

**The Association Between Maternal Attachment Styles and Dyadic Synchrony:  
Exploring a Home Visiting Program for Young Mothers**

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### **Abstract**

Using data from the Massachusetts Healthy Families Evaluation Early Childhood study, this thesis explored the association between maternal attachment style dimensions and dyadic synchrony in a diverse sample of young mothers ( $n = 312$ ) enrolled in Healthy Families Massachusetts, a newborn home visiting program for first time mothers under the age of 21. Group differences in attachment style dimensions and dyadic synchrony between mothers receiving home visits (HVS) and mothers receiving referral information only (RIO) were examined. Results revealed significant group differences in maternal attachment style dimensions, demonstrating that RIO mothers had higher scores on insecure attachment style dimensions compared to HVS mothers. There were no significant group differences in dyadic synchrony scores and a non-significant relation between maternal attachment style dimensions and dyadic synchrony. Findings can be used to encourage intervention programs to increase services specifically for young mothers that improve parent-child interactions and promote positive parenting practices.

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## INTRODUCTION

Becoming a mother during adolescence presents challenges for both the mother and child. Compared to older mothers, young mothers (< 21) are more likely to engage in risky behaviors, are less educated, live in poverty, and/or raise their children as a single parent (Coley & Chase-Lansdale, 1998; Easterbrooks, Chaudhuri, & Gestsdottir, 2005; & Ketterlinus, Lamb, & Nitz, 1991). Given these risk factors, a young mother may experience challenges that make it difficult for her to raise and provide for her child, while at the same time, she is still growing and developing. Easterbrooks, Chaudhuri, and Gestsdottir (2005) found that teen mothers experience elevated levels of stress and anxiety, and show moderate to severe levels of depressive symptoms. As a result, teen mothers may interact with their child less positively and less sensitively, and have unrealistic expectations of their child's behaviors, which may increase the risk of abuse and neglect (Barnet, Liu, Devoe, Alperovitz-Bichell, & Duggan, 2007; Eamon, 2001). These maternal attitudes and behaviors put their children at risk for developmental delays and the development of poor attachment behaviors, which may lead to negative long-term deficiencies in adaptive, cognitive, and behavioral development (Belsky & Fearon, 2002; Easterbrooks, Chaudhuri, & Gestsdottir, 2005). Although these factors suggest that young mothers may not be capable of "good parenting", one must consider that these girls are still adolescents, nevertheless, on the verge of transitioning into young adulthood. Given that teen mothers are still developing and in transition from adolescence to early adulthood, it is likely that they have yet to fully develop the necessary skills to properly provide and support their child (Flaherty & Sadler, 2011). Does this mean they will never develop the skills because they are a "teen mom"? Are they incapable of "good parenting"?

In light of these concerns, early intervention programs have been implemented to improve parent-child relations, promote optimal parent and child development, and provide resources to parents. Home visiting intervention services have been widely used, specifically for at-risk mothers, however research on the effects of services on both mothers and children has been mixed and has shown minimal effects (Avellar, & Supplee, 2013; Barnett, Liu, Devoe, Alperovitz-Bichell, & Duggan, 2007; Gomby, 1999; Sweet, & Appelbaum, 2004). This could be explained by the many moderators that influence program effects (e.g., social economic status, sibling effects in the family, single/multiple parent families, same sex parent families, amount of resources received from the home visiting program) (Duggan, Berlin, Cassidy, Burrell, & Tandon, 2009). There is however, research to support that services lead to improvements in parental health and reduced repeat pregnancies (Olds et al., 1998); increased levels of responsiveness and sensitivity in interactions (Raikes, 2006); more support for autonomy and less intrusiveness (Heinicke et al., 2001); and reduced abuse and neglect (Duggan et al., 1999).

