resources significantly account for the inverse relationship between sibship size and child educational outcome (Downey, 1995). Similar findings on intellectual development were found among samples of 6- to 11-year-old children (Svanum & Bringle, 1980), and 6th grades (Lancer & Rim, 1984). Mackner, Black, and Starr (2003) found that among low-income infants with normal growth and a history of failure to thrive (FTT), children in better quality home environments and smaller families had higher cognitive scores.
Similarly, using a sample of 8144 newborns and comparing white and Hispanic infant’s health and cognitive development, Fuller et al. (2010) found that despite the small or insignificant difference in birth outcomes between white and Hispanic infants, low maternal education, weaker cognitive facilitation, and larger family size suppressed the cognitive development among Hispanic infants.

Given the above findings linking socio-demographic factors to young children’s cognitive and socio-emotional development, further examination of this link is essential considering the high prevalence of premature birth among families living in unfavorable socio-demographic environment (Messer et al., 2008; O’Campo et al., 2007) as well as African American population compared to other race/ethnicity (March of Dimes, 2007). The present study will examine the effects of four major socio-demographic factors including socioeconomic risk, maternal marital status, father involvement, and number of children at home on premature infants’ cognitive and socio-emotional developments.

**Parental states of mind regarding attachment.** In addition to socio-demographic factors, another distal variable that is likely to influence premature infants’ development is parental states of mind regarding attachment. Parental states of mind regarding attachment has been examined as an important parent-related predictor of infant attachment security, in addition to parental sensitivity, and as a predictor of child cognitive development (e.g., Pederson, Gleason, Moran, & Bento, 1998; Steele, Steele, & Johansson, 2002; von der Lippe, Eiltertsen, Hartmann, & Killèn, 2010) A widely used measure of parental representation of attachment is the Adult Attachment Interview (AAI; George, Kaplan, & Main, 1985). The AAI is a semi-structured interview in which the person is asked to recollect attachment-related memories from early childhood, and evaluate them from the current perspective. Based on the person’s coherence in
describing the attachment-related memories, the person is classified as secure-autonomous, insecure-dismissing or insecure-preoccupied. The person may also be classified as unresolved/disorganized with respect to traumatic experiences of loss or abuse. An autonomous person presents his/her attachment-related memories in a clear, coherent manner (Hesse, 1999). Even if the individual seemed to have had a difficult background, he/she could be considered as autonomous when the discussions and evaluations of the memories are coherent. A person is classified as dismissing when he/she describes memories in a highly positive manner, but are unsupported or contradicted later in the interview (Hesse, 1999). A person with preoccupied classification presents his/her memory in a confused or angry manner as though the recollected memory is happening in the current moment (Hesse, 1999). A person receives an additional unresolved/disorganized classification when he/she indicates a lack of resolution of trauma, which is apparent by the lapses in discourse during the AAI (Hesse, 1999). The AAI has established reliability and discriminant validity (Bakermans-Kranenburg & van IJzendoorn, 1993; Main, 1996; see review by Ravitz, Maunder, Hunter, Sthankiya, Lancee, 2010; van IJzendoorn, Kranenburg, Zwart-Woudstra, van Busschbach, & Lambermon, 1991).

The AAI was developed with an aim to differentiate attachment representations of parents among children with different Strange Situation classifications (van IJzendoorn, 1995). Attachment theory suggests that the parental past attachment experiences affect their current internal working model of attachment relationships (Main, Kaplan, & Cassidy, 1985). Accordingly, the hypothesis for AAI-Strange Situation linkage was that the parental past and current representations of attachment experiences affect the degree of sensitivity and responsiveness to the infant (van IJzendoorn, 1995). Autonomous parents were expected to respond appropriately to the infant’s signals; dismissing parents were hypothesized to reject the
infant’s signals because it triggers their own negative attachment experiences, which in turn leads to avoidant infant attachment; preoccupied parents were hypothesized to be unable to attend to the infant’s signals due to the preoccupation with their own attachment memories, which in turn leads to resistant/ambivalent infant attachment (van IJzendoorn, 1995). In addition, parents with unresolved classification and their related frightened/frightening parental behaviors were hypothesized to be linked with disorganized infant attachment (van IJzendoorn, 1995). As expected, the meta-analysis by van IJzendoorn (1995) on the predictive validity of the AAI found 74% AAI-Strange Situation classification correspondence in secure-insecure split, and 63% correspondence when the four-way classification was considered. Importantly, the linkage between AAI-Strange Situation classifications was found in studies that assessed maternal AAI during pregnancy and infant security of attachment (e.g., Fonagy, Steele, & Steele, 1991; Hautamäki, Hautamäki, Neuvonen, & Maliniemi-Piispanen, 2010; Steele, Steele, & Fonagy, 1996;).

Although a high correspondence was found between the AAI-Strange Situation classifications, the expectation that parental sensitivity mediates the link between parental attachment representation and infant attachment was not strongly supported. van IJzendoorn (1995) found that the parent’s attachment representation explains about 12% of the variance in their sensitive responsiveness, suggesting that the mechanism of influence from parental attachment representation to infant attachment security is largely explained by factors other than parental sensitive responsiveness. This “transmission gap” between parental attachment representation and infant attachment continues to be examined in order to understand the factors that may influence the parental sensitive responsiveness, and/or other factors unrelated to sensitivity that could influence the parents’ attachment representation and infant attachment.
There have been few studies on the linkage between maternal attachment representation and infant attachment among premature infants. In a study by Brisch et al. (2005), no significant association between maternal state of mind regarding attachment and infant-mother attachment at 14-month was found in a sample of VLBW preterm infants. Brisch et al., (2005), however, found that neurologically impaired infants were more likely to be insecurity attached than securely attached, which may indicate the overwhelming effect of infant neurological impairment over maternal sensitivity for premature infants in developing secure attachment, or non-autonomous/insecure mothers’ resistance to extreme traumatic experiences (e.g., premature birth), which leads to disruption on the development of secure infant-mother attachment.

Coppola, Cassibba, and Costantini (2007) studied the effects of maternal attachment representation (AAI), traumatic reaction to premature birth, and infant medical risk on maternal sensitivity. The authors found that traumatic reaction was associated with lower sensitivity only among insecure mothers (Coppola et al., 2007). In addition, secure mothers of premature infants showed more sensitivity compared to secure mothers of full-term infants, but insecure mothers of premature infants showed less sensitivity compared to insecure mothers of premature infants (Coppola et al., 2007). These findings indicate higher vulnerability among insecure mothers in providing less optimal sensitivity compared to secure mothers especially when combined with a premature birth.

In addition to infant medical risk and socio-demographic variables, the present study will examine the intervening role of maternal sensitivity on the linkages between AAI and infant socio-emotional outcomes including infant-mother attachment.

**Intervening in premature infants’ cognitive and socio-emotional development**
The importance of intervening in premature infants’ socio-emotional and cognitive development is underscored by its beneficial impact on long-term developmental outcomes. Some interventions begin as early as during the infants’ stay in NICUs such as NIDCAP. Other in-NICU interventions include infant tactile stimulation/ infant massage, which was developed based on the premise that premature infants’ early negative experiences including non-normative tactile experiences (medical caregiving) and inadequate in-utero haptic experiences affect structural and functional organization of cortex in an infant’s brain (Weiss, 2005). Intervention studies on infant tactile stimulation/ infant massage has been shown to promote cognitive development (Procianoy, Mendes, & Silveira, 2010); better infant-mother interaction (Ferber et al., 2005); better parenting behaviors (Feldman, Weller, Sirota, & Eidelman, 2003); and secure attachment among relatively healthy, low-risk premature infants (Weiss, Wilson, Hertenstein, & Campos, 2000).

Based on the findings on the effects of early caregiving and parent-infant relationship on premature infants’ cognitive and socio-emotional development, various interventions were developed that included multiple components and targeted to promote parenting behavior, which in turn was expected to enhance parent-infant relationship and premature infants’ development. Some of these interventions were attachment oriented-psychotherapeutic intervention (Brisch, Bechinger, Betzler, & Heinemann, 2003), Mother-Infant Transaction Program (MITP) (Achenbach, Howell, Aoki, & Rauh, 1993), and IHDP (Brooks-Gunn, McCarton, Casey, McCormick et al., 1994). Above interventions showed effectiveness in buffering neurologically impaired premature infants from forming insecure attachment (Brisch et al., 2003); enhancing maternal self-confidence and satisfaction (Achenbach et al., 1993); and promoting long-term cognitive and achievement outcomes (Achenbach et al., 1993; Brooks-Gunn et al., 1994).
Importantly, Achenbach et al. (1993) found differential effect of intervention on cognitive and academic achievement by families’ SES status, and Brooks-Gunn et al. (1994) found differential effect of intervention on cognitive development by infants’ birth weight that underscore the ways in which premature infants’ socio-emotional and cognitive development are affected by multiple factors including parenting behavior, socio-demographic variables, and infant medical status. The present study uses data from an intervention program with multiple components, and will consider the influence of intervention on premature infants’ socio-emotional and cognitive developmental trajectories in addition to the three predictor domains (i.e., parenting quality and maternal states of mind regarding attachment, infant medical risk, socio-demographic factors) presented earlier.

**The present study**

The present study focuses on premature infants’ cognitive development, social-emotional competencies and behavioral problems, and infant-mother attachment security. The importance of examining above factors is reflected in their long-term influence on development. Early cognitive and socio-emotional development are important indicators for later academic achievement; they contribute to the development of school-age self-regulation and executive functioning skills including the ability to develop problem-solving strategies, to be flexible in modifying these strategies based on feedback, to inhibit inappropriate behaviors, and apply these strategies in a variety of situations (Landry & Smith, 2010). Executive functioning skills, in turn, are associated with academic achievement (Best, Miller, & Naglieri, 2011).

In addition to cognitive development, studies have examined the longitudinal effects of positive socio-emotional development, especially attachment security. Based on attachment theory (Bowlby 1969/1982), infant-parent attachment contributes to the development of an
internal working model, which organizes a person’s emotional and behavioral responses (Bretherton, 2005; Grossman & Grossman, 1991; Sroufe & Waters, 1977; Waters & Cummings, 2000). Internal working models are reflected in the quality of an infant’s secure base behavior, which is an infant’s ability to use the mother as a base of exploration and as a haven of safety when in distress (Ainsworth, et al., 1978; Bowlby 1969/1982, 1988). Evolutionarily, exploration promotes social competency by allowing a person to learn his/her environment and take advantages of the opportunities (Cassidy, 1999). Sroufe (2005), in his longitudinal study, found that children with a history of secure attachments were more socially competent during preschool, middle childhood, and adolescence (also see review by Ranson & Urichuk, 2008).

Considering the long-term developmental influence on socio-emotional and cognitive development, the present study aims to examine their predictors for premature infants at 12- and 24-month. Additionally, the present study will examine the association between the infants’ 12- and 24-month socio-emotional and cognitive development. The present sample includes premature infants of predominantly low-income African American mothers who participated in a randomized home visitation intervention program. The home visitation program was implemented in both the intervention and control groups. The intervention group, however, was the only group that received the intervention aimed at promoting infant development and the infant-parent relationship. The families in the present sample possess at-risk characteristics in the three predictor domains described above including parenting quality/ parental sensitivity and parents’ state of mind regarding attachment, infant medical risk, and socio-demographic factors. No study to date has examined predictive pathways from multiple predictors at birth to 12- and 24-month outcomes in two separate domains of development (i.e., cognitive and socio-emotional) among premature infants, and the systematic linkage between cognitive and socio-
emotional development across time (i.e., 12- and 24-month). The findings of present study, therefore, have the potential to inform the field about factors that should be targeted in early interventions among at-risk premature infants to promote their long-term socio-emotional and cognitive development. In addition, the present study contributes to the current knowledge on the relationship between attachment and long-term socio-emotional and cognitive outcomes among at-risk premature infants. Importantly, the present study uses a naturalistic observation rather than a structured observation in assessing maternal sensitivity and infant attachment security, which might provide more sensitivity in detecting the associations examined in the current study. Additionally, the present study examines the influence of maternal attachment representation as an indirect predictor of premature infant’s socio-emotional and cognitive outcomes.

Based on available literatures and theories, six research questions are proposed:

(a) What is the link between maternal sensitivity and premature infants’ 12- and 24-month socio-emotional and cognitive outcomes? It is proposed that higher maternal sensitivity will predict better cognitive and socio-emotional outcomes.

(b) What is the link between infant medical status at birth and premature infants’ 12- and 24-month socio-emotional and cognitive outcomes? It is proposed that higher medical risk will be associated with negative socio-emotional and cognitive outcomes.

(c) What is the link between socio-demographic factors and premature infants’ 12- and 24-month socio-emotional and cognitive outcomes? It is proposed that higher socioeconomic risk, low father involvement, and more children at home will be associated with negative socio-emotional and cognitive outcomes.

(d) What is the link between cognitive and socio-emotional development across time when the infants are 12- and 24-month old? Based on previous studies (e.g., Liaw &
Brooks-Gunn, 1993; Wang et al., 2008), development across time is influenced by multiple factors such as socio-demographic, infant medical risk, and parenting; thus directional hypotheses are withheld.

(e) What is the path of influence from the predictors, 12-month outcomes to 24-month outcomes? Does maternal sensitivity intervene in the links between maternal attachment representation, infant medical risk at birth and socio-demographic factors, and infant 12- and 24-month socio-emotional and cognitive outcomes? Based on available literatures and theories, it is proposed that autonomous maternal attachment representation, lower infant medical risks and lower socio-demographic risks will be associated with higher sensitivity, which would lead to better infant outcomes. Additionally, it is hypothesized that maternal sensitivity will be an intervening factor between the predictors and infant attachment outcome. For cognitive development, behavior problems, and socio-emotional competency outcomes, it is equally plausible to have maternal sensitivity as an intervening variable or not; therefore, no specific hypotheses are proposed.

(f) What are the relative strength of associations between maternal attachment representations, infant medical risk at birth and socio-demographic risk, and maternal sensitivity? Based on Belsky’s (1984) model of parenting, which proposes parental psychological resource (maternal attachment representation) as the strongest variable that affects parenting compared to child characteristic (infant medical risk), and material resources and support (socio-demographic risk), it is hypothesized that maternal attachment representation will be most strongly associated with maternal sensitivity compared to infant medical risk at birth and socio-demographic risk.
Chapter 2:

Methods

Participants

Participants were 173 low-income, African-American families that participated in a 20-week, eight-session early intervention study, which was designed to promote development and parent-infant relationship of preterm infants (< 37 weeks gestational age at birth). In the present sample, 104 infants (60%) were very premature (< 32 weeks gestational age at birth) and 69 infants were premature (> 32 weeks gestational age at birth). Recruitment took place between February 2002 and December 2004 at neonatal intensive care units (NICUs) of four hospitals in the Baltimore/Washington, DC area. Mothers were recruited when their infants were at least 32 weeks post conceptual age (PCA) to ensure their medical stability and viability. Mothers were excluded from recruitment if they were less than 18-year-old, had drug problems, and/or if their infants had diagnosable chromosomal abnormalities. The Internal Review Boards of four participating hospitals and the academic institution in which the investigators affiliated approved this study.

194 families were initially recruited. Within 48 hours after the recruitment, families were randomly assigned to either the intervention (N=98) or control (N=96) group using urn randomization (Stout et al., 1994). This randomization procedure promoted a between-groups balance of seven variables: maternal education (did not complete high school vs. high school graduate), parity (primiparous vs. multiparous), relationship status (presence vs. absence of partner), yearly family income (< $30,000 vs. ≥ $30,000), infant gestational age at birth (32-36 weeks GA vs. < 32 weeks GA), small-for-date status (presence vs. absence), and infant gender. One-way analysis of variance and chi-square analysis indicated intervention mothers were more
likely to be on public assistance \( t(171) = .98, p < .05 \). No difference was found between the intervention and control mothers on all other infant medical and socio-demographic variables (see Table 1).

Of the 194 families, 21 families dropped out of the study prior to the pre-intervention assessments, leaving 173 families with the pre-intervention data, which is the sample of present study. Of the 173 families, 138 (79%) families remained in the study at post-intervention (approximately 4 months of infant age, corrected for prematurity) including 65 of 83 (78%) in the intervention group, and 73 of 90 (81%) in the control group. At 12 months, 132 families remained in the study at post-intervention including 64 of 83 (77%) in the intervention group, and 68 of 90 (76%) in the control group. At 24 months, 104 families remained in the study at post-intervention including 50 of 83 (60%) in the intervention group, and 54 of 90 (60%) in the control group. Attrition analyses (analysis of variance and chi-square) indicated that at post-intervention, families who dropped out of the study were more likely to be on public assistance \( \chi^2(1) = 4.91, p < .05 \); at 12 months, families who dropped out of the study were more likely to have infants who had longer length of stay in NICU \( t(166) = -1.22, p < .01 \); and at 24 months, mothers who dropped out of the study were more likely to be younger \( t(170) = 3.21, p < .05 \). No difference was found for other socio-demographic and infant medical variables. In the present sample \( N = 173 \), 78% of the mothers were receiving public assistance, and 51% of the mothers were living below the federally established poverty threshold.

**Procedure**

Three predictors: socio-demographic variables, infant medical status, and mother’s state of mind regarding attachment were measured at pre-intervention. These assessments took place in the hospital (infant medical status) and during a scheduled home visit 1-2 weeks following
recruitment when the infants were 32-36 weeks PCA. Another predictor, maternal sensitivity, was assessed when the infants were 54-58 weeks PCA and 94-98 weeks PCA. Infant cognitive and socio-emotional developments were assessed when the infants were 94-98 weeks PCA (12-month) and 146-150 weeks PCA (24-month). Time points of eight intervention sessions were 32-36, 34-38, 36-40, 38-42, 40-44, 44-48, 48-52, and 52-56 weeks PCA. Mothers were compensated $30 after each home visitation.

Home Visitation

The Intervention. The 20-week, eight-session intervention integrated two psychoeducational components and one parent-administered infant tactile stimulation component. The intervention began while the infants were in the NICU, and continued in the home. The theoretical basis of the intervention was derived from the transactional model of development (Sameroff & Chandler, 1975), that the intervention aimed to establish positive, reciprocal transactions between infants and their caregivers to facilitate developmental outcomes; and from attachment theory (Ainsworth, et al., 1978; Bowlby, 1969/1982), that increased parental sensitivity to infants’ cues was expected to enhance the quality of infants’ attachment.

The intervention began at 32 weeks PCA for infants born < 32 weeks GA, and between 32-36 weeks PCA for infants born after 32 weeks GA. The interventionists and the intervention coordinator were certified NBAS examiners. Each family was assigned one interventionist, and a session lasted 1-2 hours. The intervention integrated following three components:

1. Premie Talk: Understanding Your Premature Baby’s Behavior (Cusson & DeWeese, 1992). This 20-minute video was shown to parents when the infants were 32-36 weeks PCA and 34-38 weeks PCA. Each viewing was followed by a 40-minute discussion that focused on
particular behaviors, and ways to establish effective communication with preterm infants.

Parents were also encouraged to discuss general questions about their infants.

2. **NBAS demonstrations with increasing parental involvement.** At 34-38 weeks PCA, the interventionist administered the Brazelton NBAS. During the first session, the parents were observers and the interventionist discussed the administration and results of the exam, emphasizing infant capacities and areas of special need. Only selected items of the NBAS were demonstrated when the infants were < 40 weeks PCA in order to minimize discomfort and stress. Parents were guided to attend to the infant’s current and ongoing state and behavioral changes, with discussion about their reflection on infant capabilities. The NBAS was repeated at each of six succeeding sessions, and the parents were encouraged to administer on their own, with guidance from the interventionist, to complete the exam by 44-48 weeks.

3. **Infant massage.** Massage therapy was introduced at 36-40 weeks PCA and at succeeding five intervention sessions, with NBAS administration following massage. At 36-40 weeks PCA, the interventionist demonstrated infant massage techniques based on methods outlined by Field et al. (1986, 1987), and gave the parents a copy of the protocol. At each session, the interventionist and parents reviewed and practiced the massage protocol with the infant. Parents were encouraged to perform the 10-15 minute massage with their infants 2-3 times a day following their infants’ hospital discharge, and to keep a daily record of the frequency of massage.

**Control group.** A “controlling-for-attention” control group was used in this study. For this group, the interventionist met with the mother at the same time points and for the same duration of time as the intervention mothers. During these visits, the interventionist discussed
infant development, and responded to any question the mother had about her infant, but did not administer the intervention components.

Measures

Predictor variables

Socio-demographic variables. Socio-demographic information was obtained from the mothers after the informed consent. The present study used socio-demographic information including socioeconomic risk index, marital status, partner’s involvement in the baby’s life, partner’s residence status with the mother, and number of children at home (see Table 2 for the descriptive statistics). A composite, summary measure of socioeconomic risk was derived for each mother by dichotomizing the information on income (< $20,000), education (< high school completed), and receipt of state/ federal assistance. The composite measure was termed “socioeconomic risk index,” and the score ranged from 0 to 3 with 3 indicating higher risk. Marital status was dummy coded as 1 = single/not living with partner, and 2 = married/living with partner. Partner’s involvement in baby’s life was dummy coded as 0 = no/not involved, and 1 = yes/involved. Partner’s residence status with the mother was dummy coded as 0 = no/not living home with the participant, and 1 = yes/living home with the participant. Number of children at home was calculated from summing the number of children at home who are offspring, and the number of other children at home.

Infant medical variables. Infant medical information was obtained from hospital records, and when the infants were 32-36 weeks PCA prior to the onset of intervention. The present study used infant medical information on infants’ length of stay in NICU, birth weight, gestational age (GA) at birth, Apgar scores at 1 and 5 minutes (see Appendix A), and nursery neurobiologic risk score (NBRS; Brazy et al., 1991) (see Appendix B) (see Table 2 for the descriptive statistics).
The NBRS is composed of 13 items (e.g., 1- and 5-minute Apgar scores, duration of assisted ventilation, intraventricular hemorrhage). Each of the 13 items is scored on a 0-to-4 scale (total score range of 0-to-52) with a higher score indicating higher risk. The NBRS is a widely used measure of health status with White and African-American premature infants, and it has been found to correlate with the standard pediatric neurological exams throughout the first two years of life ($r = .59$ to $.73$) (Brazy et al., 1991). The NBRS has also been found to predict intellectual and motor development through age 4 (Brazy et al., 1991, 1993; Thompson et al., 1994, 1997).

**Maternal sensitivity.** Maternal sensitivity was measured using the Maternal Behavior Q-Sort (MBQ; Pederson & Moran, 1995) when the infants were 4- and 12-month old (see Appendix C). The MBQ consists of 90 behaviorally descriptive items on maternal responsive behavior and sensitivity to infants’ cues. The MBQ significantly correlates with attachment scores and the Ainsworth’s maternal sensitivity rating scales (Pederson et al., 1990). Based on the 45- to 75-minute home observation of mothers and infants in daily routines, the 90 items are divided into three piles: most characteristic, least characteristic, and neutral. Individual scores are correlated with criterion scores that describe an optimally sensitive mother. Higher correlations indicate higher maternal sensitivity. The MBQ correlational coefficients were transformed to $Z$-scores (Fisher’s $r$-to-$Z$ procedure) for analyses, and the scores ranged from -.40 to 2.65 ($M = 1.30$, $SD = .57$), with a slightly negatively skewed distribution (skewness = -.53) at 4-month, and from .06 to 2.65 ($M = 1.46$, $SD = .47$), with a normal distribution (skewness = .07) at 12-month. The mean of 4-month and 12-month $z$-scores was calculated for mean maternal sensitivity during year one, which is used in the present analyses. The average maternal sensitivity among the present mothers was 1.38 ($SD = .46$) (see Table 2).
Four trained doctoral graduate students who were blind to intervention status observed maternal sensitivity. Based on 20% of the sample, inter-reliability intraclass correlations were .70-.91.

**Parent’s state of mind regarding attachment.** Parent’s state of mind regarding attachment was measured with the Adult Attachment Interview (AAI; George, Kaplan, & Main, 1985), which uses narratives to tap working models of attachments (see Appendix D). The scoring of AAI assigns an individual to one of four major attachment groups: autonomous (F), dismissing (D), preoccupied (E), and cannot classify (CC). A person with an autonomous classification values attachment relationships and acknowledges their influence, but shows autonomy by freely exploring thoughts and feelings during the interview (Hesse, 1999). An individual with a dismissing classification appears to suppress the influence of attachment relationship in his/her thoughts, feelings, or daily life; attachment relationships are often presented in a positive manner that is contradicted, and/or negative attachment experiences are denied (Hesse, 1999). A person with preoccupied classification appears to be highly preoccupied with particular attachment relationship or experience; he/she might show anger and/or disorientation in feelings and thoughts (Hesse, 1999). An individual may receive an additional classification: unresolved/disorganized (U), which is co-classified with autonomous, dismissing or preoccupied classification. A person with unresolved/disorganized classification shows a significant lapse in reasoning and speech during a discussion of loss or abuse (Hesse, 1999). Autonomous, dismissing, and preoccupied classifications are considered “organized” attachments whereas unresolved/disorganized is considered as a “disorganized” attachment.

Reliability of the AAI is well established (Benoit & Parker, 1994; Hesse, 1999); and construct validity is supported by meta-analysis, which found a significant concordance between
adult attachment classifications (autonomous, dismissing, preoccupied, unresolved) and corresponding infant-mother attachment classifications (secure, insecure-avoidant, insecure-ambivalent/resistant, insecure-disorganized) and between AAI classifications and maternal responsiveness (with autonomous mothers showing more responsiveness than non-autonomous mothers) (van IJzendoorn, 1995).

The interview was conducted during a separate home visit prior to the onset of intervention by trained research assistants who were blind to group assignment. The interview typically took 45-60 minutes, and total of 160 of 173 mothers’ AAI were obtained in the study. The AAI were audiorecorded, and were coded by two trained coders, each certified in the AAI classification system by Mary Main and Erik Hesse. Both coders were completely blind to any additional information on the mothers and infants. Interrater reliability was established on 38 transcripts, with 84% intercoder agreement ($\kappa = .64$) on autonomous vs. non-autonomous classifications, and 89% agreement ($\kappa = .71$) on the unresolved classification. Of 160 AAI, 97 were classified as autonomous, 62 as non-autonomous (58 dismissing, 4 preoccupied), and 1 cannot classify (see Table 2). 31 of 159 (excluding “cannot classify”) mothers were assigned unresolved/disorganized classification. In the present study, adult attachment classification was dummy coded as 1 = autonomous, and 2= non-autonomous. Additionally, unresolved attachment status was dummy coded as 0 = non-disorganized, 1 = unresolved/disorganized.

**Outcome variables**

**Infant cognitive development.** Infant cognitive development was assessed with the Bayley Scales of Infant Development-Version II (BSID-II; Bayley, 1993), which includes the Mental Development Index (MDI) and Psychomotor Developmental Index (PDI). The present study used the MDI for the measure of cognitive development (see Appendix E). At 12 months,
the average MDI of the infants was 94.07 ($SD = 14.08$), and at 24 months, the average MDI of the infants was 83.46 ($SD = 18.77$) (see Table 3). The BSID-II is a widely recognized and used assessment of infant development with well-established psychometrics (Bayley, 1993).

**Infant socio-emotional development.** Infant socio-emotional development was measured with the Brief Infant Toddler Social Emotional Assessment (BITSEA; Briggs-Gowan & Carter, 2002). The present study used two BITSEA dimensions including behavior problems and competencies (see Appendix F). The BITSEA uses 3-point scale items ($0 = $ not true/rarely; $1 = $ somewhat true/sometimes; $2 = $ very true/often). The scores for each domain are obtained by summing the items in each dimension and dividing by the number of items. In the present data, Cronbach's alphas for the 31 behavior problems and 11 competencies items were .75 and .63, respectively for 12-month, and .85 and .65, respectively for 24-month. The average behavior problems scores were 10.67 ($SD = 5.94$) at 12 months, and 12.17 ($SD = 7.79$) at 24 months. The average competencies scores were 15.19 ($SD = 3.22$) at 12 months, and 16.44 ($SD = 3.08$) at 24 months (see Table 3). The BITSEA is a widely used measure with established validity and reliability (Briggs-Gowan, Carter, Irwin, Wachtel, & Cicchetti, 2004).

**Infant-mother attachment.** Infant-mother attachment, another socio-emotional developmental outcome, was measured with the Attachment Q-Sort (AQS; Waters, Vaughn, Posada, & Kondo-Ikemura, 1995) when the infants were 12- and 24-month old (see Appendix G). In the present sample, the average attachment security scores were .91 ($SD = .43$) at 12 months, and 1.04 ($SD = .44$) at 24 months (see Table 3). Similar to the MBQ, the AQS consists of 90 behaviorally descriptive items on the quality of the infant’s secure base behavior in the mother’s presence. The AQS scores were found to associate with Strange Situation classifications (Vaughn & Waters, 1990) and positively relate to maternal sensitivity (Pederson et al., 1990).
Based on the 45- to 75-minute home observation of mothers and infants in daily routines, the 90 items are divided into three piles: most characteristic, least characteristic, and neutral. Individual scores are correlated with criterion scores that describe a most securely attached infant. Higher correlations indicate higher attachment security. The AQS correlational coefficients were transformed to Z-scores (Fisher’s r-to-Z procedure) for analyses, and the scores ranged from .05 to 2.09 ($M = .91, SD = .43$), with a slightly positively skewed distribution (skewness = .59) at 4-month, and from -.25 to 2.30 ($M = 1.04, SD = .44$), with a normal distribution (skewness = .15) at 12-month.

Four trained doctoral graduate students who were blind to intervention status observed attachment security. Based on 20% of the sample, inter-reliability intraclass correlations were .81-.89. The AQS is a widely used measure with established validity and reliability (van IJzendoorn, Vereijken, Bakermans-Kranenburg, & Riksen-Walraven, 2004).

**Analysis plan**

All statistical analyses were conducted with SPSS statistical program except for the path analyses that were conducted with AMOS statistical program. Because the present study used the measures collected at pre-intervention, all analyses were conducted on the 173 mother-infant dyads that participated in the study except for the path analyses that were conducted on the 104 mother-infant dyads that remained in the study at 24 months. In addition, all analyses were statistically controlled for intervention status.

**Maternal sensitivity (MBQ)**

In order to examine the association between maternal sensitivity and infants’ 12- and 24-month socio-emotional and cognitive outcomes, Pearson product moment correlations were
calculated between maternal sensitivity (MBQ) and 12- and 24-month infant outcomes (i.e., MDI, BITSEA, AQS).

**Infant medical variables**

Similar to maternal sensitivity, Pearson product moment correlations were calculated between each infant medical variable (i.e., infants’ length of stay in NICU, birth weight, GA at birth, Apgar scores at 1 and 5 minutes, NBRS), and 12- and 24-month infant outcomes.

**Socio-demographic variables**

In order to examine the association between socio-demographic variables and infants’ 12- and 24-month socio-emotional and cognitive outcomes, Pearson product moment correlations were calculated between each socio-demographic variable (i.e., socioeconomic risk, maternal marital status, partner involvement, partner’s residence status, number of children at home) and 12- and 24-month infant outcomes.

**12- and 24-month infant outcomes**

In order to examine the association between 12- and 24-month socio-emotional and cognitive outcomes among the premature infants, Pearson product moment correlations were calculated between 12- and 24-month outcomes (i.e., MDI, BITSEA, AQS).

**Path analyses**

In order to examine the relationship among the predictor domains, 12-month infant outcomes, and 24-month infant outcomes, six path analyses were performed for each outcome (i.e., MDI, BITSEA, AQS) (see Figures 2-7). The first model examined the path of influence from the predictors (i.e., maternal sensitivity, infant medical risk, socio-demographic factors, maternal state of mind regarding attachment) to a particular 12-month outcome (see Figure 2). The second model examined the intervening path from the three predictor variables (i.e., socio-
demographic factors, infant medical risk, maternal state of mind regarding attachment) to a particular 12-month outcome with maternal sensitivity as the intervening variable (see Figure 3). The AICs of the first and second models were compared to determine whether maternal sensitivity was the intervening variable or not. The third model repeated the first model, but used a particular 24-month outcome instead of a particular 12-month outcome (see Figure 4). Similarly, the fourth model repeated the second model, but used a particular 24-month instead of a particular 12-month outcome (see Figure 5). Similar to the 12-month models, the AICs of the third and fourth models were compared to examine the intervening role of maternal sensitivity. The final models examined the path from the predictor variables to a particular 24-month outcome with 12-month outcomes as intervening variables (see Figures 6 and 7). The fifth model used only the 12-month outcomes as intervening variables, and the sixth model used the 12-month outcomes and maternal sensitivity as intervening variables. The AICs of the last two models were used to examine whether maternal sensitivity intervenes in the relationship between the predictors, and 12-month outcomes and a particular 24-month outcome. For each path model, multiple group analysis was performed to determine if the intervention group status moderated the relationship between the predictors and infant outcomes.

Results of the path models that used maternal sensitivity as the intervening variable were used to examine the relative strength of associations between maternal attachment representations, infant medical risk at birth and socio-demographic risk, and maternal sensitivity. Specifically, the regression coefficients between the three predictor variables (i.e., maternal attachment representations, infant medical risk, socio-demographic risk) and maternal sensitivity were examined to determine the unique contribution of each variable to maternal sensitivity.
Chapter 3:  
Results

Maternal Sensitivity

In order to examine the association between maternal sensitivity and infants’ 12- and 24-month socio-emotional and cognitive outcomes, Pearson product moment correlations were calculated between maternal sensitivity, and 12- and 24-month outcomes (i.e., MDI, BITSEA, AQS). These correlations are presented in Table 4. Based on Cohen (1992), the strength of correlation was determined as .10 = small, .30 = medium, and .50 = large. Maternal sensitivity (averaged across 1st year) was positively associated with higher infant MDI scores at 12 months, inversely associated with infant behavior problems at 12 months, and positively associated with infant attachment security at 12 month. At 24 months, maternal sensitivity was only associated with infant attachment security. All correlations were small in magnitude except for the correlations between maternal sensitivity and 12- and 24-month infant attachment security. These were large and moderate in magnitude respectively.

Infant Medical Variables

Pearson product moment correlations were calculated between infant medical variables (i.e., infant’s length of stay in NICU, birth weight, GA at birth, Apgar scores at 1 and 5 minutes, NBRS), and 12- and 24-month infant outcomes (Tables 5 and 6). Birth weight was positively associated with behavior problems at 12 months. Apgar scores at 1 minute were positively associated with 12-month Bayley MDI scores and 12-month behavior problems. Apgar scores at 5 minutes were positively associated with behavior problems at 12 months. Infants with higher NBRS scores had lower Bayley MDI scores at 12 months. All correlations were small in magnitude.
At 24-months, infants who had higher birth weight had higher Bayley MDI scores. Older GA at birth was also associated with higher MDI scores. Similar to 12 months, infant with higher NBRS scores had lower MDI scores at 24 months. All correlations were small in magnitude.

A composite medical risk score was created for the path analyses because the variables were conceptually related to the infant medical risk construct. Birth weight, GA at birth, Apgar scores at 1 and 5 minutes were reverse scored so that higher scores were associated with higher medical risk. All variables were then converted into z-scores, and Cronbach’s alpha was calculated to measure the internal consistency of the items. Based on item-total correlation, all z-scored items were summed to create the composite risk score. Cronbach’s alpha for the 6 infant medical risk items was .91. The mean infant medical risk score for the present sample was -.03 (SD = 4.90).

**Socio-demographic Variables**

Similar to maternal sensitivity and infant medical variables, Pearson product moment correlations were calculated between each socio-demographic variable (i.e., socioeconomic risk, maternal marital status, partner involvement, partner’s residence status, number of children at home), and 12- and 24-month infant outcomes (Tables 7 and 8). Higher socioeconomic risk was associated with more infant behavior problems at 12 months, and lower infant attachment security at 12 months. Mothers who were married had infants who were more securely attached at 12 months compared to mothers who were single. Infants whose fathers lived at home scored higher on 12-month cognitive outcomes and had higher 12-month infant attachment security compared to infants whose fathers were not living at home. More children at home was associated with higher infant socio-emotional competence at 12 months. All correlations were small in magnitude.
Similar to 12 months, socioeconomic risk was inversely associated with infant attachment security at 24 months, and the correlation was moderate in magnitude. Additionally, mothers who were married had infants with higher attachment security compared to mothers who were single (small magnitude). There was no other significant association between socio-demographic variable and infant 24-months outcomes.

Similar to infant medical risk variables, a composite risk score was created for the path analyses. Socioeconomic risk was a composite score of family income, maternal education, and receipt of state/federal assistance; therefore, these three items and maternal marital status, partner involvement, partner’s residence status, and number of children at home were used to create the present composite score. Family income, maternal education, maternal marital status, partner involvement, partner’s residence status, and number of children at home were reverse scored to indicate higher score being higher risk. All variables were then converted into z-score, and Cronbach’s alpha was calculated to measure internal consistency of the items. Due to weak item-total correlation for partner involvement ($r = .28$) and number of children at home ($r = .19$), these two items were not used for the composite score. Remaining z-scored items were summed to make the composite score, and Cronbach’s alpha for the 5 socio-demographic risk items was .75. The mean socio-demographic risk score among the present sample was -.58 ($SD = 3.83$).

**Maternal State of Mind Regarding Attachment**

Point-biserial correlations were calculated between maternal state of mind regarding attachment, and 12- and 24-month infant outcomes (Table 9). Non-autonomous mothers had infants with lower attachment security at 24 months; this correlation was moderate in magnitude. There was no other significant association between maternal state of mind regarding attachment and infant outcomes.
12- and 24-month infant outcomes

In order to examine the association between infants’ 12- and 24-month socio-emotional and cognitive outcomes, Pearson product moment correlations were calculated between 12- and 24-month infant outcomes (Table 10). 12-month infant MDI scores were positively and strongly associated with 24-month infant MDI scores. Twelve-month infant MDI scores were also positively associated with 24-month socio-emotional competence and 24-month attachment security; these associations were small in magnitude. 12-month infant behavior problems were positively and strongly associated with 24-month infant behavior problems. Infant socio-emotional competence at 12 months was strongly and positively associated with infant MDI scores and socio-emotional competence. Twelve-month infant socio-emotional competence was also positively associated with higher 24-month infant security, although the size of the association was small. Finally, infant attachment security at 12 months was positively associated with 24-month infant attachment security.

Path Analyses

Preliminary analyses. In order to examine the associations among four predictor variables (i.e., socio-demographic risk composite score, infant medical risk composite score, maternal sensitivity, maternal state of mind regarding attachment), and 12- and 24-month infant outcomes, Pearson product moment and point-biserial correlations were calculated (Tables 11, 12, and 13). Among the predictor variables, socio-demographic risk was inversely associated with maternal sensitivity. In addition, higher socio-demographic risk was associated with non-autonomous maternal attachment status.

At 12 months, higher socio-demographic risk was associated with lower infant attachment security in small magnitude. Higher maternal sensitivity was weakly associated with
infant MDI scores, moderately and inversely associated with lower behavior problems, and strongly and positively associated with attachment security.

Correlations between the predictors and 24-month outcomes indicated that socio-demographic risk was inversely and moderately associated with infant security. Infant medical risk at birth was weakly and inversely associated with infant MDI scores. Maternal sensitivity was positively and moderately associated with infant attachment security. Finally, mothers with non-autonomous state of mind regarding attachment had infants with lower attachment security compared to autonomous mothers; this association was small in magnitude.

**12-month outcomes.** In order to examine the relationship among the predictors and 12-month infant outcomes, two path analyses were performed for each outcome (see Figures 2-3). Model 1 examined the path of influence from all of the predictors (i.e., maternal sensitivity, infant medical risk, socio-demographic risk, maternal state of mind regarding attachment) to a particular 12-month outcome (Figure 2). Model 2 examined the path from three predictor variables (i.e., infant medical risk, socio-demographic risk, maternal state of mind regarding attachment) to a particular 12-month outcome with maternal sensitivity as the intervening variable (Figure 3).

For each model, first, multiple group analysis was conducted to examine the significant difference between the intervention and control groups. The significant difference was examined by taking the difference in chi-square between the unstructured (i.e., all paths are freely estimated) and the structural weights models (i.e., regression weights are assumed to be equal between two groups); when there was no significant difference in chi-square between these two models, it was determined that there is no significant difference between intervention and control groups. Second, AIC was compared between the two models to determine the best-fitting model.
for the outcome. Third, the better-fitting model was trimmed to determine the final model that showed significant associations among the variables. Model trimming was conducted by removing the least significant path one by one until all paths were significant. At each removal of a path, the output was examined to determine next least significant path to remove. The fit of final model was determined by examining chi-square ($p > .05$), CFI (> .95), RMSEA (< .07), and AIC.

**Infant attachment security.** There was no group difference for the two initial path models. Based on AIC, it was determined that model 2 was the better-fitting model between the two models, $\chi^2 (6, N = 103) = 23.16$, $p < .01$, AIC = 51.16 for model 1, and $\chi^2 (6, N = 103) = 10.33$, $p = .11$, AIC = 38.33 for model 2. Model 2, therefore, was trimmed to determine the final model. For the final model, two insignificant paths (the path from infant medical risk to maternal sensitivity, and the path from maternal attachment representation to maternal sensitivity) were removed (Table 1). The final model had $\chi^2 (5, N = 103) = 2.19$, $p = .82$, CFI = 1.00, RMSEA = .00, AIC = 32.19 that indicated a good fit of the final model, and the $R^2 = .49$ (Figure 8). Examination of the final model indicated that maternal sensitivity intervened in the relationship between socio-demographic risk and infant attachment security at 12 months. Specifically, higher socio-demographic risk was associated with lower maternal sensitivity, and maternal sensitivity in turn was positively related to infant attachment security.

**Infant cognitive outcome.** No group difference was found for the initial two path models. Based on AIC, it was determined that model 2 was the better-fitting model between the two models, $\chi^2 (6, N = 103) = 22.89$, $p < .01$, AIC = 50.89 for model 1, and $\chi^2 (6, N = 103) = 12.30$, $p = .06$, AIC = 40.30 for model 2. Model 2 was trimmed to determine the final model. For the final model, two insignificant paths (the path from infant medical risk to maternal sensitivity, and
the path from maternal attachment representations to maternal sensitivity) were removed (Table 15). The final model had $\chi^2 (5, N = 103) = 4.11$, $p = .53$, CFI = 1.00, RMSEA = .00, AIC = 34.11 that indicated a good fit of the final model, and the $R^2 = .06$ (Figure 9). The final model revealed that maternal sensitivity intervened in the association between socio-demographic risk and infant cognitive outcome at 12 months. Higher socio-demographic risk predicted lower maternal sensitivity, and maternal sensitivity positively predicted infant cognitive outcome.

**Infant behavior problems.** There was no group difference in the two initial path models. Based on AIC, it was determined that model 2 was the better-fitting model between the two models, $\chi^2 (6, N = 103) = 22.65$, $p < .01$, AIC = 50.65 for model 1, and $\chi^2 (6, N = 103) = 14.13$, $p < .05$, AIC = 42.13 for model 2. The final model was determined by trimming model 2. Similar to infant attachment security and infant cognitive outcome, two insignificant paths (infant medical risk to maternal sensitivity, and maternal attachment representation to maternal sensitivity) were removed (Table 16). The final model had $\chi^2 (5, N = 103) = 5.88$, $p = .32$, CFI = .96, RMSEA = .04, AIC = 35.88 that indicated a good fit of the model, and the $R^2 = .11$ (Figure 10). The final model indicated that similar to above two outcomes, maternal sensitivity was identified as an intervening variable in the relationship between socio-demographic risk and infant behavior problems. Specifically, higher socio-demographic risk was associated with lower maternal sensitivity, and maternal sensitivity was negatively associated with infant behavior problems.

**Infant socio-emotional competency.** Similar to above three outcomes, no group difference was found in the two initial path models. Based on AIC, it was determined that model 2 was the better-fitting model between the two models, $\chi^2 (6, N = 103) = 22.10$, $p < .01$, AIC = 50.10 for model 1, and $\chi^2 (6, N = 103) = 15.61$, $p < .05$, AIC = 43.61 for model 2. Model 2,
therefore, was trimmed to determine the final model. For the final model, three insignificant paths (maternal sensitivity to infant socio-emotional competency, infant medical risk to maternal sensitivity, and maternal attachment representation to maternal sensitivity) were trimmed (Table 17). The final model had $\chi^2 (6, N = 103) = 7.48$, $p = .28$, CFI = .90, RMSEA = .05, AIC = 35.48 that indicated a good fit of the model (Figure 11). The final model revealed that none of the predictors significantly predicted infant socio-emotional competency at 12 months.

**24-month outcomes.** Similar to 12-month outcomes, two path analyses were performed for each outcome to examine the relationship among the predictors and a particular 24-month infant outcome (see Figures 4-5). For each model, multiple group models were conducted to determine the significant difference between the intervention and control groups. AIC was then compared between the two models to determine the better-fitting model, and it was trimmed to establish the final model.

**Infant attachment security.** No group difference was observed for the two initial models. Comparison of AIC revealed that model 4 was the better-fitting model between the two models, $\chi^2 (6, N = 103) = 27.02$, $p < .001$, AIC = 55.02 for model 3, and $\chi^2 (6, N = 103) = 23.30$, $p < .01$, AIC = 51.30 for model 4. Model 4 was trimmed to determine the final model. For the final model, two insignificant paths (maternal attachment representation to maternal sensitivity, and infant medical risk to maternal sensitivity) were removed (Table 18). The final model had $\chi^2 (5, N = 103) = 15.12$, $p = .01$, CFI = .76, RMSEA = .14, AIC = 45.12 that indicated a poor fit of the model. The model was then examined to add a theoretically meaningful path that could be added to the model to improve its fit. Correlations between infant medical risk and infant attachment security, and between maternal attachment representation and infant attachment security were calculated. The correlations revealed that the relationship between maternal attachment
representation and infant attachment security was significant, \(r(86) = -.30, p < .01\). The path from maternal attachment representation to infant attachment security was added, which improved the model fit to \(\chi^2(4, N = 103) = 4.99, p = .29, \text{CFI} = .98, \text{RMSEA} = .05, \text{AIC} = 36.99\), and the \(R^2 = .30\). The final model indicated that maternal sensitivity intervened in the linkage between socio-demographic risk and infant attachment security. Specifically, higher socio-demographic risk was associated with lower maternal sensitivity, and maternal sensitivity was positively related to infant attachment security. In addition, there was a significant direct association between maternal attachment representation and infant attachment security; non-autonomous maternal attachment representation was related to lower infant attachment security (Figure 12).

**Infant cognitive outcome.** There was no group difference for the two initial models. Based on AIC, it was found that model 4 had a better fit between the two models, \(\chi^2(6, N = 103) = 23.65, p < .01, \text{AIC} = 51.65\) for model 3, and \(\chi^2(6, N = 103) = 16.01, p < .05, \text{AIC} = 44.01\). Model 4 was then trimmed to determine the final model. For the final model, three insignificant paths (infant medical risk to maternal sensitivity, maternal attachment representation to maternal sensitivity, and maternal sensitivity to infant cognitive outcome) were removed (Table 19). The final model had \(\chi^2(6, N = 103) = 8.35, p = .21, \text{CFI} = .85, \text{RMSEA} = .06, \text{AIC} = 36.35\), which indicated a good fit of the model. The final model revealed that none of the predictors significantly predicted infant cognitive outcome at 24 months (Figure 13).

**Infant behavior problems.** No group difference was observed for the initial two models. Comparison of AIC revealed that model 4 was the better-fitting model between the two models, \(\chi^2(6, N = 103) = 22.76, p < .01, \text{AIC} = 50.76\) for model 3, and \(\chi^2(6, N = 103) = 12.55, p = .05, \text{AIC} = 40.55\) for model 4. Model 4 was trimmed to determine the final model. The trimming included 3 insignificant paths (infant medical risk to maternal sensitivity, maternal attachment attachment
representation to maternal sensitivity, and maternal sensitivity to infant behavior problems) (Table 20). The final model had $\chi^2 (6, N = 103) = 5.43, p = .49$, $CFI = 1.00$, $RMSEA = .00$, $AIC = 33.43$, which indicated a good fit of the model. The final model revealed that none of the predictors significantly predicted infant behavior problems at 24 months (Figure 14).

**Infant socio-emotional competency.** There was no group difference for the two initial models. Based on AIC, it was found that model 4 was the better-fitting model between the two models, $\chi^2 (6, N = 103) = 22.77, p < .01$, $AIC = 50.77$ for model 3, and $\chi^2 (6, N = 103) = 10.45, p = .11$, $AIC = 38.45$ for model 4. Model 4, therefore, was trimmed to determine the final model. For the final model, three insignificant paths (infant medical risk to maternal sensitivity, maternal attachment representation to maternal sensitivity, and maternal sensitivity to infant socio-emotional competency) were removed (Table 21). The final model had $\chi^2 (6, N = 103) = 2.74, p = .84$, $CFI = 1.00$, $RMSEA = .00$, $AIC = 30.74$, which indicated a good fit of the model. The final model indicated that none of the predictors significantly predicted infant socio-emotional competency at 24 months (Figure 15).

**24-month outcomes with 12-month outcomes as intervening factors.** In the final set of path analyses, the associations between the predictors to a particular 24-month infant outcome with the 12-month infant outcomes as intervening factors were examined (see Figures 6-7). Model 5 examined the path of influence from the predictors to a specific 24-month outcome with the 12-month outcomes (i.e., infant attachment security, cognitive, behavior problems, socio-emotional competency) as the intervening factors (Figure 6). Model 6 examined the linkage between the predictors and a specific 24-month outcome with the 12-month outcomes and maternal sensitivity as the intervening factors (Figure 7).
Similar to the path analyses of 12- and 24-month outcomes, multiple group models were conducted to determine the significant difference between the intervention and control groups for each model. AIC was then compared between the two models to determine the better-fitting model, and it was trimmed to establish the final model.

**24-month infant attachment security.** No group difference was found for the initial two models. Examination of AIC revealed that model 6 was the better-fitting model between the two models, \( \chi^2 (16, N = 103) = 70.97, p < .001, \text{AIC} = 146.97 \) for model 5, and \( \chi^2 (25, N = 103) = 74.64, p < .01, \text{AIC} = 132.64 \) for model 6. Model 6 was trimmed to determine the final model. For the final model, four insignificant paths (maternal sensitivity to 12-month infant socio-emotional competency, infant medical risk to maternal sensitivity, maternal attachment representation to maternal sensitivity, and 12-month infant attachment security to 24-month infant attachment security) were removed (Table 22). The final model had \( \chi^2 (26, N = 103) = 68.23, p < .01, \text{CFI} = .69, \text{RMSEA} = .13, \text{AIC} = 124.23 \) that indicated a poor fit of the model, and the \( R^2 = .14 \). Examination of the model indicated that there is no theoretically meaningful path to add to this model to improve its fit. The final model revealed that socio-demographic risk predicted 24-month infant attachment security, and this linkage was intervened by maternal sensitivity, 12-month infant cognitive outcome, and 12-month infant behavior problems. Specifically, higher socio-demographic risk predicted lower maternal sensitivity, which was positively related to 12-month infant MDI scores and negatively related to 12-month behavior problems. Higher 12-month MDI scores and lower behavior problems predicted higher infant attachment security at 24 months. There was a significant relation from socio-demographic risk to maternal sensitivity to 12-month infant attachment outcome, but this linkage did not significantly predict 24-month infant outcome. It was also found that 12-month socio-emotional
competency significantly predicted 24-month infant attachment security. Importantly, a poor fit of the model implies that there may be external factor(s) (other than the factors that are considered in this model) that better explains the present model (Figure 16).

**24-month infant cognitive outcome.** There was no group difference for the initial two models. Comparison of AIC indicated that model 6 was the better-fitting model between the two models, $\chi^2 (16, N = 103) = 44.37, p < .001$, AIC = 120.37 for model 5, and $\chi^2 (25, N = 103) = 49.63, p < .01$, AIC = 107.63 for model 6. Model 6, therefore, was trimmed to determine the final model. The trimming included five insignificant paths (12-month behavior problems to 24-month infant cognitive outcome, maternal sensitivity to 12-month infant socio-emotional outcome, infant medical risk to maternal sensitivity, 12-month infant attachment security to 24-month infant cognitive outcome, and maternal attachment representation to maternal sensitivity) (Table 23). The final model had $\chi^2 (27, N = 103) = 41.99, p < .03$, CFI = .90, RMSEA = .07, and the $R^2 = .42$. The fit of the model was determined to be satisfactory to interpret. The examination of the final model indicated that socio-demographic risk predicted 24-month infant cognitive outcome with maternal sensitivity and 12-month infant cognitive outcome as intervening factors. Specifically, higher socio-demographic risk negatively affected maternal sensitivity, maternal sensitivity positively influenced 12-month infant cognitive outcome, and 12-month infant cognitive outcome positively predicted 24-month outcome (Figure 17).

**24-month infant behavior problems.** No group difference was observed for the two initial models. Based on AIC, it was found that model 6 was the better-fitting model between the two models, $\chi^2 (16, N = 103) = 42.17, p < .001$, AIC = 118.17 for model 5, and $\chi^2 (25, N = 103) = 44.85, p < .01$, AIC = 102.85 for model 6. Model 6 was trimmed to determine the final model. For the final model, six insignificant paths (12-month cognitive outcome to 24-month behavior
problems, maternal sensitivity to 12-month socio-emotional competency, infant medical risk to maternal sensitivity, maternal attachment representation to maternal sensitivity, 12-month socio-emotional competency to 24-month behavior problems, and 12-month attachment security to 24-month behavior problems) were removed (Table 24). The final model had $\chi^2 (28, N = 103) = 37.89$, $p = .10$, CFI = .92, RMSEA = .06, AIC = 89.89 that indicated a good fit of the model, and the $R^2 = .41$. The final model revealed that socio-demographic risk predicted 24-month infant behavior problems, and this linkage was intervened by maternal sensitivity and 12-month behavior problems. Specifically, higher socio-demographic risk was associated with lower maternal sensitivity, lower maternal sensitivity in turn predicted higher infant behavior problems at 12-month, which was positively associated with 24-month behavior problems (Figure 18).

24-month infant socio-emotional competency. Similar to the above outcomes, there was no group difference for the two initial models. Comparison of AIC indicated that model 6 was the better-fitting model between the two models, $\chi^2 (16, N = 103) = 43.36$, $p < .001$, AIC = 119.36 for model 5, and $\chi^2 (25, N = 103) = 48.81$, $p < .01$, AIC = 106.81 for model 6. Model 6, therefore, was trimmed for the final model. The trimming included six insignificant paths (maternal sensitivity to 12-month socio-emotional competency, infant medical risk to maternal sensitivity, maternal attachment representation to maternal sensitivity, 12-month behavior problems to 24-month socio-emotional competency, 12-month cognitive outcome to 24-month socio-emotional competency, and 12-month attachment security to 24-month socio-emotional competency) (Table 25). The final model had $\chi^2 (28, N = 103) = 43.71$, $p = .03$, CFI = .87, RMSEA = .07, AIC = 95.71, and the $R^2 = .25$. The fit of the model was determined to be satisfactory to interpret. The examination of the final model revealed that 12-month socio-emotional competency was the only predictor of 24-month socio-emotional competency. There
was no significant path from the three predictors (i.e., infant medical risk, socio-demographic risk, maternal attachment representation) to infant socio-emotional outcome at 24-months (Figure 19).

**Relative Strength of Association from the Predictors to Maternal Sensitivity**

The following analyses were conducted to test the hypothesis, based on Belsky’s (1984) model of parenting, that maternal attachment representation (parental psychological resource) would be most strongly associated with maternal sensitivity compared to infant medical risk at birth (child characteristic) and socio-demographic risk (maternal resource and support). In order to examine this relationship, the relative strength of associations between maternal attachment representations, infant medical risk at birth and socio-demographic risk, and maternal sensitivity were examined using the final models of the path analyses. For each model, the regression coefficients from the three predictors (i.e., maternal attachment representations, infant medical risk at birth, socio-demographic risk) to maternal sensitivity were examined. For all 12 final models, socio-demographic risk was the only significant predictor of maternal sensitivity. In addition, for all the final models, except for the model with 24-month security of attachment as the outcome (Table 18, Figure 12), the regression coefficient of the path from infant medical risk to maternal sensitivity was less significant compared to the regression coefficient of the path from maternal attachment representation to maternal sensitivity.
Chapter 4:
Discussion

The present study examined the predictors and their linkages to preterm infant cognitive and socio-emotional development at 12 and 24 months. Specifically, three predictor domains were examined including parenting (i.e., maternal sensitivity), infant medical risk (i.e., length of stay in NICU, birth weight, GA at birth, 1- and 5-minute Apgar scores, NBRS), and socio-demographics (i.e., socioeconomic risk index, marital status, partner involvement, partner residence status, number of children at home). The infant outcomes included cognitive outcome (MDI), attachment security (AQS), and behavior problems and socio-emotional competency (BITSEA). In the sections below, the implications of the findings between each predictor domain and the infant outcomes, and the linkages between the predictors and the infant outcomes will be discussed.

Maternal sensitivity and infant outcomes

The hypothesis that maternal sensitivity would be significantly associated with better infant cognitive and socio-emotional outcomes was supported. Higher maternal sensitivity was related to higher 12-month cognitive outcome, lower 12-month behavior problems, higher 12-month attachment security, and higher 24-month attachment security. The results support the previous research findings that higher maternal sensitivity was associated with better infant outcomes in socio-emotional and cognitive domains. In particular, the linkage between maternal sensitivity and infant attachment is supported by attachment theory (Bowlby, 1969/1982), and previous studies that examined this relationship in non-clinical samples (e.g., Ainsworth et al., 1978; De Wolff & van IJzendoorn, 1997) and mother-infant dyads of infants with developmental delay and prematurity (e.g., Moran, Pederson, Pettit, & Krupka, 1992; Pederson & Moran, 1995).
Moreover, the magnitude of correlation between maternal sensitivity and attachment in the present study was stronger than that for other infant outcomes. It is interesting to note that the correlation between maternal sensitivity and infant attachment was weaker at 24 months compared to 12 months. This suggests that there are additional factors that predict infant attachment security as infants get older.

The significant association between maternal sensitivity and infant cognitive outcome supports previous research findings that higher maternal sensitivity promoted higher cognitive outcome among toddlers (e.g., Lemelin et al., 2006; Treyvaud et al., 2009; Wacharasin et al., 2003). Additionally, the present study underscores the impact of maternal sensitivity on infant cognitive development as early as 12 months, and supports the previous findings of the significant linkage between maternal sensitivity and infant cognitive outcome among premature infants (e.g., Smith et al., 1996, Landry et al., 1997).

**Infant medical status and infant outcomes**

The hypothesis that higher infant medical risk would be associated with negative infant outcomes was partially supported. Higher Apgar scores and lower NBRS were associated with higher 12-month cognitive outcomes. Lower NBRS, along with higher birth weight and older GA at birth, was also associated with higher cognitive outcomes at 24 months. Notably, the NBRS was significantly associated with infant cognitive outcomes at 12 and 24 months. These results support previous studies that found the NBRS to predict intellectual and motor development up to age 4 (e.g., Brazy et al., 1991, 1993; Thompson et al., 1994, 1997). Additionally, the present finding suggests that neurobiological development is associated with cognitive outcome. This linkage is especially important to consider for premature infants whose
neurobiological structure is affected by their early birth (Aylward, 2005; Dipasquale & Magnano, 2009; Williams, Lewandowski, Coplan, & D’Eugenio, 1987).

The present study found that the birth status (i.e., birth weight, GA at birth) was associated with 24-month cognitive development. Similar to the present finding, Munck et al. (2009) also found an association between medical risk (i.e., postnatal corticosteroids, intestinal perforation, brain pathology) and cognitive development at 2 years. The present result underscores previous findings that the effect of birth status on cognitive development could appear later in infants’ life, and that the birth status may have a long-term impact on premature infants’ cognitive development in the school years (see meta-analysis by Bhutta, Cleves, Casey, Cradock, & Anand, 2002). In fact, previous studies found a long-term effect of low birth weight on cognitive outcome up to 7- to 14-year-old (Taylor et al., 2004), and on cognitive development trajectory that was very low stable across 12-, 24- and 36-month (Liaw & Brooks-Gunn, 1993).

There was an unexpected finding that when individual infant medical factors were considered, lower infant medical risk was associated with higher behavior problems at 12 and 24 months. Specifically, higher birth weight and higher Apgar scores were associated with higher 12-month behavior problems; and shorter length of stay in NICU was associated with higher 24-month behavior problems. Nevertheless, this counterintuitive finding between low infant medical risk and higher behavior problems was not observed when the composite infant medical risk variable was used. Indeed, the significant finding between the composite and outcome was in the expected direction (i.e., infant medical risk composite negatively associated with 24-month MDI). Considering that the composite score is a more reliable and robust index of medical risk than any of its individual components, findings of relations between individual components of medical risk and specific outcomes are unclear and need to be interpreted with caution. In addition, it is
important to note that behavior problems were measured using a mother report whereas other infant outcomes (i.e. attachment security, cognitive outcome) were measured using trained observers. The unexpected findings regarding infant behavior problems, therefore, could imply the unreliability of this mother-reported measure. In fact, Langkamp et al. (1998) found that when mothers of premature infants were asked to fill out a questionnaire that contained two sets of items measuring their perception of infant temperament (e.g., average, difficult, easy) and their ratings of the frequency of specific infant behavioral reactions related to temperament (six-point Likert scale ranging from “almost never” to “almost always”), the mothers perceived their infants to be more difficult in temperament (from their overall rating of temperament) than mothers’ ratings of specific infant behaviors. Langkamp et al.’s findings suggested that mothers of premature infants may be biased toward perceiving their infants as more “difficult” than they really are, and this bias may have been operating in mothers’ ratings of infant behavior problems in the present study. Considering the lack of significant association between the infant medical risk and socio-emotional outcomes (i.e., attachment security, socio-emotional competency), the present study suggests that the infant medical risk may be more likely to affect infant outcomes that specifically tap infants’ neurological development, which would include cognitive development.