Additionally, children are found to have better health outcomes (Brooks-Gunn et al., 1994; St. Pierre, Layzer, Goodson, & Bernstein, 1997; Sweet, & Appelbaum, 2004); fewer behavioral problems (Raikes, 2006); better emotional functioning (Heinicke et al., 2001; Raikes, 2006), and more secure attachment relationships (Heinicke et al., 2001; Raikes, 2006). In fact, attachment-based intervention programs that are designed to enhance parental sensitivity and child attachment have been shown to be especially effective (Moss, Dubois-Comtois, Cyr, Tarabulsky, St-Laurent, & Bernier, 2011). Results of a randomized control design with pre- and post-test assessments indicate that an attachment-based intervention program was effective in improving parental sensitivity, reducing disorganization of children in early childhood (12-71 months), and improving parent-child security of attachment (Moss et al., 2011). Following the 8-



week intervention, Moss et al. (2011) found that children receiving the intervention were more likely to develop a secure attachment pattern than did comparison children (Moss et al., 2011). This is especially important because of how vulnerable children are at such a young age, and even more so for children of young mothers. Therefore, it is important to highlight the role of the parent-child relationship and the interactions that take place between the dyad, in relation to the child's development.

Harrist and Waugh (2002) defined the different interactional styles between a parent and child as "dyadic synchrony". Broadly defined, dyadic synchrony describes the type of parent-child interactions that are mutually regulated, contingent, harmonious, and reciprocal (Harrist & Waugh, 2002; Im-Bolter, Anam, & Cohen, 2014). Dyadic synchrony consists of a "maintained shared focus of attention, temporal coordination, and contingency" (e.g., shared eye contact, turn-taking, mutual engagement and responsiveness, and shared positive affect) (Harrist & Waugh, 2002; Pasiak & Menna, 2015). Mother-child synchrony has been a focus of research that examines different aspects of the interactional relationship in mother-child dyads in relation to other facets and moderators of child development.

Synchronous interactions between mother-child dyads is important in fostering the healthy development of a child. Without a synchronous relationship developed in infancy with his/her caregivers, the child may not develop the skills that foster relationship building with others in his/her future (Harrist & Waugh, 2002). Of note, maternal attachment styles are an important indicator of how a mother interacts with her infant, which in turn also affects the dyadic synchrony and development of a secure attachment in the infant. For example, a mother with an insecure attachment style may not have a strong interactional relationship with her child, which could negatively affect the dyadic synchrony between the two. Therefore, it is important

to highlight the role that maternal attachment styles play in the development of dyadic synchrony in the interactions between a parent-child dyad.

The present thesis aimed to understand the relation between maternal attachment styles and dyadic synchrony in a sample of high-risk young mothers. Existing research was reviewed to examine the role of maternal attachment styles in relation to the quality of interactions between a mother-child dyad. Furthermore, this thesis reviewed literature that suggests that intervention programs may improve the quality of mother-child interactions and promote positive parenting practices. Following the review of the extant literature, this paper reports analyses that assessed the relation between maternal attachment style dimensions and observed dyadic synchrony in a diverse sample of young mother-child dyads enrolled in a home visiting program. Group differences in maternal attachment style dimensions and observed dyadic synchrony were then compared between dyads enrolled in a treatment condition: Home Visiting Services (HVS), and a control condition: Referrals and Information Only (RIO).

## THEORETICAL FRAMEWORK AND LITERATURE REVIEW

### **Attachment**

Important theorists, such as Bowlby (1969), reason that parental behaviors leading to secure or insecure attachments with his/her child stem from a parent's own experiences as a child. Bowlby (1969) theorized that all children are born with the innate need to attach to some attachment figure (e.g., the mother and/or father). He explained that these initial parent-child relationships lead to the development of an internal working model (IWM): a cognitive framework consisting of mental representations for understanding the self, others, and the world (Bowlby, 1969). The IWM is derived from past experiences, memories, and expectations that

have developed throughout childhood, affecting the ways in which he/she interacts with others and the world (Belsky & Fearon, 2002; Bowlby, 1969). According to the development of the IWM, the way a parent acts towards and perceives his/her child is a reflection of his/her own childhood, expectations, and experiences. Of note, the degree to which a parent is responsive and sensitive to the child's needs and wants, influences the child's security with the parent. The child inherently learns whether the parent is a secure and trustworthy base, which will subsequently extend into the ways in which the child develops and interacts with others in his/her future.

Bowlby (1969) described the attachment system as relatively stable, but when confronted with significant stressors, individuals may display less stable and secure working models of relationships over time. For example, urban poverty and its related stressors (i.e., exposure to neighborhood crime and violence, housing instability, transient and untrustworthy neighbors, unresponsive landlords, lack of employment opportunities) can bring up fear and mistrust in an individual, and undermine one's ability to develop and maintain secure attachments (Candelaria et al. 2011; Stansfeld et al. 2008). Similarly, these factors can create obstacles that interfere with parents' abilities to be responsive and sensitive to their child.