**Socio-demographic factors and infant outcomes**

The present results partially supported the hypothesis that higher socio-demographic risk (i.e., higher socioeconomic risk, single motherhood, low father involvement, more children at home) was associated with negative infant socio-emotional and cognitive outcomes. At 12 months, higher socioeconomic risk was associated with lower infant attachment security and higher behavior problems. This finding supports Duncan et al.’s (1994) study, which found a
significant association between low family economic status and higher behavior problems among the 5 years old children who participated in the IHDP. A similar relationship between high environmental adversity and high behavior problems was found among 3 years old toddlers (Derauf et al., 2011), and 4 years old children who were born prematurely (McGrath et al., 2005). In addition to socioeconomic risk, 12-month infant attachment security was predicted by maternal marital status and partner’s residence status with infant. Specifically, the infants had higher security of attachment when their mothers were married and their partners lived at home. The present study supports the previous findings on the association between higher father involvement (i.e., time spent with his infant) and secure infant/toddler attachment (e.g., Brown, Mangelsdorf, & Neff, 2012; Cox, Owen, Henderson, & Margand, 1992; Easterbrooks & Goldberg, 1984). Additionally, Aronson and Huston (2004) found that compared to single and 2-parent cohabiting families, married mothers and their infants showed more positive interactive behaviors at 6- and 10-month; and the infants of married mothers were significantly more likely to be securely attached at 15-month than infants of single mothers. Importantly, Aronson and Huston (2004) found that married mothers had more favorable socio-demographics (older, higher education, higher incomes), and had more favorable scores on measures of psychological wellbeing, ideas about child rearing, partner relationship, and social support. Thus, the present study’s findings related to single parenthood need to be interpreted with caution, considering that the findings might be attributable to other factors associated with single parenthood.

In addition to the association with 12-month infant attachment security, partner’s residence status (partner living at home with infant) was also significantly associated with infant cognitive outcome. Previous studies also found a significant association between higher father involvement and positive infant cognitive outcome among black ethnic group (Yogman et al.,
1995), and families with infants with special needs (Bronte-Tinkew et al., 2008). The present results suggest the importance of paternal stimulation and his presence for the premature infants’ cognitive development and secure attachment. Bronte-Tinkew, Carrano, Horowitz, and Kinukawa (2008) found that at 9 months, fathers’ cognitive stimulating activity, warmth, physical care, and caregiving activities were associated with lower likelihood of negative cognitive outcomes, and this association was stronger for infants with special needs. In another study, Cabrera, Shannon, and Tamis-LeMonda (2007) found that both father’s and mothers’ supportiveness was associated with higher cognitive development at 2 and 3 years, but only fathers’ supportiveness was also associated with toddler’s emotional development. It is interesting that in the present study, partner’s residence with infant rather than father involvement was associated with cognitive and attachment outcomes. Previous studies found fathers’ “buffering” role against low maternal supportive parenting for toddlers and children’s cognitive development and school readiness; when a mother showed average or below average supportiveness, if the father was supportive, the child had better outcomes than when neither of the parents were supportive (Martin, Ryan, & Brooks-Gunn, 2010; Ryan, Martin, & Brooks-Gunn, 2006). It might be that a continuous presence of a father provides a better parenting environment for an infant where supportive parenting is always available even when one of the parents is unable to provide optimal parenting.

The importance of father presence/ two-parent presence was also reflected on the significant association between maternal marital status and 24-month infant attachment security that the married mothers had infants who had higher attachment security at 24 months. In addition, socioeconomic risk was also significantly associated with 24-month infant attachment security (i.e., higher risk, lower attachment security). Interestingly, at 24-month, the socio-
demographic factors were only associated with infant attachment security, and no other outcome. This shows a long-term and strong effect of socioeconomic risk and marital status on the development of infant attachment. Moreover, the stronger association between socioeconomic risk and infant attachment security at 24 months compared to 12 months, and a weaker association between maternal sensitivity and infant attachment security at 24 months compared to 12 months suggest a growing impact of more broadly-based “distal” variables on attachment security as infants get older.

Contrary to the hypothesis, more children at home was associated with higher infant socio-emotional competence at 12 months. The present result supports the previous research findings on siblings’ positive influence on a child’s socio-emotional development. Having an older sibling was found to promote a child’s socio-emotional problem solving (Karos, Howe, & Assee, 2007) and to have a relatively good mental health between 3 to 9 years (Lawson & Mace, 2010). Additionally, Graham and Coplan (2012) found that higher sibling relationship quality was associated with better preschool socio-emotional functioning; and Peterson (2000) found that the children between 3 to 5 years old who had siblings between 12 months to 12 years old performed better on the theory of mind experiments compared to the children who were the only-child. Similarly, Lam, Solmeyer, and McHale (2012) found that having a close relationship with a sibling was associated with higher level of empathy between 7 to 14 years after controlling for parental responsiveness and marital love. Although the present study did not examine the quality of sibling relationship, larger sibship size might have a positive influence on an infant’s socio-emotional development that the older siblings provide a unique influence on children’s socialization, and promote socio-emotional development.

**Maternal state of mind regarding attachment and infant outcomes**
The examination of the associations between maternal state of mind regarding attachment (AAI) and the 12- and 24-month infant outcomes revealed that the AAI was only significantly associated with infant attachment security at 24 months. Specifically, it was found that maternal autonomous attachment representation was associated with higher 24-month infant attachment security. The present finding that the AAI was only associated with later (i.e., 24 months) infant attachment is interesting. This suggests that for families with premature infants, maternal attachment history begins to affect infant attachment security by the second year. Similar to the present study, van IJzendoorn et al. (1991) found a correspondence between the AAI autonomous/ non-autonomous classification and 2-year old toddlers’ secure/ insecure Strange Situation classification. In addition, studies also found a significant association between maternal AAI classification and their 6-year-old children’s attachment (Behrens, Hesse, & Main, 2007; Gloger-Tippelt, Gomille, Koenig, & Vetter, 2002). The later effect of maternal attachment representation on infant attachment might be particularly seen among the families with premature infants who face overwhelming challenges associated with premature births especially during the first year of the infants’ lives. It might be that during the first year, the maternal attachment history has relatively less influence on the premature infants’ attachment development compared to the other factors. For the mothers with premature infants, their parenting behavior during the first 12 months might be explained more by how they cope with the early birth and their premature infants rather than their attachment histories. The mothers of premature infants are more likely to have higher preoccupation with their infants’ safety and wellbeing, and experience higher stress, anxiety and depression than the parents of full-term infants (e.g., Feldman, Weller, Leckman, Kwint, & Eidelman, 1999; Gambina et al., 2011). Moreover, studies have shown that among the mothers of premature infants, higher anxiety was
associated with less optimal parenting behavior during the time their infants were in the NICU and at 24 months (Zelkowitz, Bardin, & Papageordieu, 2007; Zelkowitz, Papageordieu, Bardin, & Wang, 2009). Thus, the effect of maternal attachment history on the premature infants’ attachment development might be suppressed by the mothers’ coping styles and their psychological condition during their infants’ first year.

**Linkage between 12- and 24-month infant outcomes**

The present study found a consistent pattern between the 12- and 24-month infant outcomes. For all four outcomes (i.e., attachment security, cognitive development, behavior problems, socio-emotional competency), it was found that a 12-month outcome was significantly associated with the corresponding 24-month outcome. Considering that the linkages between the 12- and 24-month outcomes were large in magnitude except for infant attachment security, the present finding suggests the continuity of development among the present sample of infants. The weaker linkage between 12- and 24-month infant attachment security compared to the other outcomes implies the possibility of change in infant attachment security over time. The present implication regarding attachment is supported by the previous studies that found attachment discontinuity through infancy, adolescence, and adulthood especially when a person experienced negative life events (e.g., loss of parent, parental divorce) and change in social context (Van Ryzin, Carlson, & Sroufe, 2011; Waters, Merrick, Treboux, Crowell, & Albersheim, 2000; Weinfield, Whaley, & Egeland, 2004). Studies show that among low-risk samples (well educated mothers, middle-class, physically healthy infants), there are strong associations between the AAI and infant attachment security measured by the Strange Situation at 12 months, which is associated with the AQS (Fonagy et al., 1991; Pederson et al., 1998). It may be that among the present sample of premature infants who are facing the “double jeopardy” of medical risk and
socioeconomic risk, their attachment security is more volatile at 12 months, but more consolidated by 24 months as their secure base behaviors become more firmly developed. Nevertheless, the present results emphasize the continuity of premature infants’ development over discontinuity between 12- and 24-month.

Path analyses

For the path analyses, the present study used the composite scores for the socio-demographic risk and the infant medical risk. Among the four predictors (e.g., maternal sensitivity, socio-demographic risk, infant medical risk, maternal state of mind regarding attachment), it was found that higher socio-demographic risk was associated with lower maternal sensitivity and non-autonomous attachment representation. The negative association between socio-demographic risk and maternal sensitivity is supported by previous studies that found the effect of socio-demographical factors including a marital/couple relationship on maternal sensitivity (e.g., Barnett et al., 2008; Belsky & Fearon, 2008; Fuertes, Faria, Soares, & Crittenden, 2009; Schoppe-Sullivan et al., 2007). Among the mothers of VLBW infants, poverty status negatively predicted maternal positive affective involvement, sensitivity and responsiveness, and positively predicted maternal negative affect and behavior during feeding at 1 and 8 months (Pridham, Melby, Brown, & Clark, 2010). Past studies also showed an association between socio-demographic risk and maternal attachment representation. Van IJzendoorn and Bakermans-Kranenberg (1996, 2010) found that the mothers from low economic status, especially adolescent mothers, showed more dismissing attachment representation and unresolved loss or trauma than the normative sample. It is important to note that no significant association was found between the infant medical risk and maternal sensitivity. Although the parents of premature infants are more likely to interact less sensitively with their infants
compared to the parents of full-term infants (Als et al., 2005), the present finding implies that this association may not be direct. The association between a premature birth and maternal sensitivity might be intervened by various factors. For example, Coppola et al., (2007) found that the mothers with autonomous attachment representation showed higher sensitivity with premature infants compared to full-term infants; this association was reversed for the non-autonomous mothers in that they showed lower sensitivity with premature infants compared to full-term infants. In addition, some studies found that a negative maternal experience and a stressful reaction to premature birth negatively affect maternal sensitivity (e.g., Korja et al., 2010; Minde et al., 1983; Muller-Nix, Forcada-Guex, Pierrehumbert, Jaunin, Borghini, & Ansermet, 2004). Although the present study only found a significant association between the socio-demographic risk and maternal sensitivity, multiple factors are likely to influence maternal sensitivity among the mothers of premature infants.

**Paths from the predictors to the 12-month outcomes.** The present hypothesis was supported that maternal sensitivity served as an intervening variable between the three predictor variables (i.e., infant medical risk, socio-demographic risk, maternal state of mind regarding attachment) and the 12-month infant outcomes. In addition, no group difference was observed in the associations. The above results suggest that regardless of intervention group status, maternal sensitivity, which is a proximal factor for infant development, serves as an intervening factor between the other predictors and infant outcomes.

In the present study, the socio-demographic risk with maternal sensitivity as an intervening variable predicted all the outcomes except socio-emotional competency. Although the infant medical risk and maternal attachment representation were related to maternal sensitivity through a common cause, there was no significant direct relation between these two
predictor variables and maternal sensitivity. It is important to note that the non-significant associations between infant medical risk and the outcomes in the present study did not appear to be due to a lack of variability in infant medical risk score. The range of gestational ages in the present sample was quite large, with the proportion of very premature infants slightly higher (60%) than the proportion of premature infants. The findings above indicate an overwhelming effect of socio-demographic risk on maternal sensitivity, which might be particularly salient for the present sample of predominantly low-income families.

Interestingly, no significant path from the predictors to socio-emotional competency was found. It is likely that factors that were not considered in the present study are more predictive of infant socio-emotional competency. Previous studies have found several predictors of infant socio-emotional development. For example, Volling, McElwain, Notaro, and Herrera (2002) found that parental emotional availability was associated with infant emotional competence at 12 and 13 months. Among premature infants, Treyvaud et al. (2009) found that parent-child synchrony at 2 years was associated with toddler’s socio-emotional development, and higher parental positive affect and sensitivity was associated with higher socio-emotional competency. Similarly, Malatesta, Culver, Tesman, and Shepard (1989) found that positive maternal expressive behaviors (i.e., contingency, affective response) was associated with infants’ positive expressive development during 1st and 2nd year for preterm and full-term infants. In addition, Van Doesum, Hosman, and Risen-Walraven (2005) developed an intervention to promote interaction between infants and mothers with depression considering that maternal depression has adverse effects on children’s socio-emotional development. Above studies suggest that infant socio-emotional competency may be predicted by multiple dimensions of parenting that were not directly measured in the present study. It is also the case, however, that infant socio-emotional
competency was assessed with a mother-report measure. Combined with the counterintuitive finding between the individual infant medical risk factors and infant behavior outcome, the difficulty in predicting infant socio-emotional competency might be associated with maternally related bias. Future studies might find different results when a more objectively-measured infant socio-emotional competency measure is used. Although no significant path was found that predicts infant socio-emotional competency at 12 months, the present study suggests that the socio-demographic risk puts a negative impact on maternal sensitivity, which then predicts infant outcomes in a predicted direction: low maternal sensitivity predicts lower infant attachment security, lower cognitive outcome, and higher behavior problems at 12 months.

**Paths from the predictors to the 24-month outcomes.** Similar to the 12-month outcomes, the comparisons of the two models (i.e., maternal sensitivity as an independent predictor vs. maternal sensitivity as an intervening variable) revealed that maternal sensitivity served as an intervening variable between the predictors and the 24-month infant outcomes regardless of group status. However, a significant path from the predictors to a 24-month outcome was only found for infant attachment security, and the addition of a direct path from maternal attachment representation (AAI) to 24-month infant attachment security improved the fit of the model. The finding implies that at 24 months, socio-demographic risk and its negative impact on maternal sensitivity continue to affect infant attachment security. In addition, maternal attachment representation directly influences infant attachment in that autonomous maternal attachment is associated with higher infant attachment security, and non-autonomous maternal attachment is associated with lower infant attachment security. There are two interesting points regarding the finding on maternal attachment representation: 1) the impact of maternal attachment representation surfaces later in an infant’s life, and 2) maternal attachment
representation directly affects infant attachment security rather than through maternal sensitivity, which documents the “transmission gap” between maternal attachment representation and infant attachment (van IJzendoorn, 1995). The present study did not expressly examine the mediational role of maternal sensitivity; nevertheless, the finding is supported by the previous studies that also found non-significant role of maternal sensitivity in explaining the transmission of attachment from a mother (i.e., AAI) to her infant (e.g., Bailey, Moran, Pederson, & Bento, 2007; Pederson et al., 1998; Raval et al., 2001). Perhaps factors such as ecological variables (e.g., maternal education, paternal support) and maternal psychopathology need to be considered to clarify the role of maternal sensitivity in intervening in the relationship between maternal attachment representation and infant attachment security (Tarabulsy et al., 2005; Wan & Green, 2009). In addition, assessing maternal behavior in specific context such as distress could be more important in predicting attachment security (Goldberg, Grusec, & Jenkins, 1999). For example, Leerkes, Blankson, and O’Brien (2009) found that maternal sensitivity to distress, but not to nondistress, was related to higher social competence among 24-month infants. Moreover, studies found that maternal sensitivity to distress and during a distressing task were associated with 15- and 16-month infant attachment, but this association was not observed with maternal sensitivity to non-distress or during a non-arousing free play task (Leerkes, 2011; McElwain & Booth-LaForce, 2006). In the present study, maternal behavior was observed during their daily routines. More studies are needed to understand the intervening and mediational roles of maternal sensitivity between maternal attachment representation and infant attachment security.

The non-significant findings on infant cognitive, behavior, and socio-emotional competency outcomes at 24 months imply that as infants get older, more factors come into play to predict developmental outcomes. According to ecological theory, as infants/children get older,
they are exposed to larger environmental contexts including parent’s work place, and larger social system (Bronfenbrenner, 1977). In addition, the premature infants’ biological regulation and organization would transact with expanding environmental context, which in turn predict their developmental outcomes (Sameroff & Fiese, 2000). Relatedly, it is possible that the lack of associations between infant medical risk and the outcomes is attributed to the fact that infant developmental outcomes were assessed at full 12 months after birth, and not earlier, in this study. Medical risk may be more likely to show stronger associations with the outcomes before 12 months, because the impact of prematurity/low birth weight, for many infants, may become less evident over time, particularly when one corrects for prematurity status, as was done in the present study. The present finding suggests that the predictions of later infant outcomes become more complex as the number of predicting factors increases and their interactions over time come into effect.

**Paths from the predictors to the 24-month outcomes with the 12-month outcomes as intervening factors.** As expected from the path analyses of 12- and 24-month outcomes, the model with maternal sensitivity as an intervening factor had a better fit compared to the model with maternal sensitivity as an independent predictor. In addition, socio-demographic risk was the only significant predictor of maternal sensitivity, which in turn predicted 12-month infant attachment security, cognitive outcome, and behavior problems. In all models, maternal sensitivity was not a significant predictor of 12-month socio-emotional competency, which implies that infant socio-emotional competency is predicted by factors other than maternal sensitivity or that maternal bias affected the findings of socio-emotional competency outcomes.

The pattern of developmental continuity was seen in two outcomes: cognitive outcome and behavior problems. For these two outcomes, maternal sensitivity predicted the 12-month
outcome, which in turn predicted the corresponding 24-month outcome. Similarly, 12-month socio-emotional competency significantly and independently predicted 24-month socio-emotional competency. The pattern of developmental continuity, however, was not found for 24-month infant attachment security, which was predicted by 12-month cognitive outcome and behavior problems. Although the 24-month infant attachment model did not have a good fit, and needs to be interpreted with caution, the present “discontinuity” between 12- and 24-month attachment security suggests that 24-month attachment security is predicted by other factors including infant cognitive and behavior problems. Attachment theory and studies suggest a possibility of change in security of attachment throughout the lifespan especially when a person faces unstable social contexts (Van Ryzin et al., 2011; Waters, et al., 2000; Weinfield, et al., 2004). The infants in this study may have been more prone to instability of attachment over time given their adverse and unpredictable life circumstances, and their attachment behaviors might not have been consolidated at 12 months. The impact of high risk life circumstances and premature birth may also explain the fact that mothers’ states of mind regarding attachment (from the AAI) were not associated with infant attachment security at 12 months, but were associated with infant attachment security at 24 months. It may be that mothers’ states of mind regarding attachment do not exhibit their effects on infant attachment in the present population by 12 months precisely because the consolidation of infant attachment behavior is hampered by stressful medical and environmental circumstances, and that such consolidation is not evidenced until the second year of life. The present study shows the possibility that the change in attachment security could happen as early as 24 months of age.

In addition to the above two major findings (i.e., maternal sensitivity as an intervening variable, patterns of continuity and discontinuity), it was found that 12-month infant socio-
emotional competency independently predicted 24-month infant attachment security, infant
cognitive outcome, and socio-emotional competency. These three findings suggest that the
interventions that target maternal sensitivity and early infant socio-emotional development are
likely to promote long-term infant development among premature infants. In addition, the pattern
of developmental continuity among the three outcomes (i.e., cognitive, behavior problems, socio-
emotional competency) implies the importance of strengthening early development, which serves
as a building block for later development.

**Relative strength of associations between maternal attachment representation,**
**infant medical risk and socio-demographic risk, and maternal sensitivity.** The present study
found that the socio-demographic risk, which included marital status, was the only significant
predictor of maternal sensitivity. This finding was contrary to Belsky’s (1984) model of
parenting, which considers the parental personality and psychological well-being to be the
strongest factor of effective parental functioning followed by the contextual subsystems of
support and child characteristics. The significant linkage between socio-demographic risk and
maternal sensitivity might have been particularly strong in the present sample, which the
majority consisted of low-income families. Nevertheless, a closer examination of the path model
trimming processes revealed that in all but one model (i.e., model with 24-month infant
attachment security as the outcome), the linkage between the infant medical risk and maternal
sensitivity was trimmed (i.e., less significant) before the linkage between maternal attachment
representation and maternal sensitivity. This finding supports Belsky’s argument that child
characteristics (e.g., infant medical risk) have the least influence on parenting outcomes (e.g.,
maternal sensitivity). The finding that the infant medical risk has the least influence on maternal
sensitivity is especially import for the present sample of mother-infant dyad with premature
infants. Premature birth may cause developmental disabilities in various degrees of severity, but it has the least effect on maternal sensitivity, which significantly predicts infant outcomes at 12- and 24-months.

**Conclusion**

The hypothesis that maternal sensitivity serves as an intervening variable between the predictors and outcomes was supported for the three 12-month outcomes including infant attachment security, cognitive outcome and behavior problems, and 24-month infant attachment security. There was no significant group difference that the paths of infant development followed the same pattern whether or not the family participated in the intervention or not. The present study did not consider the commitment to intervention among the intervention mothers. The results related to the treatment effect might have been different if the comparisons were made between the committed intervention families and the control group. The present findings suggest the importance of quality of parenting/ maternal sensitivity (i.e., a proximal factor) especially for the earlier development of premature infants, and that multiple factors influence developmental outcomes as they get older.

For both 12 and 24 months, the linkage between maternal sensitivity and infant attachment security was stronger than any other outcomes. The strong relation between maternal sensitivity and infant attachment security is expected based on attachment theory. Maternal attachment representation became a significant direct predictor of infant attachment security at 24 months, which then weakened the association between maternal sensitivity and infant attachment security at 24 months compared to 12 months. The direct linkage between maternal attachment representation and infant attachment is interesting that it shows the “transmission gap,” which maternal attachment representation predicts infant attachment security directly, and
not though maternal sensitivity (van IJzendoorn, 1995). Two questions are raised from the present “transmission gap:” 1) why does maternal attachment representation become a significant predictor at 24-month and not earlier? 2) What is the mechanism of influence from maternal attachment representation to infant attachment security at 24-month? These are questions that need to be examined in future work.

The present study examined systematic linkages between cognitive and socio-emotional development across time (i.e., 12 and 24 months). For all the outcomes except for infant attachment security, a 12-month outcome predicted the corresponding 24-month outcome. This finding implies continuity of development, and underscores the importance of early development for later outcome. The present study also found a “crossover” linkage between cognitive and socio-emotional outcomes. Specifically, 12-month socio-emotional competency predicted 24-month cognitive outcome, and 12-month cognitive outcome predicted 24-month infant attachment security. Moreover, 12-month socio-emotional competency significantly predicted all 24-month outcomes except behavior problems. The present findings show complex linkages between 12- and 24-month outcomes; in addition to the linkage between 12- and 24-month outcomes in the same developmental domain, early development could have an effect on later development in a different domain. Few studies have looked at the relationship between socio-emotional development and cognitive development. For example, Lewis, Koroshegyi, Douglas, and Kampe (1997) found a differential association between emotional response to maternal separation and cognitive development; infant distress response at 2 months was associated with lower sensorimotor scores at 4 and 8 months, but infant distress response at 6 and 10 months were associated with higher sensorimotor scores at 8 and 13 months. Similarly, Lewis (1993) found that infants’ 3 months distress and anger were associated with their lower cognitive scores.
at 4 years. Estrada, Arsenio, Hess, and Holloway (1987) also found that positive mother-child affective interaction at 4 years predicted better child cognitive performance at 4-12 years. The present study found a similar positive association between 12-month infant socio-emotional development and 24-month infant cognitive outcomes; however, more studies are needed to further understand the mechanism in which socio-emotional development affects later cognitive outcome, and vice versa.

Considering the “crossover” linkage between socio-emotional and cognitive outcomes across 12 and 24 months, the finding that maternal sensitivity served as an intervening factor for all the outcomes underscores its large impact on the premature infants’ long-term development. The large influence of maternal sensitivity, a proximal factor in infant development, is supported by the ecological and transactional models that describe the most strong environmental regulation of infant development to come from his/her immediate environment (i.e., family) (Bronfenbrenner, 1997; Sameroff & Suomi, 1996). The present findings underscore the importance of targeting maternal sensitivity to promote the premature infants’ developmental outcomes. Considering that socio-demographic risk was the only significant predictor of maternal sensitivity in the present sample of predominantly low-income African American families, focusing on maternal sensitivity might be particularly important and effective for promoting premature infants’ developmental outcomes among socio-demographically at-risk population.

Limitations and future directions

There were some limitations to the present study. First, the sample was limited to socio-demographically at-risk African American mothers and their premature infants, and the present finding of the strong relationship between the socio-demographic risk and maternal sensitivity,
and non-significant relationship between the other two predictors (i.e., infant medical risk, maternal states of mind regarding attachment) and maternal sensitivity may not generalize to populations of different ethnicity and economic status. Particularly among the present sample, the effect of socio-demographic risk on maternal sensitivity might have been overwhelming compared to the other two predictors. In addition, the present findings may not generalize to a sample of full-term infants; considering that premature infants are born early, their developmental trajectory might follow a different pattern between 12 and 24 months. Second, the present study only analyzed autonomous vs. non-autonomous maternal attachment representation classifications. The comparisons among different attachment representation classifications (autonomous, preoccupied, dismissing) were not possible because of small number of mothers with preoccupied classification. Additionally, the present study did not analyze organized (non-U) vs. disorganized (U) maternal attachment representation classification because there was no theoretical linkage between U/non-U classification and the infant outcomes examined in the present study. Third, there are limitations to the path model analysis. Path models are hypothesized models that examine linkages among factors that are theoretically supported to be related to each other; therefore, there might be other factors that are influencing the infant outcomes especially for the model that did not have a good fit.

The present study suggests that the developmental outcomes of premature infants are affected by proximal and distal factors; maternal sensitivity (a proximal factor) intervenes in the relation between a distal factor (i.e., socio-demographic risk) and infant socio-emotional and cognitive outcomes. The finding that the parenting quality predicts 12-month infant outcomes, which in turn intervenes in the linkage between parenting quality and 24-month infant outcomes demonstrates the organizational effect of parenting quality in shaping the development of
premature infants. The direct and indirect effects of parenting quality suggest the importance of targeting it in early interventions that aim to promote long-term premature infant development. In addition, early infant socio-emotional competency predicts later infant outcomes in various domains (socio-emotional and cognitive outcomes). Although more studies are needed to understand the predictors of infant socio-emotional competency, future interventions could target either or both maternal (i.e., maternal sensitivity) and infant (i.e., socio-emotional competency) levels to promote premature infants’ long-term development.

Additionally, the present study not only emphasizes the relevance of parenting quality to premature infant development, but also calls attention to the need for further work addressing how development in particular domain is affected by development in a different domain. Although some studies have looked at interrelations between different developmental domains such as emotional development and cognitive development (Bell & Wolfe, 2007), and motor development and cognitive development (Bertenthal & Campos, 1987; Diamond, 2000), further examination is needed to understand interrelations and causal influences across different developmental domains. Attachment theory, for example, has long maintained that quality of parenting is the most important, singular predictor of attachment security. The present study found that in addition to parenting quality, early infant cognitive development independently predicted later infant attachment security. This suggests that infants with better developed cognitive skills may be more likely to develop healthy secure base behavior than infants with less well developed cognitive skills, perhaps even independently of parental behavior. The mechanisms for the linkages across developmental domains are unclear, however, and calls for further exploration.
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Table 1
*Infant medical and maternal socio-demographic information at pre-intervention*  

<table>
<thead>
<tr>
<th></th>
<th>Group</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Intervention (N=83)</td>
<td>Control (N=90)</td>
</tr>
<tr>
<td>Infant Data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth weight (mean)</td>
<td>1430.42 (512.50)</td>
<td>1389.53 (598.24)</td>
</tr>
<tr>
<td>Gestational age at birth (mean)</td>
<td>30.35 (3.35)</td>
<td>29.90 (3.54)</td>
</tr>
<tr>
<td>Length of hospital stay (mean days)</td>
<td>38.85 (35.06)</td>
<td>42.34 (31.23)</td>
</tr>
<tr>
<td>Gender (% female)</td>
<td>55%</td>
<td>53%</td>
</tr>
<tr>
<td>Maternal Data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational attainment</td>
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<td></td>
</tr>
<tr>
<td>Less than high school diploma</td>
<td>17%</td>
<td>20%</td>
</tr>
<tr>
<td>High school diploma</td>
<td>42%</td>
<td>30%</td>
</tr>
<tr>
<td>Some college</td>
<td>25%</td>
<td>31%</td>
</tr>
<tr>
<td>Bachelor’s/Master’s degree</td>
<td>16%</td>
<td>19%</td>
</tr>
<tr>
<td>Yearly Family Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; $10,000</td>
<td>35%</td>
<td>30%</td>
</tr>
<tr>
<td>$10,000 - $19,999</td>
<td>18%</td>
<td>19%</td>
</tr>
<tr>
<td>$20,000 - $29,999</td>
<td>12%</td>
<td>11%</td>
</tr>
<tr>
<td>$30,000 - $39,999</td>
<td>7%</td>
<td>14%</td>
</tr>
<tr>
<td>$40,000 - $49,999</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>$50,000 - $59,999</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>$60,000 or more</td>
<td>17%</td>
<td>16%</td>
</tr>
<tr>
<td>State/federal assistance (% receiving)</td>
<td>81%</td>
<td>74%</td>
</tr>
<tr>
<td>Living below poverty threshold (%)</td>
<td>53%</td>
<td>49%</td>
</tr>
<tr>
<td>Age (mean years)</td>
<td>26.22 (6.01)</td>
<td>27.69 (7.03)</td>
</tr>
<tr>
<td>Married/living with partner (%)</td>
<td>43%</td>
<td>48%</td>
</tr>
<tr>
<td>Primiparous (%)</td>
<td>47%</td>
<td>50%</td>
</tr>
</tbody>
</table>

*Note. Numbers in parentheses are standard deviations.*
Table 2  
*Descriptive statistics of the predictor variables*

<table>
<thead>
<tr>
<th>Socio-demographic variables</th>
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</thead>
<tbody>
<tr>
<td>Socioeconomic risk index (mean)</td>
<td>1.44</td>
<td>(1.01)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; $20,000 yearly family income (%)</td>
<td>51%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did not complete high school (%)</td>
<td>19%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receive state/federal assistance (%)</td>
<td>78%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/living with partner (%)</td>
<td>46%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partner involved (%)</td>
<td>90%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partner live at home with mother (%)</td>
<td>55%</td>
<td></td>
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</tbody>
</table>

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<thead>
<tr>
<th>Infant medical variables</th>
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</thead>
<tbody>
<tr>
<td>Length of stay in NICU (mean days)</td>
<td>40.66</td>
<td>(33.08)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth weight (mean grams)</td>
<td>1409.15</td>
<td>(557.52)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GA at birth (mean)</td>
<td>30.12</td>
<td>(3.45)</td>
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<tr>
<td>Apgar scores at 1 minute (mean)</td>
<td>6.06</td>
<td>(2.32)</td>
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<tr>
<td>Apgar scores at 5 minutes (mean)</td>
<td>7.73</td>
<td>(1.65)</td>
<td></td>
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</tr>
<tr>
<td>NBRS (mean)</td>
<td>2.03</td>
<td>(2.55)</td>
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</tbody>
</table>

| Maternal sensitivity (mean) | 1.38 | (.46) |       |       |
| Autonomous maternal attachment representation (%) | 61%  |       |       |       |

*Note. Numbers in parentheses are standard deviations.*
Table 3  
*Descriptive statistics of the outcome variables*

<table>
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<th>Variable</th>
<th>12-month (mean)</th>
<th>24-month (mean)</th>
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<td>Infant cognitive development</td>
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<td></td>
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<tr>
<td>12-month (mean)</td>
<td>94.07 (14.08)</td>
<td>83.46 (18.77)</td>
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<tr>
<td>Infant behavior problems</td>
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<td></td>
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<tr>
<td>12-month (mean)</td>
<td>10.67 (5.94)</td>
<td>12.17 (7.79)</td>
</tr>
<tr>
<td>Infant socio-emotional competency</td>
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<td></td>
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<tr>
<td>12-month (mean)</td>
<td>15.19 (3.22)</td>
<td>16.44 (3.08)</td>
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<tr>
<td>Infant-mother attachment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-month (mean)</td>
<td>.91 (.43)</td>
<td>1.04 (.44)</td>
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*Note.* Numbers in parentheses are standard deviations.
Table 4
*Intercorrelations among maternal sensitivity, 12- and 24-month infant outcomes*

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<td>.23*</td>
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<td>.09</td>
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<td>.17</td>
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<td>-.12</td>
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* p < .05; *** p < .001
Table 5  
*Intercorrelations among infant medical variables and 12-month infant outcomes*

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<td>-.77***</td>
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<td>-.18*</td>
<td>-.31***</td>
<td>.29***</td>
<td>-.16</td>
<td>.29*</td>
<td>.05</td>
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</table>

* p < .05; *** p < .001

Note. Marital status was dummy coded as 1 = single/not living with partner, and 2 = married/living with partner.
Partner involvement was dummy coded as 0 = no/not involved, and 1 = yes/involved.
Partner’s residence status was dummy coded as 0 = no/not living home with participant, and 1 = yes/living home with participant.
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<td>4. Partner’s residence status</td>
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<tr>
<td>5. Number of children at home</td>
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<td>0.02</td>
<td>--</td>
<td>0.03</td>
<td>0.43***</td>
<td>0.36***</td>
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<td>0.36***</td>
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<td>0.18</td>
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Table 9
*Intercorrelations among maternal state of mind regarding attachment, and 12- and 24-month infant outcomes*

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<td>8. 24-month competency</td>
<td>-.08</td>
<td>.23*</td>
<td>.14</td>
<td>.51***</td>
<td>-.06</td>
<td>.43***</td>
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</tr>
<tr>
<td>9. 24-month attachment security</td>
<td>-.30*</td>
<td>.27*</td>
<td>-.16</td>
<td>.26*</td>
<td>.23*</td>
<td>.33*</td>
<td>-.03</td>
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</tr>
</tbody>
</table>

* p < .05; *** p < .001

Note. AAI status was dummy coded as 1= autonomous, and 2 = non-autonomous.
Table 10
Intercorrelations among 12-month infant outcomes and 24-month infant outcomes

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
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<td>--</td>
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<td>.30*</td>
<td>.29*</td>
<td>.62***</td>
<td>.07</td>
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<td>.28*</td>
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<td>2. 12-month behavior problems</td>
<td>.02</td>
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<td>.09</td>
<td>-.19</td>
<td>.09</td>
<td>.59***</td>
<td>.14</td>
<td>-.12</td>
</tr>
<tr>
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<td>.30*</td>
<td>.09</td>
<td>--</td>
<td>.09</td>
<td>.50***</td>
<td>.17</td>
<td>.51***</td>
<td>.25*</td>
</tr>
<tr>
<td>4. 12-month attachment security</td>
<td>.29*</td>
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<td>.09</td>
<td>--</td>
<td>.15</td>
<td>-.00</td>
<td>-.06</td>
<td>.24*</td>
</tr>
<tr>
<td>5. 24-month MDI</td>
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<td>.09</td>
<td>.50***</td>
<td>.15</td>
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<td>.03</td>
<td>.43***</td>
<td>.36***</td>
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<td>6. 24-month behavior problems</td>
<td>.07</td>
<td>.59***</td>
<td>.17</td>
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<td>.03</td>
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<tr>
<td>7. 24-month competency</td>
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<td>.14</td>
<td>.51***</td>
<td>-.06</td>
<td>.43***</td>
<td>.02</td>
<td>--</td>
<td>.18</td>
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<tr>
<td>8. 24-month attachment security</td>
<td>.28*</td>
<td>-.12</td>
<td>.25*</td>
<td>.24*</td>
<td>.36***</td>
<td>.02</td>
<td>.18</td>
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</tr>
</tbody>
</table>

* p < .05; *** p < .001
Table 11
*Intercorrelations among four predictor variables in path analyses*

<table>
<thead>
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</tr>
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<td>.05</td>
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<td>.28*</td>
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<td>-.12</td>
</tr>
<tr>
<td>3. Maternal sensitivity</td>
<td>-.38***</td>
<td>-.07</td>
<td>--</td>
<td>-.05</td>
</tr>
<tr>
<td>4. AAI status (autonomous vs. non-autonomous)</td>
<td>.28*</td>
<td>-.12</td>
<td>-.05</td>
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</tr>
</tbody>
</table>

* p < .05; *** p < .001

*Note. AAI status was dummy coded as 1 = autonomous, and 2 = non-autonomous.*
### Table 12
*Intercorrelations among four predictor variables in path analyses, and 12-month infant outcomes*

<table>
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<th>8</th>
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<tr>
<td>1. Socio-demographic risk composite score</td>
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<td>-.38***</td>
<td>.28*</td>
<td>-.14</td>
<td>.21</td>
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<td>-.28*</td>
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<tr>
<td>2. Infant medical risk composite score</td>
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<td>-.07</td>
<td>-.12</td>
<td>-.19</td>
<td>-.21</td>
<td>-.12</td>
<td>-.15</td>
</tr>
<tr>
<td>3. Maternal sensitivity</td>
<td>-.38***</td>
<td>-.07</td>
<td>--</td>
<td>-.05</td>
<td>.25*</td>
<td>-.33*</td>
<td>-.03</td>
<td>.70***</td>
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<td>4. AAI status (autonomous vs. non-autonomous)</td>
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<td>--</td>
<td>-.01</td>
<td>.05</td>
<td>-.13</td>
<td>.00</td>
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<td>5. 12-month MDI</td>
<td>-.15</td>
<td>-.19</td>
<td>.25*</td>
<td>-.01</td>
<td>--</td>
<td>.05</td>
<td>.38***</td>
<td>.29*</td>
</tr>
<tr>
<td>6. 12-month behavior problems</td>
<td>.21</td>
<td>-.21</td>
<td>-.33*</td>
<td>.05</td>
<td>.05</td>
<td>--</td>
<td>.11</td>
<td>-.19</td>
</tr>
<tr>
<td>7. 12-month competency</td>
<td>.18</td>
<td>-.12</td>
<td>-.03</td>
<td>-.13</td>
<td>.38***</td>
<td>.11</td>
<td>--</td>
<td>.09</td>
</tr>
<tr>
<td>8. 12-month attachment security</td>
<td>-.28*</td>
<td>-.15</td>
<td>.71***</td>
<td>.00</td>
<td>.29*</td>
<td>-.19</td>
<td>.09</td>
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</tr>
</tbody>
</table>

*p < .05; *** p < .001

*Note. AAI status was dummy coded as 1= autonomous, and 2 = non-autonomous.*
Table 13
*Intercorrelations among four predictor variables in path analyses, and 24-month infant outcomes*

<table>
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<tr>
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<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
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<tr>
<td>1. Socio-demographic risk composite score</td>
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<td>.05</td>
<td>-.38***</td>
<td>.28*</td>
<td>-.02</td>
<td>.06</td>
<td>.11</td>
<td>-.37***</td>
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<td>2. Infant medical risk composite score</td>
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<td>-.07</td>
<td>-.12</td>
<td>-.23*</td>
<td>-.17</td>
<td>.03</td>
<td>.08</td>
</tr>
<tr>
<td>3. Maternal sensitivity</td>
<td>-.38***</td>
<td>-.07</td>
<td>--</td>
<td>-.05</td>
<td>.08</td>
<td>-.13</td>
<td>-.07</td>
<td>.42***</td>
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<td>4. AAI status (autonomous vs. non-autonomous)</td>
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<td>-.10</td>
<td>-.06</td>
<td>-.08</td>
<td>-.30*</td>
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<tr>
<td>5. 24-month MDI</td>
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<td>-.10</td>
<td>--</td>
<td>-.01</td>
<td>.43***</td>
<td>.33*</td>
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<td>6. 24-month behavior problems</td>
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<td>-.13</td>
<td>-.06</td>
<td>-.01</td>
<td>--</td>
<td>.00</td>
<td>-.03</td>
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<td>7. 24-month competency</td>
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<td>.03</td>
<td>-.07</td>
<td>-.08</td>
<td>.43***</td>
<td>.00</td>
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<td>.17</td>
</tr>
<tr>
<td>8. 24-month attachment security</td>
<td>-.37***</td>
<td>.08</td>
<td>.42***</td>
<td>-.30*</td>
<td>.33*</td>
<td>-.03</td>
<td>.17</td>
<td>--</td>
</tr>
</tbody>
</table>

* p < .05; *** p < .001

*Note.* AAI status was dummy coded as 1 = autonomous, and 2 = non-autonomous.
Table 14  
Path model trimming process for infant security of attachment outcome at 12 months

<table>
<thead>
<tr>
<th></th>
<th>$\chi^2$</th>
<th>df</th>
<th>p-value</th>
<th>AIC</th>
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<td>Baseline</td>
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<td>.67</td>
<td>35.53</td>
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<tr>
<td>Trimmed Path</td>
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<td></td>
</tr>
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<td>Infant medical risk to</td>
<td>1.75</td>
<td>4</td>
<td>.78</td>
<td>33.75</td>
</tr>
<tr>
<td>maternal sensitivity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AAI to maternal sensitivity</td>
<td>2.19</td>
<td>5</td>
<td>.82</td>
<td>32.19</td>
</tr>
</tbody>
</table>

Note. CFI = 1.00, RMSEA = .00 for the final trimmed model.
Table 15
Path model trimming process for infant cognitive outcome at 12 months

<table>
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<tr>
<th></th>
<th>$\chi^2$</th>
<th>df</th>
<th>p-value</th>
<th>AIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
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<td>3</td>
<td>.32</td>
<td>37.53</td>
</tr>
<tr>
<td><strong>Trimmed Path</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infant medical risk to</td>
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<td>4</td>
<td>.44</td>
<td>35.74</td>
</tr>
<tr>
<td>maternal sensitivity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AAI to maternal sensitivity</td>
<td>4.11</td>
<td>5</td>
<td>.53</td>
<td>34.11</td>
</tr>
</tbody>
</table>

*Note.* CFI = 1.00, RMSEA = .00 for the final trimmed model.
Table 16  
Path model trimming process for infant behavior problem outcome at 12 months

<table>
<thead>
<tr>
<th></th>
<th>$\chi^2$</th>
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<th>p-value</th>
<th>AIC</th>
</tr>
</thead>
<tbody>
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<td><strong>Baseline</strong></td>
<td>5.35</td>
<td>3</td>
<td>.15</td>
<td>39.35</td>
</tr>
<tr>
<td><strong>Trimmed Path</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infant medical risk to</td>
<td>5.53</td>
<td>4</td>
<td>.24</td>
<td>37.53</td>
</tr>
<tr>
<td>maternal sensitivity</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>5.88</td>
<td>5</td>
<td>.32</td>
<td>35.88</td>
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</tbody>
</table>

*Note.* CFI = .96, RMSEA = .04 for the final trimmed model.
Table 17
*Path model trimming process for infant socio-emotional competency at 12 months*

<table>
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<tr>
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<th>df</th>
<th>p-value</th>
<th>AIC</th>
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</thead>
<tbody>
<tr>
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<td>.08</td>
<td>40.84</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal sensitivity to 12-month infant socio-emotional competency</td>
<td>6.91</td>
<td>4</td>
<td>.14</td>
<td>38.91</td>
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<td>5</td>
<td>.21</td>
<td>37.11</td>
</tr>
<tr>
<td>AAI to maternal sensitivity</td>
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<td>6</td>
<td>.28</td>
<td>35.48</td>
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</table>

*Note.* CFI = .90, RMSEA = .05 for the final trimmed model.
Table 18
Path model trimming and modification process for infant attachment security at 24 months

<table>
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<td></td>
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</tr>
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<td>AAI to maternal sensitivity</td>
<td>14.77</td>
<td>4</td>
<td>.01</td>
<td>46.77</td>
</tr>
<tr>
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<td>15.12</td>
<td>5</td>
<td>.01</td>
<td>45.12</td>
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<td>Added Path</td>
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<td></td>
</tr>
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<td>4.99</td>
<td>4</td>
<td>.29</td>
<td>36.99</td>
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</table>

Note. CFI = .98, RMSEA = .05 for the final modified model.
Table 19
Path model trimming process for infant cognitive outcome at 24 months

<table>
<thead>
<tr>
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<th>p-value</th>
<th>AIC</th>
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</thead>
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<td>41.24</td>
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<tr>
<td>Trimmed Path</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Infant medical risk to maternal sensitivity</td>
<td>7.46</td>
<td>4</td>
<td>.11</td>
<td>39.46</td>
</tr>
<tr>
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<td>5</td>
<td>.17</td>
<td>37.80</td>
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<td>8.35</td>
<td>6</td>
<td>.21</td>
<td>36.35</td>
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</table>

Note. CFI = .85, RMSEA = .06 for the final trimmed model.
Table 20
Path model trimming process for infant behavior problem outcome at 24 months

<table>
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<tr>
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<th>p-value</th>
<th>AIC</th>
</tr>
</thead>
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<td>3</td>
<td>.29</td>
<td>37.77</td>
</tr>
<tr>
<td>Trimmed Path</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infant medical risk to maternal sensitivity</td>
<td>3.99</td>
<td>4</td>
<td>.41</td>
<td>35.99</td>
</tr>
<tr>
<td>AAI to maternal sensitivity</td>
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<td>5</td>
<td>.50</td>
<td>34.35</td>
</tr>
<tr>
<td>Maternal sensitivity to 24-month infant behavior problem outcome</td>
<td>5.43</td>
<td>6</td>
<td>.49</td>
<td>33.43</td>
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</tbody>
</table>

Note. CFI = 1.00, RMSEA = .00 for the final trimmed model.
Table 21
Path model trimming process for infant socio-emotional competency at 24 months

<table>
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<th>df</th>
<th>p-value</th>
<th>AIC</th>
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</tr>
<tr>
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<td>1.86</td>
<td>4</td>
<td>.76</td>
<td>33.86</td>
</tr>
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<td>5</td>
<td>.81</td>
<td>32.26</td>
</tr>
<tr>
<td>Maternal sensitivity to 24-month infant socio-emotional competency</td>
<td>2.74</td>
<td>6</td>
<td>.84</td>
<td>30.74</td>
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</tbody>
</table>

*Note. CFI = 1.00, RMSEA = .00 for the final trimmed model.*
Table 22  
*Path model trimming process for infant attachment security outcome at 24 months with maternal sensitivity and 12-month outcomes as intervening factors*

<table>
<thead>
<tr>
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<th>$\chi^2$</th>
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<th>p-value</th>
<th>AIC</th>
</tr>
</thead>
<tbody>
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<td><strong>Baseline</strong></td>
<td>65.85</td>
<td>22</td>
<td>.00</td>
<td>129.85</td>
</tr>
<tr>
<td><strong>Trimmed Path</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal sensitivity to 12-month infant socio-emotional competency</td>
<td>65.93</td>
<td>23</td>
<td>.00</td>
<td>127.93</td>
</tr>
<tr>
<td>Infant medical risk to maternal sensitivity</td>
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<td>24</td>
<td>.00</td>
<td>126.14</td>
</tr>
<tr>
<td>AAI to maternal sensitivity</td>
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<td>25</td>
<td>.00</td>
<td>124.53</td>
</tr>
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<td>68.23</td>
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<td>.00</td>
<td>124.23</td>
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</table>

*Note.* CFI = .69, RMSEA = .13 for the final trimmed model.
Table 23
Path model trimming process for infant cognitive outcome at 24 months with maternal sensitivity and 12-month outcomes as intervening factors

<table>
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<th>$p$-value</th>
<th>AIC</th>
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</thead>
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<td>.01</td>
<td>104.83</td>
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<tr>
<td>Trimmed Path</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-month infant behavior problem to 24-month infant cognitive outcome</td>
<td>40.85</td>
<td>23</td>
<td>.01</td>
<td>102.85</td>
</tr>
<tr>
<td>Maternal sensitivity to 12-month infant socio-emotional competency</td>
<td>41.05</td>
<td>24</td>
<td>.02</td>
<td>101.05</td>
</tr>
<tr>
<td>Infant medical risk to maternal sensitivity</td>
<td>41.26</td>
<td>25</td>
<td>.02</td>
<td>99.26</td>
</tr>
<tr>
<td>12-month infant attachment security to 24-month infant cognitive outcome</td>
<td>41.56</td>
<td>26</td>
<td>.03</td>
<td>97.56</td>
</tr>
<tr>
<td>AAI to maternal sensitivity</td>
<td>41.99</td>
<td>27</td>
<td>.03</td>
<td>95.99</td>
</tr>
</tbody>
</table>

Note. CFI = .90, RMSEA = .07 for the final trimmed model.
Table 24
Path model trimming process for infant behavior problem outcome at 24 months with maternal sensitivity and 12-month outcomes as intervening factors

<table>
<thead>
<tr>
<th>Path Model</th>
<th>$\chi^2$</th>
<th>df</th>
<th>p-value</th>
<th>AIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>36.05</td>
<td>22</td>
<td>.03</td>
<td>100.05</td>
</tr>
<tr>
<td>Trimmed Path</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-month infant cognitive outcome to 24-month infant behavior problem</td>
<td>36.09</td>
<td>23</td>
<td>.04</td>
<td>98.09</td>
</tr>
<tr>
<td>Maternal sensitivity to 12-month infant socioemotional competency</td>
<td>36.19</td>
<td>24</td>
<td>.05</td>
<td>96.19</td>
</tr>
<tr>
<td>Infant medical risk to maternal sensitivity</td>
<td>36.40</td>
<td>25</td>
<td>.07</td>
<td>94.40</td>
</tr>
<tr>
<td>AAI to maternal sensitivity</td>
<td>36.86</td>
<td>26</td>
<td>.08</td>
<td>92.86</td>
</tr>
<tr>
<td>12-month infant socioemotional outcome to 24-month infant behavior problem</td>
<td>37.31</td>
<td>27</td>
<td>.09</td>
<td>91.31</td>
</tr>
<tr>
<td>12-month infant attachment security to 24-month infant behavior problem</td>
<td>37.89</td>
<td>28</td>
<td>.10</td>
<td>89.89</td>
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Note. CFI = .92, RMSEA = .06 for the final trimmed model.
<table>
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<tr>
<th></th>
<th>$\chi^2$</th>
<th>df</th>
<th>p-value</th>
<th>AIC</th>
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</thead>
<tbody>
<tr>
<td><strong>Baseline</strong></td>
<td>40.02</td>
<td>22</td>
<td>.01</td>
<td>104.02</td>
</tr>
<tr>
<td><strong>Trimmed Path</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal sensitivity to 12-month infant socio-emotional competency</td>
<td>40.16</td>
<td>23</td>
<td>.02</td>
<td>102.16</td>
</tr>
<tr>
<td>Infant medical risk to maternal sensitivity</td>
<td>40.36</td>
<td>24</td>
<td>.02</td>
<td>100.36</td>
</tr>
<tr>
<td>AAI to maternal sensitivity</td>
<td>40.82</td>
<td>25</td>
<td>.02</td>
<td>98.82</td>
</tr>
<tr>
<td>12-month infant behavior problem to 24-month infant socio-emotional competency</td>
<td>41.29</td>
<td>26</td>
<td>.03</td>
<td>97.29</td>
</tr>
<tr>
<td>12-month infant cognitive outcome to 24-month infant socio-emotional competency</td>
<td>42.35</td>
<td>27</td>
<td>.03</td>
<td>96.35</td>
</tr>
<tr>
<td>12-month infant attachment security to 24-month infant socio-emotional competency</td>
<td>43.71</td>
<td>28</td>
<td>.03</td>
<td>95.71</td>
</tr>
</tbody>
</table>

*Note.* CFI = .87, RMSEA = .07 for the final trimmed model.
Figure 1. The conceptual model of the present study. Maternal sensitivity will be examined as a direct predictor and a potential intervening variable between the other three predictors (i.e., socio-demographic risk, infant medical risk, maternal state of mind regarding attachment) and the infant outcomes. 12-month outcomes will also be examined as potential intervening variables between the predictors and 24-month outcomes.
Figure 2. Model 1. Path of influence from predictors to a 12-month outcome. Predictors are maternal sensitivity (matseny1), infant medical risk (zmedrisk), socio-demographic risk (zsocrisk), and maternal state of mind regarding attachment (cv3aai).
Figure 3. Model 2. Path of influence from the three predictor variables (i.e., infant medical risk, socio-demographic risk, maternal state of mind regarding attachment) to a 12-month outcome with maternal sensitivity as intervening factor.
Figure 4. Model 3. Path of influence from predictors to a 24-month outcome. Predictors are maternal sensitivity (matseny1), infant medical risk (zmedrisk), socio-demographic risk (zsocrisk), and maternal state of mind regarding attachment (cv3aai).
Figure 5. Model 4. Path of influence from the three predictor variables (i.e., infant medical risk, socio-demographic risk, maternal state of mind regarding attachment) to a 24-month outcome with maternal sensitivity as intervening factor.
Figure 6. Model 5. Path of influence from predictors to a 24-month outcome with 12-month outcomes (i.e., infant attachment security, infant cognitive outcome, infant behavior problem, infant socio-emotional outcome) as intervening factors. Predictors are maternal sensitivity, infant medical risk, socio-demographic risk, and maternal state of mind regarding attachment.
Figure 7. Model 6. Path of influence from the three predictor variables (i.e., infant medical risk, socio-demographic risk, maternal state of mind regarding attachment) to a 24-month outcome with 12-month infant outcomes (i.e., infant attachment security, infant cognitive outcome, infant behavior problem, infant socio-emotional outcome) and maternal sensitivity as intervening factors.
Figure 8. Final path model of relation from the three predictor variables to infant attachment security at 12 months with maternal sensitivity as intervening variable. Socio-demographic risk significantly predicted 12-month infant attachment security with maternal sensitivity as intervening variable. Infant medical risk and maternal state of mind regarding attachment predicted maternal sensitivity through common cause. All numbers in the figure are standardized coefficients. The final model had $\chi^2(5) = 2.19, p = .82$; CFI = 1.00, RMSEA = .00, AIC = 32.19; $R^2 = .49$
Figure 9. Final path model of relation from the three predictor variables to infant cognitive outcome at 12 months with maternal sensitivity as intervening variable. Socio-demographic risk significantly predicted 12-month infant cognitive outcome with maternal sensitivity as intervening variable. Infant medical risk and maternal state of mind regarding attachment predicted maternal sensitivity through common cause. All numbers in the figure are standardized coefficients. The final model had $\chi^2(5) = 4.11, p = .53$; CFI = 1.00, RMSEA = .00, AIC = 34.11; $R^2 = .06$. 
Figure 10. Final path model of relation from the three predictor variables to infant behavior problem at 12 months with maternal sensitivity as intervening variable. Socio-demographic risk significantly predicted 12-month infant behavior problem with maternal sensitivity as intervening variable. Infant medical risk and maternal state of mind regarding attachment predicted maternal sensitivity through common cause. All numbers in the figure are standardized coefficients. The final model had $\chi^2(5) = 5.88, p = .32$; CFI = .96, RMSEA = .04, AIC = 35.88; $R^2 = .11$. 
Figure 11. Final path model of relation from the three predictor variables to infant socio-emotional competency at 12 months with maternal sensitivity as intervening variable. None of the predictors significantly predicted 12-month infant socio-emotional competency. All numbers in the figure are standardized coefficients. The final model had $\chi^2(6) = 7.48, p = .28$; CFI = .90, RMSEA = .05, AIC = 35.48; $R^2 = .00$. 
Figure 12. Final path model of relation from the three predictor variables to infant attachment security at 24 months with maternal sensitivity as intervening variable. Socio-demographic risk significantly predicted 24-month infant attachment security with maternal sensitivity as intervening variable. Infant medical risk and maternal state of mind regarding attachment predicted maternal sensitivity through common cause. Addition of path from maternal state of mind regarding attachment to 24-month infant attachment security improved the fit of model. All numbers in the figure are standardized coefficients. The final model had $\chi^2(4) = 4.99, p = .29$; CFI = .98, RMSEA = .05, AIC = 36.99; $R^2 = .30$. 
Figure 13. Final path model of relation from the three predictor variables to infant cognitive outcome at 24 months with maternal sensitivity as intervening variable. None of the predictors significantly predicted 24-month infant cognitive outcome. All numbers in the figure are standardized coefficients. The final model had $\chi^2(6) = 8.35, p = .21; \text{CFI} = .85, \text{RMSEA} = .06, \text{AIC} = 36.35; R^2 = .00.$
Figure 14. Final path model of relation from the three predictor variables to infant behavior problem at 24 months with maternal sensitivity as intervening variable. None of the predictors significantly predicted 24-month infant behavior problem. All numbers in the figure are standardized coefficients. The final model had $\chi^2(6) = 5.43, p = .49$; CFI = 1.00, RMSEA = .00, AIC = 33.43; $R^2 = .00$. 
Figure 15. Final path model of relation from the three predictor variables to infant socio-emotional outcome at 24 months with maternal sensitivity as intervening variable. None of the predictors significantly predicted 24-month infant socio-emotional outcome. All numbers in the figure are standardized coefficients. The final model had $\chi^2(6) = 2.74, p = .84$; CFI = 1.00, RMSEA = .00, AIC = 30.74, $R^2 = .00$. 
Figure 16. Final path model of relation from the three predictor variables to infant attachment security at 24 months with 12-month infant outcomes and maternal sensitivity as intervening variable. Socio-demographic risk significantly predicted 24-month infant attachment security with maternal sensitivity, which significantly predicted 12-month infant cognitive outcome and infant behavior problem, as intervening variables. Infant medical risk and maternal state of mind regarding attachment predicted maternal sensitivity through common cause. All numbers in the figure are standardized coefficients. The final model had $\chi^2(26) = 68.23, p = .00$; CFI = .69, RMSEA = .13, AIC = 124.23; $R^2 = .14$. 
Figure 17. Final path model of relation from the three predictor variables to infant cognitive outcome at 24 months with 12-month infant outcomes and maternal sensitivity as intervening variable. Socio-demographic risk significantly predicted 24-month infant cognitive outcome with maternal sensitivity, which significantly predicted 12-month infant cognitive outcome, as intervening variables. Infant medical risk and maternal state of mind regarding attachment predicted maternal sensitivity through common cause. All numbers in the figure are standardized coefficients. The final model had $\chi^2(28) = 41.99, p = .03$; CFI = .90, RMSEA = .07, AIC = 95.99; $R^2 = .42$. 
Figure 18. Final path model of relation from the three predictor variables to infant behavior problem at 24 months with 12-month infant outcomes and maternal sensitivity as intervening variable. Socio-demographic risk significantly predicted 24-month infant behavior problem with maternal sensitivity, which significantly predicted 12-month infant behavior problem, as intervening variables. Infant medical risk and maternal state of mind regarding attachment predicted maternal sensitivity through common cause. All numbers in the figure are standardized coefficients. The final model had $\chi^2(28) = 37.89, p = .10; \text{CFI} = .92, \text{RMSEA} = .06, \text{AIC} = 89.89; R^2 = .41.$
Figure 19. Final path model of relation from the three predictor variables to infant socio-emotional outcome at 24 months with 12-month infant outcomes and maternal sensitivity as intervening variable. None of the predictors significantly predicted 24-month infant socio-emotional outcome at 24 months; 24-month infant socio-emotional outcome was only significantly predicted by 12-month infant socio-emotional outcome. All the number in the figure are standardized coefficients. The final model had $\chi^2(28) = 43.71, p = .03; CFI = .87, RMSEA = .07, AIC = 95.71; R^2 = .25$. 
Appendix C

Apgar Scores

<table>
<thead>
<tr>
<th>Sign</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate</td>
<td>Absent</td>
<td>Slow (&lt; 100 beats/min)</td>
<td>&gt; 100 beats/min</td>
</tr>
<tr>
<td>Respiration</td>
<td>Absent</td>
<td>Weak cry, hypoventilations</td>
<td>Good, strong cry</td>
</tr>
<tr>
<td>Muscle tone</td>
<td>Limp</td>
<td>Some flexion</td>
<td>Active motion</td>
</tr>
<tr>
<td>Reflex irritability</td>
<td>No response</td>
<td>Grimace</td>
<td>Cry or active withdrawal</td>
</tr>
<tr>
<td>Color</td>
<td>Blue or pale</td>
<td>Body pink, extremities blue</td>
<td>Completely pink</td>
</tr>
</tbody>
</table>

Appendix D

Nursery Neurobiologic Risk Score (NBRS)

<table>
<thead>
<tr>
<th>Points</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ventilation</td>
<td>No mechanical ventilation</td>
<td>≤ 7 days</td>
<td>8–28 days</td>
<td>&gt; 28 days</td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>Never &lt; 7.15</td>
<td>&lt; 7.15 for ≤ 1 hr</td>
<td>&lt; 7.15 metabolic for &gt; 1 hr</td>
<td>Cardiopulmonary arrest</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(&gt; 7.15 for ≥ 2x) or</td>
<td>(&lt; 7.15 for ≥ 2x) or</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt; 7.15 all respirator,</td>
<td>&lt; 7.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>any duration</td>
<td>metabolic, any duration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sepsis</td>
<td>None</td>
<td>Controlled on one drug and normal interictal EEG</td>
<td>Not controlled on one drug or abnormal interictal EEG</td>
<td>Status epilepticus ≥ 12 hr</td>
<td></td>
</tr>
<tr>
<td>Intraventricular hemorrhage</td>
<td>None</td>
<td>Germinal matrix only</td>
<td>Blood in one or both ventricles</td>
<td>Intraventricular blood or development of intraventricular hemorrhage</td>
<td></td>
</tr>
<tr>
<td>Periventricular leukomalacia</td>
<td>None</td>
<td>Questionable changes that resolve</td>
<td>Moderate or definite changes that resolve</td>
<td>Cyst formation or cerebral atrophy with large ventricles</td>
<td></td>
</tr>
<tr>
<td>Infection</td>
<td>None or antibiotics for possibility of infection with negative cultures</td>
<td>Highly suspicious or documented infection without changes in blood pressure</td>
<td>Septic shock (documented sepsis + hypotension)</td>
<td>Meningitis</td>
<td></td>
</tr>
<tr>
<td>Hyponatremia</td>
<td>No glucose &lt; 30 mg/dL and ≤ 8 hr duration</td>
<td>&lt; 30 mg/dL, asymptomatic and &gt; 6 hr of symptomatic at any duration</td>
<td>&lt; 26 mg/dL and ≥ 24 hr and symptomatic</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Appendix E

Maternal Behavior Q-sort (MBQ)

Manual
Maternal Behaviour Q-sort Version 3.1
David R. Pederson, Greg Moran, & Sandi Bento Department of Psychology, University of Western Ontario, London, Ontario N6A 5C2, Canada
October, 1994 (revised May, 1999)

Introduction:
This is a revision of the Maternal Behaviour Q-sort Version 2.1 a. Our major intent in this revision was to develop more items that might distinguish mothers in avoidant relationships from those in ambivalent relationships. We also removed items that do not directly describe the infant's experience. For example, in Version 2.1 there is an item about mother being a good informant. This is a good item in that it is usually easy to get relevant information during the home visit, observers generally agree, and it distinguishes mothers in secure relationships from those in non-secure relationships. The difficulty is that the item refers to the observer's rather than the infant's direct experience with the mother. Because our goal in writing q-set items is to describe mother-infant interactions rather than identifying sensitive mothers, items that did not directly describe the infant's experiences were omitted in Version 3.0. If your purpose is to distinguish sensitive from insensitive mothers, either version will work well. We have a few cases where the observer completed both versions. The summary sensitivity scores were very similar.