Building on Bowlby's attachment theory, Ainsworth and colleagues identified three primary infant behavioral styles (later classified as attachment styles) that are recognized as the outward manifestations of an individual's IWM: secure, insecure-avoidant, and insecure-anxious/ambivalent (Ainsworth, Blehar, Waters, & Wall, 1978; Lyddon, Bradford, & Nelson, 1993). While the attachment relationship forms in infancy, it is also revealed in ongoing interactions with others as the individual grows, particularly when developing romantic relationships as young adults or beyond. The way the attachment relationship is manifested in adulthood has been studied extensively, and the early attachment types have been identified as

follows. Secure individuals typically have responsive caregivers and have developed trust in others and the self (Bowlby, 1980; Sochos & Yahya, 2015). Avoidant individuals have been shown to be distrusting of others, prefer to distance themselves from forming relationships, and are uncomfortable with intimacy (Feeney, Noller, & Hanrahan, 1994; McCarthy & Taylor, 1999). Anxious/ambivalent individuals desire close relationships and often form intimate relationships, however, may have an extreme fear of rejection, which results in lacking autonomy and becoming codependent (McCarthy & Taylor, 1999; Sochos & Yahya, 2015). Examining the specific attachment styles of an individual can pave the way to understanding how they treat and view others based on their IWM. A mother with an insecure attachment style may have never developed the preexisting framework in her IWM of what a secure attachment is, and therefore, might lack the necessary skills to provide a secure attachment base for her child.

The link between past experiences and the IWM, and the development of interactional relationships, may provide a bridge to explain the question as to why some mothers are insensitive and unresponsive to their children. Waters, Merrick, Treboux, Crowell, and Albersheim (2000) found that infant–mother attachment security significantly predicted working models of attachment in young adulthood. If a mother never experienced a secure attachment as a child, she may not have the foundation to develop a secure attachment style herself. This may potentially result in the development of an insecure attachment style for the mother. A mother with an insecure attachment style may not exhibit the parenting behaviors and attitudes that are necessary in providing optimal care for a child to develop a secure attachment relationship.

### **Maternal Attachment Styles**

Existing research suggests that adult attachment styles are related to personality, depression, social support, relationship functioning, religiosity, substance use, and domestic

violence (Brennan & Shaver, 1995; Mickelson, Kessler, & Shaver, 1997). Research on attachment styles provides evidence suggesting that the way in which people perceive and organize their attachment-related childhood experiences (i.e., IWM) is an important factor in the quality of future attachment relationships that form between a parent and a child. Therefore, it is essential to acknowledge the importance of understanding adult attachment styles, and how they function in relation to the ways in which a parent interacts with his/her child (Bengtsson, & Psouni, 2008; van IJzendoorn, 1995).

Several validated instruments assess adult attachment security, typically by measuring attachment state of mind. Yet, much of the research on maternal attachment styles is conducted with older populations, with minimal research on teenage mothers. A relatively recent study assessed attachment styles in Portuguese pregnant teenage mothers aged 19 or younger, and compared their attachment styles to a sample of pregnant mothers aged 19 and older (Figueiredo, Bifulco, Pacheco, Costa, & Magarinho, 2006). Attachment was assessed via the Attachment Style Interview (ASI; Bifulco, Moran, Ball, & Bernazzani, 2002) an objective assessment of the mother and the relationship between her and up to three “supportive figures” in her life (e.g., spouse and family members). This overall assessment made by the investigators included ratings based on frequency, intensity, and extent of supportive interactions between the mother and her supportive figures. These ratings consisted of levels of active emotional support, confiding, quality of interactions, and felt attachment between these individuals as measured on a 7-point Likert scale. The ASI also has seven sub-scales assessing types of avoidant behaviors (mistrust, constraints on closeness, self-reliance, and fear of intimacy), and anxious/ambivalent behaviors (desire for engagement, fear of separation, and anger) (Bifulco, Moran, Ball, & Bernazzani, 2002). The investigators took the ASI scores and then determined an attachment style rating