Observation procedures:
Please read our description of observer training and observation procedures in the 1995 Monograph paper referenced above as well as in the description of the home visit procedures on pp 118 - 120 of the same monograph. The researcher should also carefully review the advice about q-sort procedures provided by Everett Watersb. It is essential that the observers are familiar with attachment principles and with the q-sort items, that they take extensive notes about maternal availability, acceptance and cooperation during the visit, and that they carefully review and extend these notes after the visit.

Q-sorting procedures:
We print each item on 2- by 4.25-inch heavy stock cards. Be sure to include the item numbers, but not item weights. See Appendix at end of this Manual for a copy of the items in a format suitable for printing.

The sorting procedures take place in three phases. (Be sure the cards are shuffled before you start your sort.)

First, sort the cards into three piles - with cards descriptive of the mother on the right hand pile, cards referring to behaviours not observed, only moderately descriptive of the mother, or sometimes true and sometimes not true in the middle, and cards that are not characteristic of mother on the left. Mechanically it works out better if the piles are roughly equal but
with slightly fewer cards in the middle pile. Remember that you want to describe the salient characteristics of the interactions you observed. Then sort the cards in the "like the mother pile" into three approximately equal piles that vary in how similar the behaviours are to the mother's observed behaviour.

Then sort the "unlike the mother pile" into three piles that differ in how uncharacteristic they are and, finally sort the middle pile into three piles. This second sort will also allow you to correct misplacements from the original sort. You should now have nine piles with roughly the same number of cards in each pile.

Now starting with the far right pile, place the cards so you can read each card. If you have fewer than 12 cards in that pile, look at the next pile and move enough cards over so you have at least 12 cards.

Now select the 10 cards are the most characteristic of the mother's observed behaviour. These 10 cards go into pile 9. Move the remaining cards to the next pile (pile 8) and do the same thing - pick out the 10 cards from that pile that are most descriptive of the mother. Again make sure that you have at least 12 cards to examine.

Continue this process until you have finished piles 9, 8, 7 and 6. Then go to the unlike end and do the same process of picking the 10 cards least like the mother you observed. The se cards go into pile 1. You should end up with 9 piles of 10 cards each (the order within each pile is not relevant).

Now record the item numbers on a data sheet. We find it simplest to have a sheet with 9 rows numbered 1 through 9, each with 10 columns. Essentially what you have produced are ratings of the mother's behaviour on a nine-point scale with the restriction that each scale point is used exactly 10 times. The data sheet lists the items with each rating.

Data entry:

Of course you can develop your own software to handle data entry. We have found that a simple spreadsheet program such as Excel or QuatroPro works well. We a newer version that has multiple folders in one file. One folder, labelled 'data entry', has a column with 10 '1's', 10 '2's'...and so on to 10 '9's'. We copy that column (this will become the data column) and the enter the card numbers from each pile such that the 10 cards in pile 1 are next to the 1's and so forth so that you end up with two columns of 90 rows (not counting id rows) - one with the 1's, 2's, etc., and the second with the q-set item numbers.

We then use the "sort" function to sort those two columns by the item numbers so that you have a column of item numbers from 1 to 90 and a column of the pile number (or rating) for each item. Since most statistical programs assume that subjects will be in rows, we transpose the data.
column into a row and copy this row into a second folder, labelled 'data'. Of course you will want to
provide participant and observer identification for each row and we find it helpful to have the item numbers listed in a row at the top data matrix. We have the sensitivity criterion sort as the second row in this data matrix. The mother's sensitivity score can be calculated by the spreadsheet program's correlation command.

Q-set items:

Note: The item itself follows the item number. The number in left margin is the criterion weight for sensitivity for that item. Only the item should be printed on the q-set cards (i.e., don't put the sensitivity weight or explanation on the card).

2 1. Provides B with little opportunity to contribute to the interaction

Explanation: M may initiate play or interactions, however, she does not follow B's lead, as a result there is little or no turn taking. M is directive without regard to B's intentions. If little or no interaction place in the middle piles.

8 2. Monitors B's activities during visit.

Explanation: Regardless of competing tasks, M keeps close tabs on B. Should B enter another room M is aware of B's activities, her behaviour suggests she knows what B is doing at all times

2 3. M's responses are unpredictable.

Low: Responds consistently in same manner.

Explanation: The predictability of M's responding is evaluated. From the B's experience, it is difficult to know how M will respond to positive or negative signals. Consider any response and lack of responses to B's signals. If M consistently ignores B's signals or is consistently responsive, place in the unlike piles.

2 4. During interaction with visitor does not notice B.

Explanation: M is preoccupied with visitors and does not monitor B, unaware of B's actions. M fails to notice or comment on B's activities.

1 5. Awkward and ill at ease during intimate interactions with B

Explanation: During times of physical contact with B, appears mechanical, inanimate or perfunctory. For example - M not comfortable holding and cuddling B. When B
6 6. Supports interaction of B with visitor.

Examples: Introduces B to visitor. M positions herself where she can facilitate B's interactions with visitor. Suggests what B is comfortable with in interactions with strangers.

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

Explanation: Physical movements of B are awkward, perhaps without gentleness. Examples - treats B like a puppet, swoops in on B, roughly adjusts B's posture.

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

Explanation: Consider context of B's activity to judge the appropriateness of M's signal. If not interacting with B and B is focussed on an activity, may not require a signal. If interacting with B and needs to leave the room, gives an explanation or signal when she leaves the room. If M does not leave the room, place in the middle piles.

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

Explanation: B's positive affect, or B's attempts to engage M are ignored. These are B's signals directed to M. If B does not signal M, place in the middle piles.

6 10. Speaks to B directly.

Examples: B is attending when M directs comments to B. Elicits B's attention before communicating.

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

Elaboration: M expands B's vocalizations or activities in a teaching style.

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

Explanation: M schedules appointment to fit her schedule rather than during a time when B usually at his/her best. During visit should B become tired M does not acknowledge, or respond.

5 13. Uses sibling or television to keep B entertained.
Explanation: M makes herself unavailable by putting B away in front of the television or by having sibling take over interaction with B. If M remains available to monitor and attend to B even if TV is on, place in the unlike piles.

3 14. Breaks off from B in mid-interaction to speak to visitor or attend to some other activity.

Explanation: Terminates or interrupts interaction while actively engaged with B without notice or preparation. Example - M sets B down when telephone rings or to talk to visitor while B is interacting with her.

4 15. Attempts to involve B in games or activities that are beyond B's current capability.

Explanation: Unaware or insensitive to B's current ability Example - engages B in activity when B appears frustrated, or unable to complete. This is in contrast with scaffolding, i.e., when M clearly assists B in attaining new goals.

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

Explanation: M does not alter interaction in response to B's cues of disinterest or dislike. Example - may continue to offer B a toy in spite of B's turning away or refusals, or may request B "perform" when B is not interested.

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

Explanation: M follows own agenda during interaction. Ignores B's initiatives or signals to change pace or content of the interactions. Imposes her wishes.

4 18. Home shows little evidence of presence of B.

Explanation: B's belongings not immediately obvious, indicating a lack of support of the B's exploratory behaviour. Surroundings are not "baby proofed" so that M has to restrict B's exploration.

If toys and B's belongings are accessible or M creates an interesting and safe environment for the B to explore, place in the unlike piles.

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

Explanation: Puts B away from M during displays of negative affect. Example - removes B to bedroom or playpen. If no negative affect, place in the middle piles.

9 20. Responds accurately to signals of distress.
Explanation: Accuracy is defined by B's response. B's distress is lessened or terminated after M's intervention. If no intervention from M, place in the unlike piles. If no distress place in the middle piles.

3 21. Overwhelmed by caretaking demands.

Explanation: M is struggling to provide basic care. Example - M may be passive, withdrawn, or frustrated during caregiving tasks such as changing, feeding.

1 22. Appears to tune out and not notice bids for attention.

Explanation: Psychologically inaccessible to B, unaware of B's signals.

8 23. Provides B with unrestricted access to her

Explanation: M positions herself so that B able to establish proximity on his/her own. If B mobile, able to get to M without any obstacles. If B not mobile M positions herself near B.

7 24. Arranges her location so she can perceive B's signals

Examples - sits facing B, if B moves M re-positions herself to enable her to hear or see B

3 25. Not skillful in dividing her attention between B and competing demands and therefore misses B's cues

Explanation: What is being assessed is M's skill at attending to simultaneous demands. When involved with other tasks has lapses in awareness of B.

8 26. Responds immediately to cries/whimpers

Explanation: The timing of M's response is what is evaluated. Consider all forms of negative affect, including cries, displays of frustration, and fusses. If no negative affect, place in the middle piles.

9 27. Responds to B's distress and non-distress signals even when engaged in some other activity such as having a conversation with visitor

Explanation: M not only attends but also responds to B's cues while engaged in other tasks.

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

Explanation: Provides a more appropriate activity that engages the B

9 29. When B is distressed, M is able to identify the source
Explanation: M does not appear to be guessing at what B needs, seems to know B well as evidenced by B's responses to her interventions.

5 30. Interactions with B characterized by active physical manipulations

Explanation: Interactions are physical rather than verbal. M physically controls B's movements, position, and actions. Examples - may move B's hand to object; vigorously moves B, hand over hand pat-a-cake

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

Explanations: Consider the abruptness of how M redirects B's bids for proximity or contact. Examples - does not acknowledge B's desires for contact; diverts B's attention without regard for B's need for contact met. If M acknowledges B's bid and offers an alternative that is acceptable to B, place in the unlike piles.

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

Examples - may interfere with activity B is enjoying; may not acknowledge B's communications to her; initiates interactions when B is attending to other activities; is active when B is quiet; quiet when B is active

3 33. Repeated series of interventions in search of best method to satisfy B, resorts to trial and error

Explanation: No apparent strategy in meeting B's needs, interventions seem without obvious rationale. No intuitive sense of B's needs.

9 34. Interactions revolve around B's tempo and current state

Explanation: Indicates awareness of B's current state by following B's lead. Examples - when B is tired does not push B to complete a task, changes the interaction according to B's interest or level of frustration.

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

Explanation: Comfort-seeking as well as pleasurable activities are considered. M seems to know the moment B has had enough. Example - if B is in contact with M, does not terminate, interrupt, or redirect until B is ready to be put down; if B is engaged with play with M, continues activity until B moves on or otherwise signals the game is finished.
7 36. Interrupts activity that is likely to be dangerous

Explanation: If the context requires, M makes a quick response that clearly protects B, but may not allow B an alternative. M's clear priority is to protect the B.

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

Explanation: M may seem more concerned with B getting messy rather than B's need to explore or B's budding independence. Example - M frequently wipes B's face and fingers while B is eating or drinking; interferes during mealtime where eating soft foods with fingers may be appropriate. If messy play not observed place in the middle piles.

5 38. Provides nutritional snacks

Explanation: This is a "filler" card; there is not a direct implication about M's sensitivity. However, it is important to sort filler card this accurately because the placement of each card influences the placement of all other cards. If providing nutritional snacks is one of the most salient characteristics of the M, this card will replace other cards in the most like piles. Example - gives infant and toddler nutritionally appropriate foods.

5 39. Instructive during interactions with B

Examples - Seizes interactions as instructional opportunities to teach B; labels B's activities; asks "what is...?"; uses directives during interactions.

5 40. Encourages B's initiatives in feeding

Explanation: considers what is age appropriate and what facilitates B's initiatives. Examples - provides B an opportunity to feed him/herself by providing finger foods; allows B to use spoon.

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

Explanation: M uses toys or food to mediate interactions. Notice especially what M does in response to fusses and proximity bids

2 42. Expressions of affection are limited to perfunctory, mechanical kisses, typically on the head

Explanation: expressions of affection are abrupt or obligatory, lacking in an intimate, engaging quality. Example - swoops down and pecks B on head. If no expressions of affection place in the middle piles. If affectionate exchanges are warm, with spontaneous touches, caresses, kisses or in response to B's gestures of affection place in the unlike piles.
6 43. Is animated when interacting with B

Explanation: uses varied expressions of affect, enthusiastic with B. If M apathetic or indifferent in interaction with B place in the unlike piles.

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

Explanation: intervenes when B has reached the limit in the ability to self soothe or otherwise regulate emotions. Determine M's expectations by noting the timing of M's intervention as well as the content. Examples - limits B's frustration with task by offering assistance; monitors B when falls to see if B needs comfort in managing hurt; gently suggests alternative activity to contain B's over excitement

7 45. Praises B

Examples - shows B approval by acknowledging and celebrating B's accomplishments and activities with B.

7 46. Molds B to self when holding Middle: If B not held by M

Explanation: M's body is relaxed, rounded, and oriented to accept close contact of B, cuddles B to her. If M pulls away, sits back, or places arms between herself and B while holding place in the unlike piles.

7 47. Displays affection by touching, caressing Middle: No expressions of affection

Low: affection expressed in non-physical ways

Examples - takes the opportunity when B is near to spontaneously touch or caress tenderly as expressions of positive feelings toward B. If M's expressions of affection are primarily verbal place in the unlike piles

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

Explanation: aware of B's environment such that she points to and labels things that may be of interest to B. Also consider how M structures the environment for B by offering verbal prompts to transitions in activities, introduces visitors, labels toys and activities during play.

6 49. Seeks interactions with B

Explanation: initiates interactions with B. The content, quality and timing of the interactions are not assessed here. Examples - introduces toys, talks to B, invites B to approach.
6 50. Creates interesting physical environment for B

Explanation: has apparently thought about B's needs, interests and developmental level by providing toys and objects that are accessible and appropriate to support B's exploration and learning. Also consider the provision of a place for B to play with these objects.

5 51. Provides age appropriate toys

Explanation: is mindful of B's developmental abilities by giving B toys that are developmentally suitable.

5 52. Uses verbal prohibitions (e.g., "no or don't") Explanation: inhibits, or controls B's actions verbally.

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

Explanation: ensures the B has an opportunity to respond by adapting the pace of the interactions. Examples - gives B opportunity to explore when introducing a new activity; in puzzle play is more focused on supporting play than completing puzzle

1 54. Teases B to promote continued interaction/contact

Explanation: taunts B as a way of expressing negative feeling. As in Ainsworth's rejection scale, even when B responds positively to teasing, there seems to be some negative aggressive component in the teaser's beha viour - and in extremes teasing is sadistic and hostile. Examples - offers toy then puts it out of B's reach when B shows interest; repeatedly pushes toy in B's face; trying to distract B by poking at B when distressed. If not observed and would not be expected from this M, place in the unlike piles.

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

Explanation: accepts B's desire to express autonomy, explore, and or experience his/her environment without restrictions even when these experiences may be contrary to M's expectations. This does not include experiences which may be dangerous or which the B may need M's interventions (e.g., bedtime).

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

Explanation: has pre-conceived, inflexible ideas about child rearing without regard or accommodation to B's actual needs or desires. Examples - keeps B on schedule rather than meeting the immediate needs of B; insists on early toilet training or weaning

9 57. Shows delight in interaction with B.
Explanation: enjoyment and adoration of B is evident in interaction. Interactions are characterized by spontaneous positive gestures, vocalizations, smiles to B.

6 58. Considers B's needs when structuring environment

Explanation: consider both psychological and physical needs of B. Examples - arranges her schedule to reflect needs of B; provides quiet time when B is stressed or tired; structures the physical environment to allow for uninhibited exploration and movement; dangerous and adult objects are out of B's reach; B's toys are within reach.

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

Explanation: as in Ainsworth's cooperation scale, M's interventions and initiations of interaction do not break into or interrupt the B's ongoing activity. Interactions are geared in both timing and quality to B's state, mood, and current interest. Example - if B is engaged in appropriate activity, waits until B is finished before introducing a new task.

2 60. Scolds or criticizes B

Explanation: interactions characterized by reprimands, scorn or hostile criticism. There is a punitive tone to the interactions.

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

Explanation: Irritation may be expressed covertly by purposely ignoring bids for contact with signs of irritation (e.g., sighs, hostile glances). Irritation may also be expressed overtly by criticizing B's bids for proximity (e.g., 'oh, you suck' said in a derogatory tone) or by abruptly physically redirecting the B's bids for contact.

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

Explanation: predicts B's needs accurately as shown by B's satisfaction with her response. Example - B fussing, M intervenes and B settles and appears content

2 63. Signals awareness of B's distress to B, but does not intervene

Explanation: Not ignoring B's distress, she is aware but does not respond. Example - may look or comment to B but does not give B what B seems to want or need.

6 64. Greets B when re-entering room
Explanation: Demonstrates an awareness of B's attentional state. Example - when she comes back after a brief separation, will acknowledge B, except when such a greeting might be intrusive or disruptive of B's ongoing activity. If not observed, place in middle piles.

8 65. Responds to B's signals

Explanation: not only is M aware of B's signals to her, she also responds to these signals. Responses may or may not be appropriate. If B does not signal, place in middle piles

1 66. Consistently unresponsive

Explanation: does not respond to negative or positive signals, consider the consistency of her unresponsiveness in the pile placement. Example - M responds to negative signals and ignores positive signals place in middle piles.

1 67. Responds only to frequent, prolonged or intense distress

Explanation: intervenes and/or comforts B only when signals of distress are frequent, or prolonged or intense, otherwise seems oblivious to B's distress. M does not respond to B's less intense signals of distress such as fusses and whimpers.

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

Explanation: interactions with B are well-timed and matched to B's level of activity or enthusiasm.

7 69. Notices when B is distressed (e.g., cries, fusses or whimpers)

Explanation: shows that she is aware of B's distress. Gives an observable sign to B that she is attending. She may look or comment to B. M may or may not intervene.

1 70. Response delayed such that B cannot connect M's responses with the action that initiated it

Explanation: because of her timing, responses are not contingent on or obviously related to B's signals or behaviour. Example: B's signals for juice, M gets juice several minutes later; B's signals to be picked up, M ignores until she finishes her activity in progress and then responds.

9 71. Builds on the focus of B's attention

Explanation: aware of B's interest and attention and uses this information as a guide for her interactions. Example - in play, attends to what the B is interested in, rather than introducing a new activity.
8 72. Notices when B smiles and vocalizes
Explanation: gives an observable sign that she is aware of B's positive signals. Example - looks when B smiles, but may or may not respond by smiling, vocalizing.

5 73. When irritated with B, disengages or distances herself from interaction with B. Middle: Condition not observed or irritation not directed to B
Low: Irritation with B expressed through increased emotionally engaged interaction.
Explanation: if irritated, withdraws from B either by physically or psychologically distancing herself. Examples - when she is annoyed with B, refuses to engage in joint activity or may respond with flat affect or indifference.
Place in low piles if irritation or annoyance expressed by emotionally charged interactions with B. Example - B does something M does not like, she may retaliate by scolding, teasing, or screaming at B.

4 74. Anxious about B's exploration (e.g. hovers over B)
Explanation: Overzealous monitoring of B's independent exploration. Seems overly concerned or hyper vigilant about B's developmentally appropriate exploration. Example - may physically restrict B's movements, stands over B when B is obviously good at walking.

7 75. Encourages independent exploration of environment.
Explanation: acknowledges B's exploratory interests by providing B with opportunities to explore independently. Example - introduces a potentially interesting activity or toy, then allows B to investigate
Place in middle piles if M ignores B's exploration
Place in unlike piles if M discourages independent exploration by controlling or interfering with B's exploration.

8 76. Uses close bodily contact to soothe B.
Explanation: when B is upset, M comforts B physically by cuddling, molding herself to B. Example - when B distressed M picks up and hugs.
Place in middle piles if no distress
6 77. Vocalizes to B throughout the visit.

Explanation: uses verbal contact to signal her accessibility. This item assesses the quantity of vocalizations, they may or may not be appropriate in timing or content. Example - there is a sense that M is aware and connected to B. Place in low piles if M never talks to B

6 78. Plays social games with B.

Explanation: engages B with interactive games. Examples - peek-a-boo, pat-a-cake, round and round the garden, and other age appropriate, animated play

4 79. Distressed by B's demands.

Explanation: has a low tolerance for more insistent signals; has difficulty accepting responsibility for B's care. Examples - when B needs care or comfort, M is annoyed, irritable, exasperated or resentful.

4 80. Annoyed by B's uncooperative behaviour.

Explanation: does not accept or respect B when B does not comply with M's initiatives or requests. Examples - when B does not comply, M may escalate the emotional tone by joining battle with B; putting B away, ignoring B, or refusing to give into B's demands.

9 81. Spontaneously expresses positive feelings to B.

Explanation: love and acceptance is expressed outwardly to B; M not only loves B, but these feelings are made obvious to B. Examples - shows her feelings of pleasure to B by saying endearing things to B, when B does something cute, smiles and comments to B.

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

Explanation: physically restrains B. Impersonal restraints such as playpens and highchairs may be considered if B is placed in these as a way of restricting the B's active exploration. Example - encloses the B with her legs while in play so B cannot move away.

3 83. Aloof when interacting with B

Explanation: interactions are impersonal, detached, and remote from B's activity in progress. Example - interactions seem more obligatory than pleasurable

3 84. Display of affect does not match B's display of affect (e.g., smiles when B is distressed)
Explanation: affect is not congruent with B's emotional state, may indicate that M mislabels B's affect. Example - B frightened, M laughs and says B is shy;

3 85. Interactions with B are incomplete

Explanation: interactions are fragmented or arbitrarily terminated before reaching a natural end. Does not give B opportunity to fully explore current activity. Example - introduces different activity when B is enjoying playing with a toy.

2 86. Terminates physical contact before B is satisfied

Explanation: when is in contact, breaks off contact before B is soothed completely or ready to move on to other activities.

2 87. Actively opposes B's wishes

Explanation: does not acknowledge B's autonomy, does not accept that B has a will, actively interferes or redirects B from activity in progress. Does not considers B's mood and activity in progress.

1 88. Interactions with B are characterized by conflict

Explanation: M and B seem to have different agendas, lack of mutual enjoyment, undercurrent of hostility to each other.

9 89. Interventions satisfy B

Explanation: interventions are effective as evidenced by B being settled or content.

1 90. Punitive or retaliatory during interactions with B

Explanation: underling hostility and rejection of B. Examples - scolds, criticizes, ignores, aggressive, abrupt jerking about, or slaps B.


b http://www.psychology.sunysb.edu/attachment/measures/content/aqs_items.pdf
Appendix F

Adult Attachment Interview (AAI)

ADULT ATTACHMENT INTERVIEW PROTOCOL

Mary B. Main

Introduction

I’m going to be interviewing you about your childhood experiences, and how those experiences may have affected your adult personality. So, I’d like to ask you about your early relationship with your family, and what you think about the way it might have affected you. We'll focus mainly on your childhood, but later we'll get on to your adolescence and then to what's going on right now. This interview often takes about an hour, but it could be anywhere between 45 minutes and an hour and a half.

1. Could you start by helping me get oriented to your early family situation, and where you lived and so on? If you could tell me where you were born, whether you moved around much, what your family did at various times for a living?

This question is used for orientation to the family constellation, and for warm-up purposes. The research participant must not be allowed to begin discussing the quality of relationships here, so the "atmosphere" set by the interviewer is that a brief list of "who, when" is being sought, and no more than two or three minutes at most should be used for this question. The atmosphere is one of briefly collecting demographics.

In the case of participants raised by several persons, and not necessarily raised by the biological or adoptive parents (frequent in high-risk samples), the opening question above may be "Who would you say raised you?": The interviewer will use this to help determine who should be considered the primary attachment figure(s) on whom the interview will focus.

Did you see much of your grandparents when you were little? If participant indicates that grandparents died during his or her own lifetime, ask the participant's age at the time of each loss. If there were grandparents whom she or he never met, ask whether this (these) grandparents) had died before she was born. If yes, continue as follows: Your mother's father died before you were born? How old was she at the time, do you know? In a casual and spontaneous way, inviting only a very brief reply, the interviewer then asks, Did she tell you much about this grandfather?

Did you have brothers and sisters living in the house, or anybody besides your parents? Are they living nearby now or do they live elsewhere?

2. I'd like you to try to describe your relationship with your parents as a young child if you could start from as far back as you can remember?
Encourage participants to try to begin by remembering very early. Many say they cannot remember early childhood, but you should shape the questions such that they focus at first around age five or earlier, and gently re-mind the research participant from time to time that if possible, you would like her to think back to this age period.

Admittedly, this is leaping right into it, and the participant may stumble. If necessary, indicate in some way that experiencing some difficulty in initially attempting to respond to this question is natural, but indicate by some silence that you would nonetheless like the participant to attempt a general description.

3. Now I'd like to ask you to choose five adjectives or words that reflect your relationship with your mother starting from as far back as you can remember in early childhood--as early as you can go, but say, age 5 to 12 is fine. I know this may take a bit of time, so go ahead and think for a minute...then I'd like to ask you why you chose them. I'll write each one down as you give them to me.

Not all participants will be able to think of five adjectives right away. Be sure to make the word relationship clear enough to be heard in this sentence. Some participants do use "relationship" adjectives to describe the parent, but some just describe the parent herself--e.g., "pretty"... "efficient manager"--as though they had only been asked to "pick adjectives to describe your mother". These individual differences are of interest only if the participant has heard the phrase, "that reflect your childhood relationship" with your mother. The word should be spoken clearly, but with only slight stress or emphasis.

Some participants will not know what you mean by the term adjectives, which is why we phrase the question as "adjectives or words". If the participant has further questions, you can explain, "just words or phrases that would describe or tell me about your relationship with your (mother) during childhood".

The probes provided below are intended to follow the entire set of adjectives, and the interviewer must not begin to probe until the full set of adjectives has been given. Be patient in waiting for the participant to arrive at five adjectives, and be encouraging. This task has proven very helpful both in starting an interview, and in later interview analysis. It helps some participants to continue to focus upon the relationship when otherwise they would not be able to come up with spontaneous comments.

If for some reason a subject does not understand what a memory is, you might suggest they think of it like an image they have in their mind similar to a videotape of something which happened when they were young. Make certain that the subject really does not understand the question first, however. The great majority who may seem not to understand it are simply unable to provide a memory or incident.

The participant's ability (or inability) to provide both an overview of the relationship and specific memories supporting that overview forms one of the most critical bases of interview analysis. For this reason it is important for the interviewer to press enough in the effort to
obtain the five "overview" adjectives that if a full set is not provided, she or he is reasonably certain that they truly cannot be given.

The interviewer's manner should indicate that waiting as long as a minute is not unusual, and that trying to come up with these words can be difficult. Often, participants indicate by their non-verbal behavior that they are actively thinking through or refining their choices. In this case an interested silence is warranted. Don't, however, repeatedly leave the participant in embarrassing silences for very long periods. Some research participants may tell you that this is a hard job, and you can readily acknowledge this. If the participant has extreme difficulty coming up with more than one or two words or adjectives, after a period of two to three minutes of supported attempts ("Mm... I know it can be hard ...this is a pretty tough question... Just take a little more time"), then say something like "Well, that's fine. Thank you, we'll just go with the ones you've already given me." The interviewer's tone here should make it clear that the participant's response is perfectly acceptable and not un-common.

Okay, now let me go through some more questions about your description of your childhood relationship with your mother. You say your relationships with her was (you used the phrase) Are there any memories or incidents that come to mind with respect to (word) The same questions will be asked separately for each adjective in series. Having gone through the probes which follow upon this question (below), the interviewer moves on to seek illustration for each of the succeeding adjectives in turn:

You described your childhood relationship with your mother as (or, "your second adjective was", or "the second word you used was"). Can you think of a memory or an incident that would illustrate why you chose to describe the relationship?

The interviewer continues, as naturally as possible, through each phrase or adjective chosen by the participant, until all five adjectives or phrases are covered. A specific supportive memory or expansion and illustration is requested for each of the adjectives, separately. In terms of time to answer, this is usually the longest question. Obviously, some adjectives chosen may be almost identical, e.g., "loving ... caring". Nonetheless, if they have been given to you as separate descriptors, you must treat each separately, and ask for memories for each.

While participants sometimes readily provide a well-elaborated incident for a particular word they have chosen, at other times they may fall silent; or "illustrate" one adjective with another ("loving ...um, because she was generous"); or describe what usually happened--i.e., offer a "scripted" memory--rather than describing specific incidents. There are a set series of responses available for these contingencies, and it is vital to memorize them.

If the participant is silent, the interviewer waits an appropriate length of time. If the participant indicates non-verbally that she or he is actively thinking, remembering or simply attempting to come up with a particularly telling illustration, the interviewer maintains an interested silence. If the silence continues and seems to indicate that the participant is
feeling stumped, the interviewer says something like, "well, just take another minute and see if anything comes to mind". If following another waiting period the participant still cannot respond to the question, treat this in a casual, matter of fact manner and say "well, that's fine, let's take the next one, then". Most participants do come up with a response eventually, however, and the nature of the response then deter-mines which of the follow-up probes are utilize

If the participant re-defines an affective with a second adjective as, "Loving ---she was generous", the inter-viewer probes by repeating the original adjective (loving) rather than permitting the participant to lead them to use the second one (generous). In other words, the interviewer in this case will say, "Well, can you think of a specific memory that would illustrate how your relationship was loving?" The interviewer should be careful, however, not to be too explicit in their intention to lead the participant back to their original word usage. If the speaker continues to discuss "generous" after having been probed about loving once more, this violation of the discourse task is meaningful and must be allowed. As above, the nature of the participant's response determines which follow-up probes are utilized.

If a specific and well-elaborated incident is given, the participant has responded satisfactorily to the task, and the interviewer should indicate that she or he understands that. However, the interviewer should briefly show continuing interest by asking whether the participant can think of a second incident.

• If one specific but poorly elaborated incident is given, the interviewer probes for a second. Again, the interviewer does this in a manner emphasizing his or her own interest.
• If as a first response the participant gives a "scripted" or "general" memory, as "Loving. She always took us to the park and on picnics. She was really good on holidays" or "Loving. He taught me to ride a bike"--the interviewer says, "Well, that's a good general description, but I'm wondering if there was a particular time that happened, that made you think about it as loving?"

• If the participant does now offer a specific memory, briefly seek a second memory, as above. If an-other scripted memory is offered instead, or if the participant responds "I just think that was a loving thing to do", the interviewer should be accepting, and go on to the next adjective. Here as elsewhere the interviewer's behavior indicates that the participant's response is satisfactory.

4. Now I'd like to ask you to choose five adjectives or words that reflect your childhood relationship with your father, again starting from as far back as you can remember in early childhood--as early as you can go, but again say, age 5 to 12 is fine. I know this may take a bit of time, so go ahead and think again for a minute...then I'd like to ask you why you chose them. I'll write each one down as you give them to me. (Interviewer repeats with probes as above).

5. Now I wonder if you could tell me, to which parent did you feel the closest, and why? Why isn't there this feeling with the other parent?
By the time you are through with the above set of questions, the answer to this one may be obvious, and you may want to remark on that ("You've already discussed this a bit, but I'd like to ask about it briefly any- way..."). Furthermore, while the answer to this question may indeed be obvious for many participants, some—particularly those who describe both parents as loving—may be able to use it to reflect further on the difference in these two relationships.

6. When you were upset as a child, what would you do?

This is a critical question in the interview, and variations in the interpretation of this question are important. Consequently, the participant is first encouraged to think up her own interpretations of "upset", with the interviewer pausing quietly to indicate that the question is completed, and that an answer is requested.

Once the participant has completed her own interpretation of the question, giving a first answer, begin on the following probes. Be sure to get expansions of every answer. If the participant states, for example, "I withdrew", probe to understand what this research participant means by "withdrew". For example, you might say, "And what would you do when you withdrew?"

The interviewer now goes on to ask the specific follow-up questions below. These questions may appear similar, but they vary in critical ways, so the interviewer must make sure that the participant thinks through each question separately. This is done by placing vocal stress on the changing contexts (as we have indicated by underlining).

-----When you were Upset emotionally when you were little, what would you do? (Wait for participant's reply). Can you think of a specific time that happened?

-----Can you remember what would happen when you were hurt physically? (Wait for participant's reply). Again, do any specific incidents (or, do any other incidents) come to mind?

-----Were you ever M when you were little? (Wait for participant's reply). Do you remember what would happen?

When the participant describes going to a parent, see first what details they can give you spontaneously. Try to get a sense of how the parent or parents responded, and then when and if it seems appropriate you can briefly ask one or two clarifying questions.

Be sure to get expansions of every answer. Again, if the participant says "I withdrew", for example, probe to see what the participant means by this, i.e., what exactly she or he did, or how exactly they felt, and if they can elaborate on the topic.

If the participant has not spontaneously mentioned being held by the parent in response to any of the above questions, the interviewer can ask casually at the conclusion to the series, "I
was just wondering, do you remember being held by either of your parents at any of these times--I mean, when you were upset, or hurt, or ill?"

In earlier editions of these guidelines, we suggested that if the participant answers primarily in terms of responses by one of the parents, the interviewer should go through the above queries again with respect to the remaining parent. This can take a long time and distract from the recommended pacing of the interview. Consequently, it is no longer required.

What is the first time you remember being separated from your parents? - - -How did you respond? Do you remember how your parents responded?

- - -Are there any other separations that stand out in your mind? Here research participants often describe first going off to nursery school, or to primary school, or going camping.

In this context, participants sometimes spontaneously compare their own responses to those of other children. This provides important information regarding the participant's own overall attitude towards attachment, so be careful not to cut any such descriptions or comparisons short.

8. Did you ever feel rejected as a young child? Of course, looking back on it now, you may realize it wasn't really rejection, but what I'm trying to ask about here is whether you remember ever having rejected in childhood

-----How old were you when you first felt this way, and what did you do?

-----Why do you think your parent did those things--do you think he/she realized he/she was rejecting you?

Interviewer may want to add a probe by refraining the question here, especially if no examples are forthcoming. The probe we suggest here is, Did you ever feel pushed away or ignored?" Many participants tend to avoid this in terms of a positive answer.

So, were you ever frightened or worried as a child?

Let the research participant respond "freely" to this question, defining the meaning for themselves. They may ask you what the question means, and if so, simply respond by saying "It's just a more general question". Do not probe heavily here. If the research participant has had traumatic experiences which they elect not to de- scribe, or which they have difficulty remembering or thinking about, you should not insist upon hearing about them. They will have a second, brief opportunity to discuss such topics later.

9. Were your parents ever threatening with you in any way - maybe for discipline, or even jokingly?

-----Some people have told us for example that their parents would threaten to leave them or send them away from home.-----(Note to researchers). In particular communities, some
specific kind of punishment not generally considered fully abusive is common, such as "the silent treatment", or "shaming", etc. One question regarding this one selected specific form of punishment can be inserted here, as for example, 'Some people have told us that their parents would use the silent treatment--did this ever happen with your parents?: The question should then be treated exactly as threatening to send away from home, i.e., the participant is free to answer and expand on the topic if she or he wishes, but there are no specific probes. The researcher should not ask about more than one such specific (community) form of punishment, since queries regarding more than one common type will lead the topic away from its more general intent (below).

Some people have memories of threats or of some kind of behavior that was abusive. -----Did anything like this ever happen to you, or in your family?

-----How old were you at the time? Did it happen frequently? -----Do you feel this experience affects you now as an adult? -----Does it influence your approach to your own child?

-----Did you have any such experiences involving people outside your family?

If the participant indicates that something like this did happen outside the family, take the participant through the same probes (age? frequency? affects you now as an adult? Influences your approach to your own child?). Be careful with this question, however, as it is clinically sensitive, and by now you may have been asking the participant difficult questions for an extended period of time.

Many participants simply answer "no" to these questions. Some, however, describe abuse and may some suffer distress in the memory. When the participant is willing to discuss experiences of this kind, the interviewer must be ready to maintain a respectful silence, or to offer active sympathy, or to do whatever may be required to recognize and insofar as possible to help alleviate the distress arising with such memories.

If the interviewer suspects that abuse or other traumatic experiences occurred, it is important to attempt to ascertain the specific details of these events insofar as possible. In the coding and classification system which accompanies this interview, distressing experiences cannot be scored for Unresolved/disorganized responses unless the researcher is able to establish that abuse (as opposed to just heavy spanking, or light hitting with a spoon that was not frightening) occurred.

Where the nature of a potentially physically abusive (belting, whipping, or hitting) experience is ambiguous, then, the interviewer should try to establish the nature of the experience in a light, matter-of-fact manner, without excessive prodding. If, for example, the participant says "I got the belt" and stops, the interviewer asks, "And what did getting the belt mean?". After encouraging as much spontaneous expansion as possible, the interviewer may still need to ask, again in a matter-of-fact tone, how the participant responded or felt at the time. "Getting the belt" in itself will not qualify as abuse within the adult attachment scoring and classification systems, since in some households and communities this is a common, systematically but not harshly imposed experience. Being
belted heavily enough to overwhelmingly frighten the child for her physical welfare at the time, being belted heavily enough to cause lingering pain, and/or being belted heavily enough to leave welts or bruises will qualify.

In the case of sexual abuse as opposed to battering, the interviewer will seldom need to press for details, and should be very careful to follow the participant's lead. Whereas on most occasions in which a participant describes themselves as sexually abused the interviewer and transcript judge will have little need to probe further, occasionally a remark is ambiguous enough to require at least mild elaboration. If, for example, the participant states `and I just thought he could be pretty sexually abusive', the interviewer will ideally follow-up with a query such as, `well, could you tell me a little about what was happening to make you see him as sexually abusive?'. Should the participant reply that the parent repeatedly told off-color jokes in her company, or made un-toward remarks about her attractiveness, the parent's behavior, though insensitive, will not qualify as sexually abusive within the accompanying coding system. Before seeking elaboration of any kind, however, the interviewer should endeavor to determine whether the participant seems comfortable in discussing the incident or incidents.

All querying regarding abuse incidents must be conducted in a matter-of-fact, professional manner. The interviewer must use good judgment in deciding whether to bring querying to a close if the participant is becoming uncomfortable. At the same time, the interviewer must not avoid the topic or give the participant the impression that discussion of such experiences is unusual. Interviewers sometimes involuntarily close the topic of abuse experiences and their effects, in part as a well-intentioned and protective response towards participants who in point of fact would have found the discussion welcome.

Participants who seem to be either thinking about or revealing abuse experiences for the first time-- "No, nothing ....no... well, 1, I haven't thought, remembered this for, oh, years, but ...maybe they used to... tie me.... "-- must be handled with special care, and should not be probed unless they clearly and actively seem to want to discuss the topic. If you sense that the participant has told you things they have not previously discussed or remembered, special care must be taken at the end of the interview to ensure that the participant does not still suffer distress, and feels able to contact the interviewer or project director should feelings of distress arise in the future.

In such cases the participant's welfare must be placed above that of the researcher. While matter-of-fact, professional and tactful handling of abuse-related questions usually makes it possible to obtain sufficient information for scoring, the interviewer must be alert to indications of marked distress, and ready to tactfully abandon this line of questioning where necessary. Where the complete sequence of probes must be abandoned, the interviewer should move gracefully and smoothly to the next question, as though the participant had in fact answered fully.

10. In general, how do you think your overall experiences with your parents have affected your adult personality?
The interviewer should pause to indicate she or he expects the participant to be thoughtful regarding this question, and is aware that answering may require some time.

Are there any aspects to your early experiences that you feel were a set-back in your development?

In some cases, the participant will already have discussed this question. Indicate, as usual, that you would just like some verbal response again anyway, "for the record".

It is quite important to know whether or not a participant sees their experiences as having had a negative effect on them, so the interviewer will follow-up with one of the two probes provided directly below. The interviewer must stay alert to the participant's exact response to the question, since the phrasing of the probe differs according to the participant's original response.

If the participant has named one or two setbacks, the follow-up probe used is:

---Are there any other aspects of your early experiences, that you think might have held your development back, or had a negative effect on the way you turned out?

If the participant has understood the question, but has not considered anything about early experiences a setback, the follow-up probe used is:

---Is there any thin about your early experiences that you think might have held your development back, or had a negative effect on the way you turned out?

Although the word anything receives some vocal stress, the interviewer must be careful not to seem to be expressing impatience with the participant's previous answer. The stress simply implies that the participant is being given another chance to think of something else she or he might have forgotten a moment ago.

RE: PARTICIPANTS WHO DON'T SEEM TO UNDERSTAND THE TERM, SETBACK. A few participants aren't familiar with the term, set-back. If after a considerable wait for the participant to reflect, the participant seems simply puzzled by the question, the interviewer says,

"Well, not everybody uses terms like set-back for what I mean here. I mean, was there anything about your early experiences, or any parts of your early experiences, that you think might have held your development back, or had a negative effect on the way you turned out?"

In this case, this becomes the main question, and the probe becomes

-Is there anything else about your early experiences that you think might have held your development back, or had a negative effect on the way you turned out?

Why do you think your parents behaved as they did during your childhood?
This question is relevant even if the participant feels childhood experiences were entirely positive. For participants reporting negative experiences, this question is particularly important.

Were there any other adults with whom you were close, like parents, as a child?

--- Or any other adults who were especially important to you, even though not parental?

Give the participant time to reflect on this question. This is the point at which some participants will mention housekeepers, au pairs, or nannies, and some will mention other family members, teachers, or neighbors.

Be sure to find out ages at which these persons were close with the participant, whether they had lived with the family, and whether they had had any caregiving responsibilities. In general, attempt to determine the significance and nature of the relationship.

13. Did you experience the loss of a parent or other close loved one while you were a young child—for example, a sibling, or a close family member?

(A few participants understand the term "loss" to cover brief or long-term separations from living persons, as, "I lost my mom when she moved South to stay with her mother". If necessary, clarify that you are referring to death only, i.e. specifically to loved ones who had died).

-----Could you tell me about the circumstances, and how old you were at the time? -----How did you respond at the time?-----Was this death sudden or was it expected?-----Can you recall your feelings at that time?

-----Have your feelings regarding this death changed much over time? If not volunteered earlier. Did you attend the funeral, and what was this like for you?

If loss of a parent or sibling. What would you say was the effect on your (other parent) and on your household, and how did this change over the years?

-----Would you say this loss has had an effect on your adult personality?

-----Were relevant How does it affect your approach to your own child? 13a. Did you lose any other important persons during your childhood?

(Same queries—again, this refers to people who have died rather than separation experiences).

13b. Have you lost other close persons, in adult years? (Same queries).

Be sure that the response to these questions covers loss of any siblings, whether older or younger, loss of grandparents, and loss of any person who seemed a "substitute parent" or who lived with the family for a time. Some individuals will have been deeply affected by.
Probe any loss which seems important to the participant, including loss of friends, distant relatives, and neighbors or neighbor's children. Rarely, the research participant will seem distressed by the death of someone who they did not personally know (often, a person in the family, but sometimes someone as removed as the friend of a friend).

If a participant brings up the suicide of a friend of a friend and seems distressed by it, the loss should be fully probed. The interviewer should be aware, then, that speakers may be assigned to the unresolved/disorganized adult attachment classification as readily for lapses in monitoring occurring during the discussion of the death of a neighbor's child experienced during the adult years as for loss of a parent in childhood.

Interviewing research participants regarding loss obviously requires good clinical judgment. At maximum, only four to five losses are usually fully probed. In the case of older research participants or those with traumatic histories, there may be many losses, and the interviewer will have to decide on the spot which losses to probe. No hard and fast rules can be laid out for determining which losses to skip, and the interviewer must to the best of his or her ability determine which losses--if there are many--are in fact of personal significance to the participant. Roughly, in the case of a participant who has lost both parents, spouse, and many other friends and relatives by the time of the interview, the interviewer might elect to probe the loss of the parents, the spouse, and "any other loss which you feel may have been especially important to you". If, however, these queries seem to be becoming wearying or distressing for the participant, the interviewer should acknowledge the excessive length of the querying, and offer to cut it short.

14. Other than any difficult experiences you've already described, have you had any other experiences which you should regard as potentially traumatic?

Let the participant free-associate to this question, then clarify if necessary with a phrase such as, I mean, any experience which was overwhelmingly and immediately terrifying.

This question is a recent addition to the interview. It permits participants to bring up experiences which may otherwise be missed, such as scenes of violence which they have observed, war experiences, violent separation, or rape.

Some researchers may elect not to use this question, since it is new to the 1996 protocol. If you do elect to use it, it must of course be used with all subjects in a given study.

The advantage of adding this question is that it may reveal lapses in reasoning or discourse specific to traumatic experiences other than loss or abuse.

Be very careful, however, not to permit this question to open up the interview to all stressful, sad, lonely or up- setting experiences which may have occurred in the subject's lifetime, or the purpose of the interview and of the question may be diverted. It will help if your tone indicates that these are rare experiences.
Follow up on such experiences with probes only where the participant seems at relative ease in discussing the event, and/or seems clearly to have discussed and thought about it before.

Answers to this question will be varied. Consequently, exact follow-up probes cannot be given in advance, although the probes succeeding the abuse and loss questions may serve as a partial guide. In general, the same cautions should be taken with respect to this question as with respect to queries regarding frightening or worrisome incidents in childhood, and experiences of physical or sexual abuse. Many researchers may elect to treat this question lightly, since the interview is coming to a close and it is not desirable to leave the participant re- viewing too many difficult experiences just prior to leave taking.

15. Now I'd like to ask you a few more questions about your relationship with your pants. Were there many changes in your relationship with your parents (or remaining parent) after childhood? We'll get to the present in a moment, but right now I mean changes occurring roughly between your childhood and your adulthood?

Here we are in part trying to find out, indirectly (1) whether there has been a period of rebellion from the parents, and (2) also indirectly, whether the participant may have rethought early unfortunate relationships and "forgiven" the parents. Do not ask anything about forgiveness directly, however--this will need to come up spontaneously. This question also gives the participant the chance to describe any changes in the parents behavior, favorable or unfavorable, which occurred at that time.

16. Now I'd like to ask you, what is your relationship with your parents (or remaining parent) like for you now as an adult? Here I am asking about your current relationship.

----Do you have much contact with your parents at present?----What would you say the relationship with your parents is like currently?----Could you tell me about any (or any other) sources of dissatisfaction in your current relationship with your parents? any special (or any other) sources of special satisfaction?

This has become a critical question within the Adult Attachment Interview, since a few participants who had taken a positive stance towards their parents earlier suddenly take a negative stance when asked to describe current relationships. As always, the interviewer should express a genuine interest in the participant's response to this question, with sufficient pause to indicate that a reflective response is welcome.

17. I’d like to move now to a different sort of question--it's not about your relationship with your parents, instead it's about an aspect of your current relationship with (specific child of special interest to the re- searcher, or all the participant's children considered together). How do you respond now, in terms of feelings, when you separate from your child / children? (For adolescents or individuals without children, see below).

Ask this question exactly as it is, without elaboration, and be sure to give the participant enough time to respond. Participants may respond in terms of leaving child at school, leaving
child for vacations, etc., and this is encouraged. What we want here are the participant's feelings about the separation. This question has been very helpful in interview analysis, for two reasons. In some cases it highlights a kind of role-reversal between parents and child, i.e., the participant may in fact respond as though it were the child who was leaving the parent alone, as though the parent was the child. In other cases, the research participant may speak of a fear of loss of the child, or a fear of death in general. When you are certain you have given enough time (or repeated or clarified the question enough) for the participant's naturally-occurring response, then (and only then) add the following probe:

-----Do you ever feel worried about (child)?

For individuals without children, you will pose this question as a hypothetical one, and continue through the remaining questions in the same manner. For example, you can say, now I'd like you to imagine that you have a one-year-old child, and I wonder how you think you might respond, in terms of feelings, if you had to separate from this child?" Do you think you would ever feel worried about this child?".

18. If you had three wishes for your child twenty years from now, what would they be? I'm thinking partly of the kind of future you would like to see for your child I'll give you a minute or two to think about this one.

This question is primarily intended to help the participant begin to look to the future, and to lift any negative mood which previous questions may have imposed.

For individuals without children, you again pose this question in hypothetical terms. For example, you can say,

"Now I'd like you to continue to imagine that you have a one-year-old child for just another minute. This time, I'd like to ask, if you had three wishes for your child twenty years from now, what would they be? I'm thinking partly of the kind of future you would like to see for your imagined child I'll give you a minute or two to think about this one':

19. Is there any particular thing which you feel you learned above all from your own childhood experiences? I'm thinking here of something you feel you might have gained from the kind of childhood you had.

Give the participant plenty of time to respond to this question. Like the previous and succeeding questions, it is intended to help integrate whatever untoward events or feelings he or she has experienced or remembered within this interview, and to bring the interview down to a light close.

20. We've been focusing a lot on the past in this interview, but I'd like to end up looking quite a ways into the future. We've just talked about what you think you may have learned from your own childhood experiences. I'd like to end by asking you what would you hope
your child (or, your imagined child) might have learned from his/her experiences of being parented by you?

The interviewer now begins helping the participant to turn his or her attention to other topics and tasks. Participants are given a contact number for the interviewer and/or project director, and encouraged to feel free to call if they have any questions.
Appendix G

Bayley Scales of Infant Development-Version II, Mental Development Index (MDI)

BSID-II MENTAL SCALE: 12 Months

82) Suspending Ring by String
Midline; level with ch's eye; 6-10" from face
Move slightly, then stationary
Place out of reach on table; string toward ch

85) Attempts to Secure Three Cubes
Place 3 cubes on table one at a time
Allow ch time to pick up before offering another
If ch does not pick up place one cube in each of ch's hands
Then present third cube

97) Builda Tower of Two Cubes
Place 12 cubes on table; stack 3 in front of you
"See my tower?"
Leave model standing; place 3 blocks in front of ch
"Use these blocks to make a big tower."
If ch builds a tower of 3, give ch remaining blocks
"Make your tower as big as you can. Use all the blocks."
Maximum of 3 trials
"Build another tower. Make it as big as you can."
(Does not hand cubes to ch)

94) Puts One Cube in a Cup
Cup on table (with handle away from ch)
Place cube in cup; remove cube; hand to ch
Point from cube to cup
"Put the block in the cup. Put it in the cup."
Maximum of 3 trials
If ch releases cube in cup, place 8 more cubes on table
"Put the blocks in the cup."
"Put them all in the cup."
Maximum of 3 trials
(Does not hand cube to ch)

95) Puts Three Cubes in a Cup

96) Finds Toy Under Reversed Cups [2 of 3]
Rabbit, two inverted cups on table
"This is a bunny. I am going to hide it."
"Look. I'm hiding it under these cups."
Put under cup on ch's left
Slide both cups toward ch "One, two, three."
"Find the bunny. Where is the bunny?"
Maximum of 3 trials (alternating)

97) Looks for Contents of Box
As ch watches, place toy under cup on ch's right
Reverse cups; put toward ch
"Find the bunny. Where is the bunny?"
Maximum of 3 trials (alternating)

98) Removes Lid from Box [2 of 3]
In view, place toy on box; place lid on box
Take off lid; remove toy; show toy to ch
Put toy back in box; replace lid; place box on table
"(Name), get the toy."
Maximum of 3 trials

99) Puts Six Beads in Box
Place box with hole in lid on table; drop bead in hole
"See? They go in here."
"(Name) put them in. Put them all in."
Maximum of 3 trials

100) Places One Piece (Blue Board)
Place all pieces on table
Place board in front of ch; hand ch round piece
"Put the block in its hole. Put it where it belongs."
Begin timing when ch grasps piece (allow 150 sec)
Alternately hand ch square, round pieces one at a time

101) Puts Cross Car
Slowly push car across table; push car to ch
"(Name), push the car. Push the car like I did."
Maximum of 3 trials

102) Flingers Holes in Pegboard
Place pegboard on table
Poke finger in one hole, then another
"See?"

103) Places Pegs in 10 Seconds

104) Fats Toy in Imagination
Fat toy on table with palm a few times
"Put the toy. You can do it. Put the toy."

105) Turns Page of Book
Place book on table; open to first page
"Look. See!"

106) Scribbles Spontaneously
Place paper on table
Place crayon on paper, with point away from ch

107) Closes Round Container
Open and shut 2 times as ch watches
Place container and cover open-hand on table
"Close the box. Put the lid on. You put it on."
Maximum of 3 trials

108) Responds to Spoken Request
Have CG request ch to perform an action without gesturing
E.g., waveing to Bye-bye; clap hands to Pat-a-cake:
Show me your nose; where is the light

109) Removes Pellet from Bottle
Put pellet in bottle as ch watches
Shake bottle; hand bottle to ch
"Now get it out."
Maximum of 3 trials
BSID-II MENTAL SCALE: 12 Months (continued)

83) Retrieve Toy (Close Box)
Hold toy inside close box.
Place on table with open end facing ch
Remove hand under box opposite open end; hold box
"Get the toy. Go ahead. Get it."
Allow 30 sec

85) Please Circle Picture (Flash Card)
Insert cards in frameboard out of view
Place on table with circle toward ch
Remove square, circle, triangle
"I take them out."
"(Name), you put them in."
Begin timing (allow 180 sec)

94) Imitate Word
Incidental or...
In playful voice: mama, dada, all gone, uh-oh, up, ball, that, thank you; baby

99) Puts to Two Pictures
Simultaneously flat on table
Point to Dog "What is this?" or "Tell me what this is."
Request for each picture (give two opportunities for each)
"Show me the picture."
"Put your finger on the picture."

100) Use Two Different Words Appropriately
Incidental or...
Ask CO for words ch name
Attempt to elicit with familiar objects

* 71) Repeats Vocal-Consonant Combination
Such as da-da, ba-ba, ma-ma, ha-ha, la-la, ga-ga

* 76) Jokkes Expressively
Expressive vocal intonations (pitch or tone)

* 78) Vocalizes Four Different Vocal-Consonant Combinations
Such as da, ma, ba, go, ma, etc.
Ask CO to elicit vocalizations

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BSID-II MENTAL SCALE: 23-25 Months

123) Builds Tower of Six Cubes
   Place 12 cubes on table; stack 3 in front of you
   "See my tower?"
   Leave model standing; place 3 blocks in front of ch
   "Use these blocks to make a big tower."
   If ch builds tower of 3, give ch remaining blocks
   "Make your tower as big as you can. Use all the blocks."
   Maximum of 3 trials
   "Build another tower. Make it as big as you can."
   (DO NOT hand cubes to ch)

125) Builds Tower of Eight Cubes

138) Builds Train of Cubes
   Place 4 cubes touching in horizontal row
   "Look how I make a train."
   "Like this and this and this and this."
   As place fifth cube on top of first, +
   "And here is the engine."
   "See how it goes?"
   Push train on table
   "Choo-choo-choo."
   Leave model standing; give 5 small cubes to ch
   "You make one. Make a train (choo-choo) just like mine."

141) Understands Concept of One
   Place 3 cubes on table; hold out hand
   "Hend me one block."
   (allow 5 secs)

119) Places Pegs in 25 Seconds
   Insert pegs in pegboard out of view
   Place on table; remove pegs one at time
   Place each peg between ch and pegboard
   Point to pegs, then to holes
   "Put them in the holes. Put them all in."
   Begin timing when ch grasps peg (allow 25 secs)
   Maximum of 3 trials

116) Differentiates Scribble from Stroke
   Place paper on table
   Place crayon on paper, with point away from ch
   With another crayon, rapidly draw vertical line toward ch
   "See? It goes up. You do it."
   Maximum of 2 trials
   Then draw horizontal line from your R to L
   "Now make it go this way. Zip. You do it."
   Maximum of 2 trials
   If ch makes definite Stroke, make circular scribbles on paper
   "Now make it go this way. You do it."
   Maximum of 2 trials

139) Imitates Vertical and Horizontal Strokes

133) Names Five Pictures
   Stimulate book flat on table
   Point to dog + "What is that?" or "Tell me what this is."
   Repeat for each picture + (give two opportunities for each)

122) Points to Five Pictures
   For any pictures not correctly named +
   "Show me the pictures. Put your finger on the (pictures)."

126) Names Three Objects
   Place Ball, Book, Pencil, Spoon, Cup on table
   Allow ch time to explore
   As ch picks up item + "What is that? What do you have?"
   After 2 mins, pick up inanimate objects one at time +
   "What is this? What do I have?"

130) Completes Blue Board in 75 Seconds
   Place all pieces on table
   Place board in front of ch; hand ch round piece
   "Put the block in its hole. Put it where it belongs."
   Begin timing when ch grasps piece (allow 150 secs)
   Alternately hand ch square, round piece one at time

118) Identifies Objects in Photograph [2 of 3]
   Insert objects in tray
   Place tray on table; 9" away from ch; car/block toward ch
   Point to rabbit + "What is that?"
   If ch does not name, label object
   Place shield in front of tray
   Place stimulus book photo on table in front of shield
   "Show me the (rabbit) in this picture."
   Repeat for Bell, Cube, Car, Triangle

117) Imitates a Two-Word Sentence
   Incidental or...
   In playful voice + "Mama go; Daddy eat; Baby drink; Go home. What's this?"

121) Uses Pronoun(s)
   Incidental (e.g., my, me, mine, I, you, he, she, it) or...
   "Whose (clothing) is this? Is that your (clothing)??"

115) Completes Pink Board
   Insert forms in formboard out of view
   Place on table with circle toward ch
   Remove square, circle, triangle + "I take them out."
   "(Name), you put them in."
   Begin timing (allow 180 secs)

120) Completes Reversed Pink Board
   Insert forms in formboard out of view
   Place on table with circle toward ch
   Remove square, circle, triangle + "I take them out."
   "Watch. See what I do."
   Slowly remove board on table surface 180°
   "Now put them in their holes."

124) Discriminates Book, Cube, and Key [3 of 3]
   From ch's L, place Book, Cube, Key in row on table
   "Show me the block. Please show me the block."
   As return to original position + "Thank you."
   Repeat for Key, Book
   Maximum of 3 trials for each

125) Matches Pictures [3 of 4]
   Place stimulus booklet on table
   Point to airplane + "This is an airplane."
   Sweep hand across lower half of page
   "Can you find another airplane?"
   "Show me another airplane down here."
   If ch points to more than one, + "Which one is it?"
   If incorrect responses, point +
   "Here is another airplane; it looks just like this one."
   Present Tricycle, Tree, Telephone without further help

128) Matches Three Colors
   Stimulate book flat on table; Red disk in front of booklet
   Point to red disk, then to red circle +
   "Red. They are both red."
   Push disk to ch, point to circle + "Put this red one here."
   If no response, repeat one, then remove red disk
   Present Yellow disk + "Here. Where does it go?"
   Remove Yellow disk. Repeat for Blue disk

190
BSID-II MENTAL SCALE: 23-25 Months (continued)

137) Matches Four Colors
- Stimulus book flat on table, red disk in front of booklist
- Point to red disk, then to red circle: "Red. They are both red."
- Push disk to ch, point to circle: "Put this red one here."
- If no response, repeat same, then remove red disk.
- Present yellow disk: "Here. Where does it go?"
- Repeat for blue, black, green: remove previous disk on time

144) Discriminates Pictures [2 of 2]
- Stimulus book flat on table
- Turn page after several seconds: "Show me the same picture here."
- If incorrect response: "Turn back page; turn page again; point to picture.
"See? This matches the picture you just saw."
- Repeat for giraffe

145) Compress Stairs [2 of 2]
- Stimulus book flat on table
- "Which one is the big tree? Point to the big tree."
- "Point to the little tree. Which one is the little tree?"

134) Displays Verbal Comprehension [3 of 6]
- Stimulus book flat on table
- "I am going to read to you."
- "I want you to point to the picture I am reading about." (The children are playing ball together.)
- "Show me the picture of the children playing ball together."
- "Point to the picture."
- If incorrect response, point to picture: "See?"
- "This is the picture of the children playing ball together."
- "Now point to the picture where...the child is eating."
- "...the girl is walking.
- "...the boy is coloring."
- "...the child is sleeping."
- "...the children are walking together."