based on the mother's "ability to make and maintain relationships" (Figueiredo, Bifulco, Pacheco, Costa, & Magarinho, 2006). Having at least two supportive figures present for the assessment was scored as "good" for quality of support, which was considered a "clearly secure" or "mildly insecure" attachment. Less than two was scored as "moderate" levels of insecure attachment. The investigators then looked at the subscales and classified the mothers on a 13-point scale based on type of secure or insecure attachment (e.g., enmeshed, fearful, angry-dismissive, withdrawn, or clearly secure) and degree of the attachment (markedly, moderately, mildly, or not insecure). The investigators reported satisfactory inter-rater reliability ( $\alpha = 0.81$ ) between the observers (Figueiredo, Bifulco, Pacheco, Costa, & Magarinho, 2006).

Results indicated that there was a significant difference in responses of teenage mothers and older mothers. The teenage mothers had significantly higher rates of enmeshed, angry-dismissive, and fearful attachment styles, with only 8% of the teenage mother sample with a "clearly secure" attachment rating. The pregnant teenagers were also more likely to have been separated from their parents before the age of 18, and have parents who were divorced, compared to the older sample. These findings suggest that due to the lack of support and the experiences of parental separation in their childhood, teenage mothers may exhibit higher levels of negative attitudes about closeness and autonomy (Figueiredo, Bifulco, Pacheco, Costa, & Magarinho, 2006). However, the ASI poses some limitations for the analyzed results. Because this was an in-person assessment, the mothers and/or "supportive figures" may have been acting a certain way to better their image, and to make it seem like they were more supportive of the child and mother than they actually were on a regular basis. Additionally, it could be the case that some of the "supportive figures" were not able to participate (e.g., personal reasons, health issues, not in the area at the time of data collection), therefore affecting the overall results. The

researchers suggested that teenage pregnancy in itself may not necessarily be a risk factor for the child's future development. Rather, the child may become more prone to negative developmental outcomes if the mother is an insecurely attached individual herself. It is evident that attachment styles, and Bowlby and Ainsworth's attachment theories, are crucial in understanding the conceptual framework of relationship development. However, more research is needed to further explore the attachment styles of at-risk young mothers.

Kohlhoff and Barnett (2013) examined predictors of parenting self-efficacy in a sample of first-time mothers during the first year after childbirth by assessing psychological distress and adult attachment. Parenting self-efficacy was defined as the "beliefs a parent holds of their capabilities to organize and execute the tasks related to parenting a child" (de Montigny, & Lacharité, 2005). Eighty-three mothers with infants less than a year old admitted to a residential parent infant program participated in a structured clinical interview for any DSM-IV diagnoses of depressive and anxiety disorders. These mothers also completed the Attachment Style Questionnaire (ASQ), a validated self-report scale that assesses adult attachment styles (Feeney, Noller, & Hanrahan, 1994). The mothers were asked to rate on a 6-point Likert scale the extent to which the questionnaire items described their feelings and behaviors in regards to their close relationships. The questionnaire items correspond to 5 different subscales (Confidence in Self and Others, Discomfort with Closeness, the Need for Approval, Preoccupation with Relationships, and Treating Relationships as Secondary to Achievement). Within these five subscales is a 3-factor solution that yields "security", "anxiety", and "avoidance" factors that correspond with the self-reported items.

Results revealed that parenting self-efficacy was negatively correlated with attachment insecurity, maternal depression, and maternal anxiety. Mothers with low self-efficacy reported as

more insecurely attached. Additionally, avoidant attachment style traits predicted lower parenting self-efficacy. Attachment anxiety and attachment avoidance were moderately correlated ( $r = .56$ ), reflecting a connection between these two attachment style traits. This study highlights the importance that adult attachment security has in the development of parenting self-efficacy. The use of the ASQ was beneficial in this study because it is a 40-item self-report measure, which was easily administered during the structured interview, and results were easily attainable. It was a quick and effective measure of adult attachment, however, using the ASQ also posed a limitation in the interpretation of the results. The ASQ is a self-report measure that does not provide objective information or any information regarding whether an individual has “resolved” previous abuse and loss experiences. Although it was practical to administer, the ASQ might not have been the most comprehensive attachment style measure, as compared to the ASI, therefore results should be interpreted with caution.