131) Attends to Story
- Place book on table; open to first page: "Look. See."
- Allow ch to explore, turn pages: "Let's read the story."
- Sit beside child; retrieve book: "Listen to the story."
- Begin reading

142) Produces Multiple-Word Utterances in Response to Picture Book
- e.g., pig play; horse wet

132) Places Beads in Tube in 120 Seconds
- Place tube, string of beads on table
- Hand to ch if does not pick up
- Point from beads to tube: "Put the beads in the tube. Put them all in."
- Begin timing (allow 120 sec)
- Give instructions maximum of 2 times

140) Understands Two Prepositions
- One upright cup, one inverted cup on table; rabbit to ch.
- "This bunny wants to go on a cup. Put it on a cup."
- "Now the bunny wants to go...in a cup. Put it...in a cup."
- "...under a cup."
- "...between the cups.
- Remove inverted cup; orient handle of other cup to ch's R.
- "The bunny wants to go...behind the cup. Put it...behind the cup."
- "...in front of the cup."
- Repeat each maximum of one time

143) Recalls Geometric Forms [2 of 3]
- Place Triangle, Circle, Square on table out of ch's reach.
- After 10 sec, place shield in front of forms
- Ask child to do, + "This is a circle."
- Allow ch time to manipulate
- Return to position behind shield, remove shield.
- "Point to the circle. Point to the one I just gave you."
- Repeat for Square, Triangle

147) Compare Masses [2 of 2]
- Hand two boxes to ch
- "Which box is the heavy box?"
- Exchange boxes; reverse position out of view; represent

148) Uses Past Tense
- "What did you do yesterday?"

146) Counts (Number Names)
- "I want to see how high you can count."
- "Count as high as you can for me."

* 113) Says Eight Different Words
- Ask GO for words ch uses
- Attempt to elicit with familiar objects

* 114) Uses a Two-Word Utterance
- e.g., good kitty, what that, (name) bye-bye, you do,
- where daddy, give me

* 127) Uses a Three-Word Sentence
- e.g., daddy go home, give me toy, do it again, me get ball

* 129) Makes a Contingent Utterance
- Adds new info to E's or ch's previous statements
- e.g., car red

* 136) Poses Question(s)
- e.g., who, what, where, why

# Corrected Items = 113

Raw Score = 113

MDI = 113

Lora Tread, B.S., M.D.  
(revised 01/22/90)
Appendix H

Brief Infant Toddler Social Emotional Assessment (BITSEA)

ID ____________

Date ____________

Child's birth date: ______/_____/______

Today's date: ______/_____/______

Sex of child: 1: Boy 2: Girl

Your relationship to child: 1: Mother 2: Father 3: Other

Instructions: This questionnaire contains statements about 1- to 3-year-old children. Many statements describe normal feelings and behaviors, but some describe things that can be problems. Some may seem too young or too old for your child. Please do your best to answer every question.

For each statement, please circle the answer that best describes your child in the LAST MONTH.

0 = not true/rarely 1 = somewhat true/sometimes 2 = very true/often

1. Shows pleasure when s/he succeeds (For example, claps for self).
   0 1 2

2. Gets hurt so often that you can't take your eyes off him/her.
   0 1 2

3. Seems nervous, tense or fearful.
   0 1 2

4. Is restless and can't sit still.
   0 1 2

5. Follows rules.
   0 1 2

6. Wakes up at night and needs help to fall asleep again.
   0 1 2

7. Cries or tantrums until s/he is exhausted.
   0 1 2

8. Is afraid of certain places, animals or things. What is s/he afraid of?
   0 1 2

9. Has less fun than other children.
   0 1 2

10. Looks for you (or other parent) when upset.
    0 1 2

11. Cries or hangs onto you when you try to leave.
    0 1 2

12. Worries a lot or is very serious.
    0 1 2

13. Looks right at you when you say his/her name.
    0 1 2

14. Does not react when hurt.
    0 1 2

15. Is affectionate with loved ones.
    0 1 2

16. Won't touch some objects because of how they feel.
    0 1 2

17. Has trouble falling asleep or staying asleep.
    0 1 2

18. Runs away in public places.
    0 1 2

19. Plays well with other children (not including brother/sister). (N = No contact with other children)
    0 1 2

20. Can pay attention for a long time. (Not including TV)
    0 1 2

21. Has trouble adjusting to changes.
    0 1 2

22. Tries to help when someone is hurt. For example, gives a toy.
    0 1 2

23. Often gets very upset.
    0 1 2
The following questions are about feelings and behaviors that can be problems for young children. Some of the questions may be a bit hard to understand, especially if you have not seen them in a child. Please do your best to answer them anyway.

24. Gags or chokes on food.  0  1  2
25. Imitates playful sounds when you ask him/her to.  0  1  2
26. Refuses to eat.  0  1  2
27. Hits, shoves, kicks, or bites children (not including brother/sister).  (N = No contact with other children)  0  1  2
28. Is destructive. Breaks or ruins things on purpose.  0  1  2
29. Points to show you something far away.  0  1  2
30. Hits, bites or kicks you (or other parent).  0  1  2
31. Hugs or feeds dolls or stuffed animals.  0  1  2
32. Seems very unhappy, sad, depressed or withdrawn.  0  1  2
33. Purposely tries to hurt you (or other parent).  0  1  2
34. When upset, gets very still, freezes or doesn’t move.  0  1  2

A. How worried are you about your child’s behavior, emotions & relationships?  1=Not at all worried  2=A little worried  3=Worried  4=Very worried
B. How worried are you about your child’s language development?  1=Not at all worried  2=A little worried  3=Worried  4=Very worried
Appendix I

Attachment Q-sort (AQS)

Attachment Q-set (Version 3) Items and Explanations

The Attachment Q-Set was developed for three reasons: (1) to provide an economical methodology for further examining relations between secure base behavior at home and Strange Situation classifications, (2) to better define (via a Q-set) the behavioral referents of the secure base concept, and (3) to stimulate interest in normative secure base behavior and individual differences in attachment security beyond infancy. As a first step toward further examining relations between secure base behavior at home and Strange Situation classifications, Vaughn & Waters (1991) replicated the association reported by Ainsworth et al. (1973). This illustrated a method that can be used to test the validity of Strange Situation classifications across age, across cultures, and in clinical populations. The current version of the Attachment Q Set is Version 3.0. It was written in 1987 and consists of 90 items.

Below is a complete list of the AQS items with descriptive information about the meaning and use of each item. The “Rationale” for each item is for training only. When the q-set items are reproduced on cards for use by observers, only the item content (“Item”, “Middle”, and “Low”) need be included.

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

Rationale: Sharing is interesting because it is an aspect of smooth interaction and secure base behavior (insofar as it involves seeking information). From clear instances of sharing or refusing you can see whether the child expects the mother to be intrusive and/or unresponsive (i.e., to keep the object and end the interaction). You can't make much out of the absence of sharing. Sharing includes both spontaneous offers to the mom and going along when mother is more the initiator of the sharing.

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

Low: Child is happy or affectionate when he returns to mother between or after play times.

Rationale: The smoothness of the child's transition from exploration to proximity and contact is a defining feature of a well functioning secure base relationship. In the Strange Situation fussing during the pre-separation episodes, incomplete approaches with fussing instead or reaching to be picked up, and inability to be comforted by contact are hallmarks of insecure attachment. This item is in the Q-set because the behavior is so important in the S/S. Such returns are not necessarily easy to anticipate and they are not very frequent in home settings. Stay alert or you will miss the key moments right at the end of the approach. It might be useful for observers to see this behavior in a few videotapes of the S/S.

3. When he is upset or injured, child will accept comforting from adults other than mother.
Low: Mother is the only one he allows to comfort him.

Rationale: Preference for one figure over others is a hallmark of attachment. However, this does not imply exclusivity or rejection of all others. Nor does it apply to all contexts. In Ainsworth's Baltimore home observations, the only behavior directed almost exclusively to the mother was "approach ending in reach or other effort to make contact". Count only approaches related to comforting. Disregard if the child approaches wanting something other than comfort. The behavior referred to in this item is probably most often a function of how upset s/he is; and this is more a function of the situation and of temperament than of attachment status. Secure base relevance is an empirical issue.

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

Rationale: This is a "filler" item. It may be related to an impulsive / reflective cognitive style or to imitation of parental behavior with pets or care of infant siblings. No secure base connotation is intended. Nonetheless, it is important to score this item correctly. Infants classified anxious resistant in the Strange Situation tend, even in pre-separation episodes, to bang and sweep toys around rather than playing with them carefully. Both anxiety and immaturity might explain this behavior. Filler items make the Q-set sort more easily. They also make the focus on security less obvious. This may reduce social desirability responding when moms are observers.

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

Low: More interested in things than people.

Rationale: This is a filler item. It may be related to a trait adult personality theorists term "person-thing orientation". No secure base connotation is intended. It may well be that secure attachment would be associated with a positive orientation toward people. But the observers' task is not to estimate attachment security from the behavior they observe; it is simply to describe what they see.

Do not let evidence of sociability influence scoring of secure base behavior. Filler items are necessary. If all the items in the Q-set were about using mom as a secure base, they would be hard to sort; some items would have to be placed low even though the child is quite secure. "Filler" items can also make the Q-set's focus on security less obvious. This may reduce social desirability responding when mothers serve as observers.

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

Low: Goes to what he wants without fussing or dragging mother along.

Rationale: Exploring away from mom is a key part of the secure base phenomenon. This item would therefore seem to describe the opposite of secure base behavior. Note, however, that the child is maintaining interest in the environment and finding mother's proximity comforting. This is very much the picture of the B4 infant in the Strange Situation. Perhaps it works for infants
with a low threshold for fearfulness. Observers should not prejudge the meaning of this behavior. This behavior is not common. Most children are somewhat the opposite, so this item tends to fall a bit below the middle of most sorts.

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

Low: Mother can get him to smile or laugh more easily than others.

Rationale: This is a "filler" item. It may be related to sociability or low threshold for positive affect. No secure base connotation is intended. Nonetheless, it is important to score this item accurately. In addition to noting response to observers, ask mother about this behavior. "Filler" items make the Q-set sort more easily and the focus on security less obvious. This may reduce social desirability response when mothers serve as observers. In addition to serving as filler items, the temperament related items in the Q-set may be of some use for assessing discriminant validity.

8. When child cries, he cries hard.

Low: Weeps, sobs, doesn’t cry hard, or hard crying never lasts very long.

Rationale: This is a "filler" item. If anything, it relates to the trait termed "response intensity" in Thomas & Chess' work or to a parameter of negative affect. activity level. No secure base connotation is intended. Nonetheless, it is important to score this item accurately. When scoring this behavior be careful to take context into account. Crying hard after falling is easy to score. Similar crying when mother is being intrusive or in a struggle of wills is more difficult; it is often appropriate to view the mom or the situation as contributing to the intensity of the cry. Moderate your scoring accordingly. Look for other instances of negative affect to confirm (or disconfirm) your interpretation.

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

Low: Child tends to be serious, sad, or annoyed a good deal of the time.

Rationale: This item is refers to a trait-like temperament characteristic, not an aspect of secure base behavior. The observer should simply describe the child. One can't reliably attribute positive affect to temperament in some instances and to secure attachment in others. Attachment theory expects positive affect to accompany both smooth interaction and secure base behavior in non-threatening contexts. Clearly, a child could be lighthearted and playful most of the time and yet show few signs of monitoring mom location or activities, engaging in affective sharing across a distance, returning to her spontaneously, or enjoying physical contact. The "Security" criterion sort (See the Q-set Advisor Index) places more weight on secure base behaviors than on positive affect per se. But a child receives a higher security score if both secure base items and positive affect items receive high scores. This seems reasonable but if relations to the Strange Situation increased by placing this item closer to the middle of the "Security" criterion sort then it would make sense to revise the criterion sort.
10. Child often cries or resists when mother takes him to bed for naps or at night. Low: Does not cry or resist going to bed.

Rationale: This is a "filler" item. No secure base connotation is intended. Unless the child is put to bed during the visit this item can only be scored from the mother's report. The item is rarely placed far from Pile 5. It will probably be dropped if the Q-set is revised. "Filler" items are necessary. If each item referred to secure base behavior, the Q-set would be hard to sort; some items would have to be placed low even though the child is quite secure. "Filler" items can also serve other purposes. For example, they make the Q-set's focus on security less obvious. This may reduce social desirability responding when mothers serve as observers.

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

Low: Child doesn’t hug or cuddle much, unless mother hugs him first or asks him to give her a hug.

Rationale: This item refers to physical contact for its own sake during ordinary play or interaction. It does not refer to behavior when the child is upset. Data by Mary Blehar, Mary Ainsworth, and Mary Main suggest that enjoying physical contact is an antecedent and an aspect of good secure base behavior. The implication (well worth testing) is that a child who is averse to physical contact in non-stressful contexts is less likely than one who enjoys it to seek or be comforted by contact when upset. (See related item #44)

12. Child quickly gets used to people or things that initially made him shy or frightened him. Middle if never shy or afraid. Low: Child is slow to get used to people or things.

Rationale: This is a "filler" item. If anything, it may be related to a temperament trait termed "quick to warm up" or to some parameter of fearfulness. No secure base connotation is intended. Focus on overcoming fear or shyness with major help from mom. If mom is always right there and very active, all you can do is place this item in Pile 5. Items referring to the effectiveness of mom's presence and encouragement, include #7, #60, and #71.

In addition to noting response to observers, ask mother about this behavior. This is the only way to score the item if you don't observe relevant behavior during a visit. As indicated in the introduction, we do not ordinarily place items very far from the middle of a sort solely on the basis of maternal report.

In addition to serving as "fillers", the temperament related items in the Q-set may be of some use for assessing discriminant validity. Filler items are necessary. If all the items in the Q-set were about using mom as a secure base, they would be hard to sort; some items would have to be placed low even though the child is quite secure. "Filler" items can also serve other purposes. For example, they make the Q-set's focus on security less obvious. This may reduce social desirability response when mom's are the observers.

13. When the child is upset by mother’s leaving, he continues to cry or even gets angry after she is gone.
Middle if not upset by mom leaving.

Low: Cry stops right after mom leaves.

Rationale: The concept of "angry" crying is difficult to quantify. Nonetheless, observers generally recognize it when they hear it. Scoring instructions for the Strange Situation refer to angry crying in association with separation behavior of A2 and C infants and resistant behavior of C's during reunion. Crying in response to separation is not commonly observed during home visits. Consequently this item usually falls near the middle of sorts. You may well see angry crying in other contexts (e.g., mother won't let the child do or have something s/he wants). Do not score such behavior in relation to this item.

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

Low: Plays with the new object quietly or goes where he won’t be interrupted.

Rationale: This refers to behavior Alan Sroufe and others term "affective sharing". Secure infants are virtually the only ones who show this behavior in the Strange Situation, though the proportion who do so has not been tabulated. This item is included in the Q-set in order to fill out the complete set of secure base related behaviors. The more secure base behaviors we can include the more reliably we can distinguish secure from insecure infants. One disadvantage of the Q-sort method is that we will not be able to tell from Q-sort data what percent of children displayed this specific behavior. This is the price paid for its many advantages.

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

Low: Mother’s suggestion does not increase willingness to engage new people.

Rationale: As Ainsworth demonstrated, infants are ordinarily more confident to explore if an attachment figure is present. As Joe Campos and others have demonstrated, children also pay attention to caregiver signals to evaluate the risk or safety of social and other situations. This item assesses behavior in these domains. This behavior is very sensitive to context. The item assumes that mom is nearby, her affect is positive and encouraging, and the child is at least somewhat interested in the person (even if a bit shy). Sometimes however, the mother is merely shouting orders across the room, or the child is being pushed too quickly.

Do not over score this item on the basis of such situations. Do not over score this item from situations in which the child is eager to share or show without the mother's suggestions; here mom's suggestions and encouragement are accompanying rather than motivating the child's behavior. Do not prejudge the secure base relevance of this behavior. It probably reflects more about sociability than security. Score the item carefully and let the relation to security be determined in the data analysis.
16. Child prefers toys that are modeled after living things (e.g., dolls, stuffed animals). Low: Prefers balls, blocks, pots and pans, etc.

Rationale: This is a "filler" item. Despite it's content it is unlikely to be related to sociability. If anything it may relate to sex-role play references. No secure base connotation is intended. Nonetheless, it is important to score this item accurately.

"Filler" items are necessary. If all the items in the Q-set were about using mom as a secure base, they would be hard to sort; some items would have to be placed low even though the child is quite secure. "Filler" items can also serve other purposes. For example, they make the Q-set's focus on security less obvious. This may reduce social desirability responding when mothers serve as observers.

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

Rationale: This is a "filler" item. The behavior may reflect something about (low) sociability or intensity of negative affect. No secure base connotation is intended. "Filler" items are necessary. If all the items in the Q-set were about using mom as a secure base, they would be hard to sort; some items would have to be placed low even though the child is quite secure. "Filler" items can also serve other purposes. For example, they make the Q-set's focus on security less obvious. This may reduce social desirability responding when mothers serve as observers.

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

Low: Ignores or refuses unless ordered.

Rationale: This behavior can be construed in a number of ways. It is probably best treated as a "filler" item. It probably tells more about mom's intuitive grasp of good behavior modification principles than about secure base behavior. But these are not unrelated; that Ainsworth described as "maternal sensitivity" is easily approved of by behavior therapists. The best way for us to learn more about this behavior is for observers to describe what they see and let the interpretations come out of the data analysis.

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

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

Low: Mother has to take the object or raise her voice to get it away from him.

Rationale: This behavior reflects both the mom's implicit understanding of behavior modification principles and the child's history of harmonious or interfering interaction with her. Studies by Keng Ling Lay have shown that non-interfering maternal behavior can put a child in a positive mood and that positive mood increases compliance. This behavior occurs in many contexts. Sometimes mother just needs a hand. Or she is asking for a toy the child is playing with; she may be joining in the play or showing the child something; she may plan to take something away.
Don't over score refusals when the mother is clearly trying to stop the child from playing with something.

20. Child ignores most bumps, falls, or startles. Low: Cries after minor bumps, falls, or startles.

Rationale: This is a "filler" item. If anything, the behavior may be related to a temperament trait such as high threshold for negative affect. No secure base connotation is intended. "Filler" items are necessary. If each of the Q-set items were about using mom as a secure base, the Q-set would be hard to sort; some items would have to be placed low even though the child is quite secure. "Filler" items can also serve other purposes. For example, they make the Q-set's focus on security less obvious. This may reduce social desirability responding when mothers serve as observers.

21. Child keeps track of mother's location when he plays around the house.

Calls to her now and then notices her go from room to room. Notices if she changes activities

Middle if child isn't allowed or doesn't have room, to play away from mom.

Low: Doesn’t keep track.

Rationale: This is a key element of the secure base phenomenon. It can be difficult to observe in the home because the child is very familiar with mother's behavior and can tell from the slightest cue what she is doing or about to do. Do not mistake this for failure to keep track.

One indication of failure to keep track is that the child has gone so long without checking on mom that s/he has to call or look for her. You could conclude the same if the child went to a specific place and didn't find her as expected. But these obvious signs are uncommon at home. More often failure to keep track has to be inferred from the lack of overt monitoring or signaling and the depth of the child's interest in whatever s/he has been doing.

When an observer suspects that the child is not monitoring mothers location and activities, it is OK to ask the child "Where is your mom; what is she doing?" Do not over interpret the answer; the child has a fair chance of guessing correctly. Note the child's confidence in his/her answer. Do not over score this item on the basis of such questioning.

Note: It is OK, almost unavoidable, for observers to interact with the child. Be careful however not to be so entertaining that you distract the child from ordinary secure base behavior (such as keeping track) or child-mother interaction.

22. Child acts like an affectionate parent toward dolls, pets, or infants. Middle if child doesn’t play with or have access to dolls, pets, or infants. Low: Plays with them in other ways.

Rationale: Like Item 4 (Careful and gentle with toys and pets) and Item 16 (Prefers toys modeled after living things), this item is included as a "filler" item. No secure base connotation is intended. This behavior probably reflects an interaction between imitation and temperament.
characteristics. The imitation may be of mother's behavior toward the child, of behavior she models for the child with toys, or of her behavior toward an infant sibling. Temperament traits could include activity level, impulsivity, and positive affect. There could also be a trait of responsiveness to contact comfort. Observers should just describe what they see.

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

Low: Lets her be affectionate with others. May join in but not in a jealous way.

Rationale: Interfering or objecting when mom is with other family members suggests the child lacks confidence in her availability and responsiveness. Accepting or joining in suggests the child continues to be confident in her availability and responsiveness during her engagement with others. Other Q-set items refer to the child's confidence in mom's continuing availability and responsiveness when she is engaged in other types of activity (e.g., conversation with the visitor or busy around the house.) Revisiting the same issue in different contexts is a strategy built into the Q-set to raise the reliability of scores based on criterion sorts or aggregated subsets of items.

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

(Do not score high if child is simply upset by the raised voice or afraid of getting punished)

Low: Child does not become upset in response to such behavior.

Rationale: This behavior may be related to the internalization of parental values. It is included so we can see whether it is related to attachment security. (Do not prejudge the answer.) In our experience such behavior is rare. Nonetheless, observers should be alert for this type of behavior and try to score it carefully. This item will rarely be placed above the middle of a sort; it may be placed rather low if you see clear instances of angry responses to mother speaking firmly.

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

Middle if never plays out of sight.

Low: Talks and calls when out of sight. Easy to find; easy to keep track of what child is doing.

Rationale: For a secure base relationship to work well, both partners have to play an active role. Being easy to keep track of makes it easier for mom to do her part. The kinds of proximity, signaling, noisiness, and distance interactions that make a child easy to keep track of are not necessarily intentional. They simply accompany ordinary play and exploration. It is often noticed that in the Strange Situation many infants babble more actively when mother is out of the room. "Trackability" is the predictable outcome of this behavior. It probably is not an outcome that the baby "intends".
26. Child cries when mother leaves him at home with babysitter, father, or grandparent.

Low: Doesn’t cry with any of these.

Rationale: The Q-set includes a number of items to assess crying in various contexts. These include crying when interfered with, when mom moves from room to room, in the midst of secure base transitions, and even when injured. The implicit hypothesis is that crying is not merely a unitary indicator of a temperament trait; instead the "meaning" of crying is viewed as depending on context. Ask the mother in a non-evaluative way about this behavior.

Do not prejudge the relation between this behavior and secure base behavior or overall security. Because the behavior is primarily assessed by mother report, the item is not often placed far from the middle of a sort.

27. Child laughs when mother teases him. Middle If mother never teases child during play or conversations. Low: Annoyed when mother teases him.

Rationale: This item was included in the Q-set with the idea that it would reflect the child's history of intrusive vs. non-intrusive interaction with the mother. It is interesting to see whether this is related to current secure base behavior. In our experience, this behavior is rarely seen in home observations of infant and child behavior with mothers. It is perhaps more common with older children and in father-child interaction. Our impression is that the rate is reduced by the presence of unfamiliar observers. This item is rarely placed far from the middle of a sort.

28. Child enjoys relaxing in mother’s lap. Middle: If child never sits still. Low: Prefers to relax on the floor or on furniture.

Rationale: This is an aspect of secure base behavior. A child who enjoys close physical contact is expected to find such contact comforting if distressed. The child may be demanding or casual in establishing contact, or mother may be the one who initiates it. Focus on the child's behavior once contact is established. A relaxed posture, cuddling, patting mother, and long duration of contact are examples of relevant behavior.

Place this item low if in several instances the child refuses contact, seems uncomfortable, or breaks contact quickly. Obviously, a child can enjoy contact and yet resist if mother interrupts ongoing play because she wants some affection. This would not warrant low placement. In general, you can infer more from a single positive example of enjoying contact than from a single example of the child resisting or squirming to get down. Note: If the child is very active and doesn't sit still long enough for much physical contact, you can't score this item. Place it in Pile 5.

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

Low: Even when deeply Involved in play, child notices when people speak to him.
Rationale: This is a "filler" item. The behavior may reflect something about the temperament trait "depth of attention". No secure base or sociability connotation is intended. "Filler" items are necessary. If all the items in the Q-set were about using mom as a secure base, they would be hard to sort; some items would have to be placed low even though the child is quite secure. "Filler" items can also serve other purposes. For example, they make the Q-set's focus on security less obvious. This may reduce social desirability responding when mothers serve as observers.

30. Child easily becomes angry with toys. Low: Child does not easily become angry with toys. Rationale: This is a "filler" item. The behavior could reflect something about (low) frustration tolerance or low threshold for negative affect. No secure base connotation is intended. "Filler" items are necessary. If all the items in the Q-set were about using mom as a secure base, they would be hard to sort; some items would have to be placed low even though the child is quite secure. "Filler" items can also serve other purposes. For example, they make the Q-set's focus on security less obvious. This may reduce social desirability responding when mothers serve as observers.

31. Child wants to be the center of mother’s attention. If mom is busy or talking to someone, he interrupts. Low: Doesn’t notice or doesn’t mind not being the center of mother’s attention.

Rationale: This behavior is interesting insofar as it reflects lack of confidence in mom's availability and responsiveness. Relevant behavior is likely to be colored by fussiness or annoyance. A child might also try to be the center of mom's attention if she has reinforced this behavior. In such cases the child may seem dependent, but the affective tone is positive; the child seems to expect that mother's attention is easily gained. In such cases, do not place the item very high (>7) in the sort. Place this item low if the child is satisfied being an onlooker or doing something on his/her own when mother attends to something or someone else. Such behavior is not a secure base problem. It reflects confidence that she is available and responsive if needed. Low placement doesn't imply insecurity. If the child is consistently indifferent to mom, place this item in Pile 5. There are other items to capture the kinds of indifference to mother that suggest a secure base problem. Examples are Item 21 (keeps track of mother's location), Item 36 (plays, returns to mom, goes off to play), and Item 59 (doesn't return to mom between activities).

32. When mother says "No" or punishes him, child stops misbehaving (at least at that time). Doesn’t have to be told twice. Low: Child persists in misbehavior.

Rationale: Although this behavior can be construed in a number of ways, it is best treated as if it were a "filler" item. It probably tells more about mom's intuitive grasp of behavior modification principles than about secure base behavior. But these are not unrelated; that Ainsworth described as "maternal sensitivity" is easily approved of by behavior therapists. The best way for us to learn more about this behavior is for observers to describe what they see and let the interpretations come out of the data analysis.
33. Child sometimes signals mother (or gives the impression) that he wants to be put down, and then fusses or wants to be picked right back up.

Low: Always ready to go play by the time he signals mother to put him down.

Rationale: In the Strange Situation, this behavior is a hallmark of the C (anxious resistant) pattern. It is included in the Q-set because we are interested in the extent to which it occurs outside the S/S and because it is such a clear failure of proximity and contact to serve their usual secure base function. Do not let your scoring be much influenced by mere tantrums or "power struggles", in which the child wants some thing and mother says "No" and neither will give in. Focus on situations in which the child wants proximity or contact and remains upset even though it is readily available or even achieved. (Note: Do not place this item high if mom is unresponsive or intrusive in a way that clearly causes the child's continuing upset.

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

Middle: If never upset by her leaving
Low: Actively goes after her if he is upset or crying.

Rationale: Effective signaling, proximity seeking, and contact maintaining behavior are defining features of a well functioning secure base relationship. In the Strange Situation incomplete approaches with fussing instead or reaching to be picked up and inability to be comforted by contact are hallmarks of insecure attachment. This item was included in the Q-set because the behavior is so important in the S/S. This behavior is not common in home observations. It might be useful for observers to see such behavior in videotapes of a few Strange Situations.

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

Middle allowed or not enough room to play
Low: Prefers playing with or near mother

Rationale: This item refers to the traits of independence and dependency. Both theoretically and empirically these are unrelated to security, especially after about 24 months. While a child is content and alert to mother's location and activities, independence doesn't imply insecurity. Similarly, as long as a child is content and constructively occupied, preferring to play with or near mother does not imply a lack of confidence in her availability or responsiveness. If the child prefers to play close to mom, place this item low in the sort, regardless of whether the child is fussy or content. There are other Q-set items that will capture the security implications of positive or negative mood.
36. Child clearly shows a pattern of using mother as a base from which to explore. Moves out to play; Returns or plays near her; moves out to play again, etc. Low: Always away unless retrieved, or always stays near.

Rationale: In Vol. 1 of Attachment and Loss Bowlby argued that play - contact - play cycles reflect the operation of an attachment control system. Accordingly, secure base cycles can be considered a criterion for the existence of an attachment. This item assesses the presence not the quality of the secure base pattern. This behavior is a bit easier to see in unfamiliar settings than in the home.

Observers should keep in mind that in familiar settings the play - contact - play cycle is more likely to occur over 30 minutes than over the 2-3 min. one sees in the Strange Situation. Note, however, that a quick play - contact - play cycle does not in and of itself justify a high score. The issue is how characteristic is the behavior, not how frequent or how fast.

Not all returns to mother are equal. A return for the sake of contact, interaction, or affective sharing is a secure base return. Returns for help or to get food, permission to do something, etc. are less clearly relevant to the secure base phenomenon. Ask your self whether this is a secure base return or is the child merely using mother as a banker or tool chest.

Keep in mind that play punctuated by interaction over a distance is equivalent to play - contact - play cycles with full approaches. One of the problems in trying to observe this behavior is that mothers frequently call the child to them or stay nearby or check on the child periodically. These activities "short circuit" the child's play - contact - play cycles.

The size and configuration of the home can also be a factor in whether secure base cycles are seen. In light of these complexities, this item should not be placed far below the middle of a sort solely because play - contact - play cycles were not seen. Low placement should be based on evidence that the child typically does something other than secure base behavior. As the item states these can include clear lack of interest in mother's activities or location, or staying close and never venturing away from her.

37. Child is very active. Always moving around. Prefers active games to quiet ones. Low: Child’s activity level is low. Prefers quite activities.

Rationale: This item refers to the temperament trait "activity level". It is simply a "filler item". It is not even a variable that raises an issue of discriminant validity. No secure base connotation is intended. "Filler" items are necessary. If all the items in the Q-set were about using mom as a secure base, they would be hard to sort; some items would have to be placed low even though the child is quite secure. "Filler" items can also serve other purposes. For example, they make the Q-set's focus on security less obvious. This may reduce social desirability responding when mothers serve as observers.

38. Child is demanding and impatient with mother. Fusses and persists unless she does what he wants right away.
Low: Child waits a reasonable time if mother doesn’t respond immediately.

Rationale: A key postulate of Bowlby and Ainsworth's attachment theory is that maternal sensitivity is a critical factor in attachment development. Sensitivity includes a low threshold for detecting infant signals, cooperation (vs. interference) with the infant's ongoing behavior, physical and psychological availability, and acceptance of the infant's needs and demands. This item is included on the theory that it reflects a history of maternal interference. Although hypothesized to be related to secure base behavior, this is an empirical issue. Observers should not prejudge this relationship.

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

Low: Often silly or laughing when playing away from mother or alone with his toys.

Rationale: This is a "filler item". It refers to behavior that probably combines attention, activity level, and affect parameters. No secure base connotation is intended. "Filler" items are necessary. If all the items in the Q-set were about using mom as a secure base, they would be hard to sort; some items would have to be placed low even though the child is quite secure. "Filler" items can also serve other purposes. For example, they make the Q-set's focus on security less obvious. This may reduce social desirability responding when mothers serve as observers.

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

Low: First look at new objects or toys is usually brief. (May return to them later how-ever.)

Rationale: This is a "filler item". It refers to behavior that probably combines attention, activity level, and cognitive style. No secure base connotation is intended. This item was included to help address the issue of social desirability response in maternal Q-sorts. We are still working on the best way to do this.

41. When mother says to follow her, child does so.

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

Low: Child ignores or refuses.

Rationale: This is a "filler item". It probably says more about mother's intuitive understanding of good behavior modification principles than with any trait of the child. No secure base connotation is intended. The relations among maternal behavior, secure base behavior, security, and compliance are complex and interesting. It is unlikely that they can be dealt with within a single instrument. Observers should simply observe this behavior carefully and describe what they see, without imposing much interpretation on the behavior. This item may have some value in addressing the issue of desirability response in maternal sorts, but this is not yet worked out.
42. Child recognizes when mother is upset. Becomes quiet or upset himself. Tries to comfort her. Asks what is wrong, etc.

Low: Doesn’t recognize; continues play; behaves toward her as if she were OK.

Rationale: Mary Main and others have suggested that empathy is a correlate of secure attachment. Observers should not prejudge the relation between empathy and security. They should just describe what they see and not let the presence or absence of empathic behavior influence how other items are scored. The data will tell whether empathy and security are related. Note: As a practical matter, this behavior is very rare. Following Carolyn ZahnWaxler and Mark Cummings, one could perhaps have mother pretend to be upset 2-3 times in the course of several visits.

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

Low: Doesn’t keep close track of mother’s location or behavior.

Rationale: This is included in the Q-set on the theory that such behavior reflects the child's confidence in the mom's availability and responsiveness. A secure child is comfortable moving away from mom and keeping track of her location and activities over a distance and through periodic approaches and contact. It is worth noting that in the Strange Situation infants classified B4 behave very much as described in this item. They are comfortable and play very well as long as they can stay near mother or on her lap. They are neither angry nor ambivalent like group C infants. In a word they seem merely dependent. Observers should not prejudge the relation of this behavior to other secure base behaviors.

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

Low: Not especially eager for this. Tolerates it but doesn’t seek it; or wiggles to be put down.

Rationale: Initiating and enjoying physical contact suggests that the child could be comforted by contact if distressed. As with Item 11 (hugs or cuddles without mother asking), this is an aspect of the secure base phenomenon. If you don't see any contact place this item in Pile 5. Don't assume the child doesn't like contact just because there wasn't any.

Note: This item refers to situations in which the child initiates contact for contact's sake. Item 11 (hugs or cuddles without mother asking) refers to behavior that is largely incidental to ongoing activities (e.g., resting arm on mom while she shows how to do something or leaning against mom while she reads). In a brief home visit you might see enough behavior to score this item or Item 11, but perhaps not both. Either way, the child's security score increases if he/she enjoys or is comfortable with close contact. See also Item 53 and others related to contact and comforting when distressed.

45. Child enjoys dancing or singing along with music. Low: Neither likes nor dislikes music.
Rationale: This is a "filler item". It was also included to help address the issue of social desirability response in maternal Q sorts. "Filler" items are necessary. If all Q-set items were about using mom as a secure base, they would be hard to sort; some items would have to be placed low even though the child is quite secure. "Filler" items can also serve other purposes. For example, they make the Q-set's focus on security less obvious. This may reduce social desirability responding when mothers serve as observers.

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

Low: Bumps, drops, or stumbles happen throughout the day (even if no injuries result).

Rationale: This is a "filler" item. It is important to place even "filler" items accurately. Don't make it difficult by trying to see some deep attachment relevance where there isn't any. Score this item in relation to the child's age. It is rarely placed above 7 or below Pile 3. If every Q-set item were about secure base behavior, the cards would be hard to sort; some items would have to be placed low even though the child is quite secure. "Filler" items can also serve other purposes. For example, they might help make the Q-set's focus on security less obvious and thus reduce social desirability set when mothers serve as your observers.

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

Low: Child gets upset, even if mother indicates the sound or activity is safe or fun.

Rationale: In his book A Secure Base, Bowlby suggested that an attachment figure must be one who is viewed as "stronger and wiser" than one's self. This however is not enough; the person must also be someone who is trusted. This item is intended to assess the child's trust or confidence in mother's support and reassurance. Observers should keep in mind that this behavior reflects an interaction of the child's interaction history with the attachment figure and a wide range of temperamental and situational factors that influence how worried or afraid the child is.

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

Low: Child does not readily share with new adults when asked.

Rationale: A number of items in the Q-set assess positive responses or positive expectations in relation to the mother. This item is included to assess the specificity of such behavior. Do not place much weight on refusals or protests if the mother is being very intrusive. Keep in mind also that the mother's request need not be explicitly stated; it often involves little more than approaching or reaching for the child's plaything.

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

Middle: If child doesn’t run to mother at all when visitors arrive.
Low: Even if he eventually warms up to visitors, child initially runs to mother with a fret or a cry.

Rationale: The issue here is whether the child's response to the stranger is predominantly negative or combines wariness and interest (a response Bob Marvin termed this "coyness"). Neither high nor low placement necessarily suggests a secure base problem. Whether the more negative response has stronger correlates in the temperament or secure base domains is an empirical question. Observers should not prejudge the answer. This item is very different from item (#34) which says "When child is upset s/he sits where s/he is and cries rather than going to mother". The present item assesses fearfulness, #34 assesses the child's ability to use the mother as a secure base.

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

Low: Initial reaction s to approach and interact.

Rationale: This behavior probably says more about temperament and the child's learning history than about confidence in mom's availability or responsiveness. This item refers to the child's initial reaction. Look for relevant behavior from the moment mother or child answers the door. A common response is "coyness", e.g., looking at the visitor with a shy smile or from behind mom's skirt). If you see this mixture of initial wariness and positive interest, place the item only moderately low. Note: Bronson & Pankey (1977) showed that initial wariness of and persistent caution or fear are separate variables.

51. Child enjoys climbing all over visitors when he plays with them. Middle if he won’t play with visitors. Low: Doesn’t seek close contact with visitors when he plays with them.

Rationale: This is a "filler" item. If anything, it is related to activity level. There may also be trait-like differences in positive response to physical contact in general, unrelated to caretaking experience. No secure base connotation is intended. Nonetheless, it is important to score this item accurately. The item may have some secure base relevance if the child is positively forward in initiating physical contact and directs little or no social referencing toward mother initially or during the contact. This would be unusual but reasonable if there are other indications pointing to the same conclusion.

Filler items are necessary. If all the items in the Q-set were about using mom as a secure base, they would be hard to sort; some items would have to be placed low even though the child is quite secure. "Filler" items can also serve other purposes. For example, they make the Q-set's focus on security less obvious. This may reduce social desirability responding when mothers serve as observers.

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

Low: Very skillful with small objects, pencils, etc.
Rationale: This is a "filler" item related to motor development. In addition to its role as a filler item, it might play a role in evaluating discriminant validity vis a vis maturational delay. With mothers as observers it could be useful in examining social desirability responding. Filler items are necessary. If all the items in the Q-set were about using mom as a secure base, they would be hard to sort; some items would have to be placed low even though the child is quite secure. "Filler" items can also serve other purposes. For example, they make the Q-set's focus on security less obvious. This may reduce social desirability responding when mothers serve as observers.

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

Low: Accepts being picked up but doesn’t especially help or hold on.

Rationale: This is of interest as an aspect of secure base behavior. Specifically, this relaxed posture suggests that the child is not concerned about mother being intrusive or controlling during contact, terminating contact while the child still desires it, or being unresponsive to contact maintaining behaviors. It may also indicate that, if distressed, the child could be comforted by contact with mother. (Including this item in the Q-set lets us treat this interpretation as an empirical question. ) See Item 88 for comment on Bowlby's interpretation of physical contact as a consummatory response.

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

Low: Accepts mother’s help readily, unless she is in fact interfering.

Rationale: This suggests a history of maternal interference and also reveals difficulty using the mother as a source of information during play and exploration. Relevant behaviors are whining, angry slapping or banging a plaything, or turning away. This is a specific case of behavior referred to more generally in Item 79 (Readily becomes angry at mother). Interaction among Q-set: I items complement one another and increase the sensitivity of a Q-sort description.

If you see several instances of anger when mother offers help, or anger when she offers help and in other contexts as well, both Items 54 and 79 are placed high. This markedly reduces security scores based on the security criterion sort. If you see anger only when mother offers help, only Item 54 is placed high. If you see only "low level" signs of anger, you can at least place Item 79 somewhat above the middle of the sort. But because it is not placed as high as Item 54 in the criterion sort it can't, on its own, have much effect on the security score.

55. Child copies a number of behaviors or way of doing things from watching mother’s behavior.

Low: Doesn’t noticeably copy mother’s behavior.

Rationale: It would be interesting to see whether there is a relation between security and the imitative behavior that was once used as an index of closeness or "identification". However, this is a primarily a "filler" item. Such items are necessary. They make a Q-set sort more easily. They
can also serve other purposes. For example, they make the Q-set's focus on security less obvious. This may reduce social desirability responding when mothers serve as observers. In our experience, the behavior described in this item is not very often observed. It is usually placed in Pile 5. It would probably be dropped in any revision of the Q-set.

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

Low: Thinks he can do difficult tasks.

Rationale: This is a "filler" item. If anything, it reflects (negatively) competence motivation or a persistence-related temperament trait. No secure base connotation is intended. "Filler" items are necessary. They make a Q-set sort more easily. They can also serve other purposes. For example, they make the Q-set's focus on security less obvious. This may reduce social desirability responding when mothers serve as observers. Along with other exploration related items, this item might play a useful role in a competence motivation criterion sort.

57. Child is fearless.

Low: Child is cautious or fearful.

Rationale: This is a "filler" item. It may reflect a trait-like disposition toward positive or negative affectivity. Filler items are necessary. If all the items in the Q-set were about using mom as a secure base, they would be hard to sort; some items would have to be placed low even though the child is quite secure. "Filler" items can also serve other purposes. For example, they make the Q-set's focus on security less obvious. This may reduce social desirability responding when mothers serve as observers.

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

Low: Finds visitors quite interesting, even if he is a bit shy at first.

Rationale: This is a "filler" item intended to assess trait-like sociability. No secure base connotation is intended. If this item were in fact significantly with the overall security score, experts would want to place it higher in any future security criterion sort. It would not follow that observers should use the item differently. It is never appropriate for observers to make a global appraisal and then derive item placements from this. Their job is to describe the child's behavior. There is no reason for the observer even to know what constructs will be scored from the sort.

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

Low: When finished with an activity or toy, he returns to mother for play, affection or help finding more to do.

Rationale: An attachment figure supports exploration and learning by providing a source of information, help and stimulation. Ross Parke calls this "provisioning". This item focuses on how actively the child uses the mother as a base from which to explore. Both mother and child play active roles in the secure base relationship. Mother monitors the child's activity, offering con-
tact, reassurance, help, and interaction and pointing out interesting things to do or examine. The child's role is to monitor her location and activities, and actively turn to her when such "provisions" are needed.

It is important to distinguish between relationships in which the mother is very active and takes all the initiative in provisioning and those in which the child takes an active role as well. A common mistake is to place the item low merely because there are lots of provisioning interactions. Place the item low if the child is actively using the mother as a resource. If mom is so active that the child has little opportunity to initiate secure base bids, you can't score the item. Place it in Pile 5. To score this item correctly the observer must know to look for the behavior, be alert to situations in which it might occur, keep track of multiple instances.

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

Middle if never cautious or afraid.Low: Child does not accept mother’s assurances.

Rationale: In his book, A Secure Base, Bowlby suggested that an attachment figure must be one who is viewed as "stronger and wiser" than one's self. This however is not enough; the person must also be someone who is trusted. This item is intended to assess the child's trust or confidence in mother's support and reassurance. Observers should keep in mind that this behavior reflects an interaction of the child's interaction history with the attachment figure and a wide range of temperamental and situational factors that influence how worried or afraid the child is.

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

Middle if play is never very active

Low: Plays active games without injuring mother.

Rationale: This item was included in the Q-set to help cope with the problem of social desirability bias in maternal sorts. However, some attachment theorists would interpret such behavior as a sign of underlying relationship problems. Others would view it in terms of temperament. Do not prejudge the secure base relevance of this behavior. Do not let it influence placement of other items. Observers rarely see relevant behavior during a visit. This is not the kind of behavior that can be assessed very well by questioning the mother. This item is rarely placed far from the middle of a sort.

18

Attachment Q-set

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

Low: Happy moods are very changeable.

Rationale: This item refers to a temperament trait that could be construed as either high threshold for negative affect or tendency toward positive affect. No secure base connotation is intended. This item was included primarily to help examine the relation between security and positive affect. Studies have consistently shown that security is associated with positive affect. One aspect of this is that maternal sensitivity is related to harmonious interaction. Another aspect involves the possibility that positive affectivity could be an alternative interpretation of security.

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

Low: Confident. Tries things himself before seeking help.

Rationale: This is a "filler item". It refers to independence or competence related behavior. No secure base connotation is intended. "Filler" items are necessary. If all the items in the Q-set were about using mom as a secure base, they would be hard to sort; some items would have to be placed low even though the child is quite secure. "Filler" items can also serve other purposes. For example, they make the Q-set's focus on security less obvious. This may reduce social desirability responding when mothers serve as observers.

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

Low: Doesn’t especially want a lot of close contact when they play.

Rationale: This item focuses on indications that the child enjoys close physical contact. A child who enjoys close physical contact is assumed likely to find such contact comforting when distressed. A very active child may not show much cuddling or resting on mother's lap. But it may be clear from rough-and-tumble play that the child enjoys close physical contact. Not all contact play indicates such enjoyment. Looks for hugs or leaning on the mother at the end of a chase; clambering on the mother in a teasing or playful way when she is sitting; or running toward mother and grasping her legs/ burying face in her skirt. Also count long bouts of contact play as evidence that the child enjoys physical contact per se. If there are no bouts of active play, place the item in Pile 5. Place it lower if there is plenty of active play and only incidental contact.

65. Child is easily upset when mother makes him change from one activity to another.

(Even if the new activity is something child often enjoys.)

Low: Readily changes activities when mother suggest new ones.

Rationale: This is a "filler item". The behavior this item describes probably reflects an interaction between temperament traits and a history of intrusive maternal behavior. Still, no secure base connotation is intended. "Filler" items are necessary. If all the items in the Q-set were about
using mom as a secure base, they would be hard to sort; some items would have to be placed low even though the child is quite secure. "Filler" items can also serve other purposes. For example, they make the Q-set's focus on security less obvious. This may reduce social desirability responding when mothers serve as observers.

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

Low: Doesn’t grow fond of new people very easily.

Rationale: Some attachment theorists have hypothesized that attachment security is associated with a range of positive emotional responses ranging from empathy to emotional openness. In order to evaluate this hypothesis, the Q-set includes a number of relevant items. Observers should avoid prejudging the relation of such behavior to secure base behavior and attachment security. It is very important not to reduce attachment theory to the hypothesis that "All good things go together". Relations between attachment and various aspects of emotion and positive affectivity should be viewed as empirical issues.

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

Low: Does not particularly seek attention from visitors.

Rationale: This item is included in the Q-set to assess sociability, not secure base behavior. Place it low in the sort if child is preoccupied with his/her own activities or is indifferent to the observer. Place it in Pile 5 if the child is preoccupied with mom or wary of the observer throughout the visit. Observers should respond if the child seeks interaction, but not monopolize the child's time. After age 3, many children are distracted by a very engaging observer. This is not related to attachment security and cuts down on opportunities to observe secure base related behavior.

Note: It is easy to overlook "scorable" behavior until you are very familiar with the Q-set items and have used them in the field. Lapsing into play for play's sake is often a sign that an inexperienced observer is missing a lot and therefore finding the visits boring.

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

Low: On the average, child is less active type person than mother.

Rationale: This is a "filler item". No secure base connotation is intended. "Filler" items are necessary. If all the items in the Q-set were about using mom as a secure base, they would be hard to sort; some items would have to be placed low even though the child is quite secure. "Filler" items can also serve other purposes. For example, they make the Q-set's focus on security less obvious. This may reduce social desirability responding when mothers serve as observers.

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

Rationale: This item is included in the Q-set to assess a problem in secure base behavior, not as a measure of independence. Using mother as a source of information is an aspect of secure base behavior. Asking for her help suggests confidence in her availability and responsiveness. A child who expects mom to ignore or be intrusive rarely asks or approaches her for help. Place the item low in the sort if the child seems comfortable asking mother for help. Don't place it low if the child is merely clingy and dependent.

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

Low: Doesn’t greet mother unless she greets him first.

Rationale: Some attachment theorists have hypothesized that attachment security is associated with a range of positive emotional responses ranging from empathy to emotional openness. In order to evaluate this hypothesis, the Q-set includes a number of relevant items. Observers should avoid prejudging the relation of such behavior to secure base behavior and attachment security. It is very important not to reduce attachment theory to the hypothesis that "All good things go together". Relations between attachment and various aspects of emotion and positive affectivity should be viewed as empirical issues.

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

Low: Not easily comforted.

Rationale: The secure base phenomenon operates in both ordinary and emergency situations. In emergencies exploratory behavior is preempted by proximity seeking and contact maintaining behavior. Bowlby described ventral-ventral contact as a prepotent distress reducing stimulus. In the Strange Situation, the paradoxical combination of contact seeking and inability to be comforted by contact is a hallmark of insecure resistant attachment. This item is intended to capture effective functioning of physical contact as a component of secure base behavior in emergencies. This behavior is not ordinarily seen in home observations unless the child suffers some sort of injury. Situations in which the mother refuses to give the child something often elicit crying but are not the best contexts for assessing response to contact because the mother is both provocateur and comforter. Do not overlook the fact that temperament characteristics can influence ease of comforting. When a secure infant is difficult to comfort it tends to actively maintain contact and does not engage in angry or contact resisting behavior unless mom is intrusive or unresponsive.

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

Low: Visitors’ reactions don’t influence child this way.
Rationale: This item refers to the child's response to the observer. Within children this seems to be a rather consistent trait. Differences among children striking, ranging from eager engagement to indifference or active avoidance. No secure base connotation is intended.

73. Child has a cuddly toy or security blanket that he carries around, takes it to bed, or holds when upset.

(Do not include bottle or pacifier if child is under two years old.)

Low: Can take such things or leave them, or has none at all.

Rationale: It has long been hypothesized that cuddly toys and "security blankets" are psychological equivalents or substitutes for an attachment figure. This is an interesting idea and this item was included to take a look at the phenomenon in observational data. Observers should not prejudge the issue. You can often get useful information about this behavior by asking the child if he/she has a doll or animal they like to carry around or take with them when they go to bed. It is also useful to ask mothers for information about this behavior.

74. When mother doesn’t do what child wants right away, child behaves as if mom were not going to do it at all.

(Fusses, gets angry, walks off to other activities, etc.)

Low: Waits a reasonable time, as if he expects mother will shortly do what he asked.

Rationale: A key postulate of Bowlby and Ainsworth's attachment theory is that maternal sensitivity is a critical factor in attachment development. Sensitivity includes a low threshold for detecting infant signals, cooperation (vs. interference) with the infant's ongoing behavior, physical and psychological availability, and acceptance of the infant's needs and demands. This item is included in the Q-set on the theory that it reflects a history of maternal interference. Although it is thought to be related to secure base behavior, this is an empirical issue. Observers should not prejudge this relationship.

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

Low: Notices her leaving; may follow but doesn’t get, upset.

Rationale: A hallmark of secure attachment is confidence in the mom's availability and responsiveness. In a familiar setting most infants and children do not protest mother leaving the room unless her behavior is in some way out of the ordinary. Observers should watch closely for facial signs; these are sometimes subtle or fleeting. Do not over score separation responses that occur before the child is clearly comfortable with the observer's presence. Do not over score a single instance. That the behavior is clear or intense does not imply that it is typical. Ask the mother whether the child "reacts this way now and then".
76. When given a choice, child would rather play with toys than with adults. Low: Would rather play with adults than toys.

Rationale: This is a "filler" item. It refers to a trait called "Person vs. Thing Orientation" which is studied in adult personality research. Although the item has nothing to do with attachment, it is important to score it accurately. "Filler" items are necessary. If all the items in the Q-set were about using mom as a secure base, they would be hard to sort; some items would have to be placed low even though the child is quite secure. "Filler" items can also serve other purposes. For example, they make the Q-set's focus on security less obvious. This may reduce social desirability responding when mothers serve as observers.

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

Middle if too young to understand
Low: Sometimes puzzled or slow to understand what mother wants.

Rationale: This is a "filler" item. It is related to the child's cognitive abilities, not to any aspect of secure base behavior. Although the item has nothing to do with attachment, it is important to score it accurately. "Filler" items are necessary. If all the items in the Q-set were about using mom as a secure base, they would be hard to sort; some items would have to be placed low even though the child is quite secure. "Filler" items can also serve other purposes. For example, they make the Q-set's focus on security less obvious. This may reduce social desirability responding when mothers serve as observers.

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

Low: No particular interest in such contact.

Rationale: Although infants and children often initiate contact with visitors, they are less likely to accept or enjoy contact initiated by the visitor. Especially after age 1, indiscriminate fondness for physical contact with unfamiliar adults is unusual. It suggests diminished secure base orientation. Focus on contact initiated by the adult, especially in the first half of the visit, before there has been a lot of interaction with the child. It can be useful for the visitor to take the child's hand, ask the child to sit on his/her lap, or pick the child up in an appropriate context.

Do not place the item low because the child rejects being picked up or hugged when upset. It is expected that the child would prefer mom in this situation. Note: Child may be especially cautious with male visitors. Do not place the item in Pile 8 or 9 unless mom reports that the child would be the same with a female.

79. Child easily becomes angry at mother. Low: Doesn’t become angry at mother unless she is very intrusive or he is very tired.

Rationale: This is an aspect of smooth interaction and confidence in mother's sensitivity, availability and responsiveness. Any child might become angry if mom is extremely unresponsive or
intrusive. Don't place this item high if you find yourself saying "she asked for it". Look for situations in which the child becomes angry with little provocation. In order to correctly score this item, you need to have noticed the eliciting circumstances. Don't just watch; anticipate.

Clear instances of anger or annoyance are a better basis for scoring than the mere absence of anger. Do not place this item very low (< 3) unless the child is clearly patient and consistently pleasant during interaction with mom. Place it in Pile 5 if you don't have clear evidence. Some very pleasant children can surprise you.

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

Low: Makes up his own mind without checking mother’s expressions first.

Rationale: This behavior has been labeled "social referencing" by Campos & Stenberg (1981) and labeled this behavior "social referencing". It is of interest here as an element of the secure base phenomenon. Include both looking to mom for information about an object or intended act and looking to her for information about her likely response (i.e., will she disapprove). Looking toward the mother can easily come under operant control if she is ever present and a bit intrusive. Look for instances in which there is no obvious cue or prompt from mom.

This is a situation in which you have to learn to anticipate. You won't remember a cue or prompt that preceded the social referencing unless you are alert to such things before the child looks to her.

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

Low: Mainly cries because of genuine discomfort (tired, sad, afraid, etc.).

Rationale: Attachment theorists associate this behavior with insensitive care, limited communication skills and interrupted play and exploration. Focus on crying as the child's first or quickest way of communicating and on the extent to which the child's behavior is organized around crying to get what he/she wants. It is doesn't matter that this may be the only behavior that could elicit a timely response from mother.

This behavior has been the subject of controversy. Operant theorists focus on the fact that contingent maternal response could increase rates of crying. Clearly, crying can come under a degree of operant control, esp. after age one.

Attachment theorists focus on the secure base implications of differential response to crying. They emphasize that it undermines both the growth of more fluent communication skills and confidence in mother's availability and responsiveness. In addition, frequent crying interferes with ongoing play and exploration. Insensitive care, limited communication skills, and disrupted play add up to a difficult secure base relationship.
82. Child spends most of his play time with just a few favorite toys or activities. Low: Explores and plays (briefly) with a number of different toys.

Rationale: This is a "filler item". No secure base connotation is intended. Nonetheless, it is important to score this item accurately. This item is rarely placed >7 or <3. If you place this item very high (or very low), you are saying that the child's behavior is very largely organized around the need or intention to play with only a few (or with many) toys. That is, the child would adjust other aspects of his behavior in order to maintain this preference. The child would stick with one activity at all costs (or seem driven from toy to toy to toy). Either would be unusual.

Filler items are necessary. If all the items in the Q-set were about the child's ability to use mom as a secure base, they would be hard to sort; some items would have to be placed low even though the child is quite secure. "Filler" items can also serve other purposes. For example, they make the Q-set's focus on security less obvious. This may reduce social desirability responding when mothers serve as observers.

83. When child is bored, he goes to mother looking for something to do. Low: Wanders around or just does nothing for a while, until something comes up.

Rationale: This is an aspect of secure base behavior. An attachment figure supports exploration and learning by providing a source of information, help and stimulation. Ross Parke calls this "provisioning". This item focuses on how actively the child uses mom as a base from which to explore. Both mother and child play active roles in the secure base relationship. Mother monitors the child's activity, offering contact, reassurance, help, and interaction and pointing out interesting things to do or examine. The child's role is to monitor her location and activities, and actively turn to her when such "provisions" are needed.

It is important to distinguish between relationships in which the mother is very active and takes all the initiative in provisioning and those in which the child takes an active role as well. A common mistake is to place the item high merely because there are lots of provisioning interactions.

Place the item high only if the child is actively using the mother as a resource. Place it low if typically the child wanders aimlessly when finished playing with something or bored with some activity. (Don't count viewing TV as "aimless" behavior. Don't place the item very low because of one bout of wandering. Make sure this is typical. If mother is so active that the child has little opportunity to initiate secure base bids, you can't score the item. Place it in Pile 5.

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

Low: Spills and smears things on himself and on floors all the time.

Rationale: This is a "filler" item. It was included because it is very socially desirable. The item is placed <3 only if the child is a real mess (either clumsily or carelessly). Don't place the item >7 unless, throughout the visit, the child seems to have a low (or high) threshold for behavior related
to keeping things clean and tidy. Either extreme is unusual. You will recognize relevant behavior if you see it.

For infants and very young children, place the item in Pile 5. Note: This is a good example of an item that is worded moderately but allows you to make a rather extreme statement about the child by placing it very high or very low. Moderate phrasing reduces desirability response set.

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

Low: New things do not attract him away from familiar toys or activities.

Rationale: This is a "filler" item. If anything, it might be related to cognitive style. It is not intended to carry any secure base connotation at all. Nonetheless it is important to score it accurately. Focus on novel things the visitor brings (not necessarily toys) and on new activities he/ she suggests. Do not focus on the child's response to the visitor per se or on participating with the strange in familiar activities. These are aspects of sociability and tapped by other items.

It can be useful to suggest a novel activity in order to gauge the child's response. As mentioned in the section, About Sorting and Observing, it is also useful to plan some brief activities for mother and child. Unless they are activities in which mother and child often engage, this is a good chance to observe the child's interest in new activities. You might also ask mother about interest in new activities. If you don't have an opportunity to observe responses to new activities or toys, place the item in pile 5.

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

Low: Doesn’t show any particular interest in this such engagement.

Rationale: This behavior that combines aspects of smooth interaction, affective sharing, and perhaps also social referencing. It refers only to behavior toward mother; not toward the visitor. Do not over score single instances. Look for several instances, long chains of repeating the imitated behavior, or instances in which the child's response is very clearly positive. Do not place the item low just because you don't see the child try to elicit imitation. Look for clear or repeated instances of the child being indifferent to mother imitating him. Because the behavior is rare, the item is most often placed in pile 5.

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

Low: Child is not particularly influenced this way.

Rationale: This behavior is reflects a trait-like low threshold for positive affect. Such a trait facilitates smooth interaction; that increases the chance that the child can put together a useful secure base relationship (if mother cooperates). It is also, in many instances, related to smooth interaction and affective sharing. It is fine for a temperament loaded item to add to the overall security score. Criterion sort scores are based on many items. Any item is most influential when
it reinforces information from other items. If key secure base items are placed high, then this one can make a difference in the overall security score. It cannot produce a spuriously high security score on its own.

88. When something upsets the child, he stays where he is and cries. Low: Goes to mother when he cries. Doesn’t wait for mom to come to him.

Rationale: This behavior is analogous to "passive" behavior scored as resistance to contact in the Strange Situation. Both partners have active roles to play in a secure base relationship. Thus you should take note if all the responsibility is left to the adult partner. Give more weight to situations in which something has happened to the infant and less to tantrums when mother is unresponsive. This item is in the Q-set because it describes behavior that is sometimes observed. The observer should score the item from the behavior alone. Describe, don't diagnose.

Bowlby, of course, took a very strong position about what a human infant "ought" to do when distressed and what form secure base behavior should take. Unless the infant is restrained or disabled, distress without proximity seeking is inconsistent with Bowlby's idea of a properly working attachment control system. (Whether the problem is a flaw in the control system itself or some sort of affect-based interference with its smooth functioning is not specified.)

In Bowlby's view attachment behavior is controlled by a species specific behavior control system. When an infant is distressed this control system will be activated. Play and exploration are reduced. The infant orient toward and seeks proximity to the attachment figure. It makes a full approach and seeks ventral-ventral contact until comforted. Ventral-ventral contact is seen as a virtual consummatory response for terminating distress.

Learning theorists are understandably skeptical of the notion that any specific behavior "ought" to occur in a particular situation. But Bowlby's strong normative position has served attachment theory well. It is the only a priori basis for predicting that avoidance and resistance in the Strange Situation would be associated with insensitive care and attachment related problems beyond infancy.

89. Child’s facial expressions are strong and clear when he is playing with something. Low: Facial expressions are not particularly clear or varied.

Rationale: This item refers to facial expressions of positive affect and interest, not to fussing and cry faces. It is a "filler item". It is not intended to carry any secure base connotation at all. Nonetheless it is important to score it accurately.

"Filler" items are necessary. If all the items in the Q-set were about the child's ability to use mom as a secure base, they would be hard to sort; some items would have to be placed low even though the child is quite secure. "Filler" items can also serve other purposes. For example, they make the Q-set's focus on security less obvious. This may reduce social desirability responding when mothers serve as observers.
Note: It is easy to overlook "scorable" behavior until you are very familiar with the Q-set items and have used them in the field. Lapsing into play for play's sake is often a sign that an inexperienced observer is missing a lot and therefore finding the visits boring.

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

Middle if child isn’t allowed or doesn’t have room to move very far away.

**Low: Child may or may not continue play but does not adjust location when mom moves.**

Rationale: This is of interest as an aspect of the child's active role in the secure base relationship. The child manages to coordinate play with active efforts to monitor and maintain access to mom. There is no negative connotation (e.g., clinginess or dependency) attached to this behavior. The child moves along without getting upset. This is competent secure base behavior in a child who (for trait or situational reasons) prefers to play in proximity to mom.

This behavior is most often seen in unfamiliar settings or if the child is wary of the visitor. If you see clear examples in the home, place the item appropriately. In a few cases we have placed the item high when a child whose play was not movable and the child protested mom beginning to move away. Although mother is moving off, she is willing to let the child continue playing where he is.

Do not give much weight to the absence of following or moving play if the observations are limited to in and around the home the child seems comfortable with the visitor.
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