This study suggests that when assessing self-efficacy in new parents, clinicians should keep in mind adult attachment issues, particularly when working with women presenting with early parenting difficulties or first time mothers. It is important to note the factors that influence self-efficacy, and to help parents promote more positive self-efficacy. If left unaddressed, low parenting self-efficacy can lead to the use of negative parenting strategies, parents being more likely to “give up”, parents making internal attributions for failure, and the likelihood of experiencing anxiety/depression in response to challenging situations (Kohlhoff and Barnett (2013). This may result in the infant crying more, appearing more tense and fussy, and acting less interactive, which in turn affects how the parent interacts with the child. When there is low parenting-self efficacy, not only is the parent affected emotionally, but the child is affected as well; both the parent and the child’s actions are reflective of each other in a reciprocal manner.



## **Dyadic Synchrony**

Leclère and colleagues (2014) completed a systematic review of the importance of dyadic synchrony in mother-child dyads, particularly in children between two and five years old. They described the importance of the concept of synchrony and how it includes the interactive behaviors and non-verbal communication (e.g., gestures, body language, facial displays, gazes, and vocalizations) between partners. Because of the interactions and coordination between a dyad, the investigators described dyadic synchrony as an “intricate dance” that builds on the familiarity with a partner’s behaviors and interaction rhythms (Leclère et al., 2014). Dyadic synchrony encompasses the idea of a system, in that the mother and child’s responsivity, behaviors, and emotional states are matched to form a single unit; hence “dyadic” synchrony.

Of the 63 studies reviewed, 84% examined mother-child interactions only, and mean child age was approximately one year old. The review included studies examining synchrony in normal populations (e.g., no psychopathology, mental/medical conditions, or disorders in mother or child) as well as synchrony in clinical populations (e.g., infant psychopathology, developmental impairments, mental/medical condition in mother). Results revealed that synchrony varied between children of different developmental stages and was based on the children’s communicative abilities that allowed them to be interactive with their partner. For example, a mother’s voice and a child’s movements characterize synchrony between an infant and mother, and as the child develops into early childhood, synchrony may consist of turn-taking between the dyad, reciprocal conversation, shared eye contact, and increased initiation from the child (Leclère et al., 2014).

Ambrose (2013) examined parent-child synchrony as a predictor of young children’s social and emotional functioning. Ambrose assessed mother-child dyads as they engaged in a

free play task as well as a structured teaching task in order to code for interactional synchrony. She also looked at mothers' self-reports of their reactions to their child's negative emotional expressions, in addition to their children's emotion regulation and social skills. She found that mothers with distressful reactions to their child's negative emotions predicted negative emotional regulation difficulties and weaker prosocial skills in their child. She also found that lower levels of interactional synchrony in mother-child dyads was associated with the mothers' tendency to use minimizing reactions to their child's negative emotions during the observed tasks, which resulted in the child having fewer social skills compared to the more synchronous mother-child pairs. There was also a positive association between mothers with expressive and encouraging reactions, and their child's cooperation and assertion skills (Ambrose, 2013). These findings emphasize the importance of high quality dyadic synchrony and interactional relationships between mother-child dyads in fostering the optimal growth and development of children. Of note, when there is a high level of dyadic synchrony in mother-child dyads, the child is likely to develop a more secure attachment to his/her mother because of her positive reactions and interactions with the child.

In relation to attachment theory, Crandell, Fitzgerald, and Whipple (1997) reasoned that adult attachment security is associated with infant attachment security, and that adult mental representations of attachment are the underlying factor linking attachment patterns across multiple generations. The investigators sought to examine the impact of the quality of attachments on the interactional relationship between mother-child dyads based on the mother's own attachment style. They examined the relation between maternal representations of attachment and mother-child interactions in a community sample of 36 mother-child dyads.

Mothers completed the Parenting Stress Index (PSI; Abidin, 1986), a standardized 100-item questionnaire that assesses stress in the parent-child relationship based on a 5-point Likert scale. Ratings were measured on three domains: child domain score, parent domain score, and total stress score. The child domain measured six dimensions of child functioning: acceptability, adaptability, hyperactivity, mood, demandingness, and positive reinforcement. The parent domain measured seven dimensions of parent functioning: attachment, competence, depression, relationship with spouse, social isolation, health, and role restriction. The scores on these two domains were summed to provide a total stress score (Abidin, 1986; Crandell, Fitzgerald, & Whipple, 1997).

Mothers also completed the Adult Attachment Interview Questionnaire (AAIQ), a measure that asks its subjects to describe their childhood relations with their parents, their understanding of why their parents acted the way they did, the effects of these prior relationships on their own adult personality, and how their relationships with their parents have changed over the years (Adams, 1992; Main & Goldwyn, 1984-1996). This measure consists of two dimensions. The first assesses the “emotional quality of the parent-child relationships” rated on five subscales: rejection, role-reversal, neglect, pressure to achieve, and abuse. The second assesses the individual’s “current representational model of attachment” rated on three subscales: idealization, ability to recall memories, and resolution of emotional conflicts (Adams, 1992; Main & Goldwyn, 1984-1996). In addition to the questionnaires, the mother-child dyads were video-recorded during a play interaction task, which was later coded with a modified version of the Belsky Parent-Child Interaction Coding System (Belsky, Youngblade, Rovine, & Volling, 1991). The interactions were observed based on parental warmth/affection, parental control, child affect, and child social behavior, and rated on a 5-point Likert scale.

Results indicated that there was a more fluid and synchronous interaction between secure mothers and their children compared to insecure mothers and their children. More secure mothers also encouraged more child autonomy and were less intrusive than insecure mothers. The mothers who had experienced more loving and secure relationships with their parents when they were children were more warm and affectionate with their children during the play task. In turn, their children were more compliant and had closer contact with the more warm and affectionate mothers. The overall findings of this study emphasize the importance of maternal representations of attachment styles in relation to the mother's own interactions with her child and degree of dyadic synchrony. When an individual experiences a loving and secure relationship with his/her own parents, it transfers to how he/she acts with and toward his/her own children. The individual who has experienced a warm environment during childhood is likely to have developed a secure attachment style. When an individual develops a secure attachment style, he/she will have the skills to have high quality interactions with his/her children, like positive affect, good communication, and warmth/affection. These qualities provide the foundation for having strong, and synchronous interactions with the child. This increases the chances that the individual will provide for a secure attachment base for his/her future children to develop a secure attachment too (Crandell, Fitzgerald, & Whipple, 1997). Although these findings are helpful in understanding the relation between attachment styles and dyadic synchrony, there is a need for this research specifically in high-risk populations. In order to better support high-risk mothers (e.g., young mothers) it would be beneficial to first understand the attachment styles of a sample of high-risk mothers, and then to explore the ways in which the mothers interact with their children, and the quality of these interactions.

## **Intervention Programs**

Research suggests that intervention programs are beneficial for the development of positive parenting habits, child developmental outcomes, and parent-child relationships. Van Doesum, Karin, Riksen-Walraven, Hosman, and Hoefnagels (2008), examined the effects of a mother-infant intervention program that assessed the quality of mother-child interactions, mother-child attachment security, and child socio-emotional functioning. The researchers conducted a randomized controlled trial, comparing the interactions of an experimental group that received the intervention (home visits) and a control group that only received support via telephone calls. Those mothers in the control group received three phone calls from child psychologists throughout the duration of the program. These 15-minute phone calls consisted of non-specific parenting advice to support the mother. The mother-child dyads in the intervention group received home visits from qualified prevention specialists, each with a master's degree in psychology and training in health and prevention education. During the home visits, the mother-child interactions were video-recorded, which were later analyzed and assessed by the multidisciplinary team of specialists. They assessed the interactions, specifically focusing on the mother's sensitivity and responsiveness to her child's signals and needs. The team members then defined the specific aims and methods of intervention that best suited the needs of the mother-child dyads. The home visitor discussed the observed interactions with the mother, and father if present, and then suggested ways of expanding her range of appropriate behaviors with her child. For example, parents were encouraged to adopt new and more sensitive interactive behaviors with their children (e.g., making more eye contact with the child, having more physical contact with the child, imitating the child to elicit attention, and decreasing negative thinking). These

home visits were intended to help the mother/parents recognize ways of improving their interactions with their child as well as expand on their already existing parenting skills.

The investigators assessed program effects pre (first home visit) and post (within 2-weeks of completion) intervention, and then again after a 6-month follow up. The mother-child dyads were videotaped at home while they played together during each assessment. The mothers also completed an oral questionnaire on their child's socio-emotional functioning. After observing the home visit, the specialist then completed the 90-item version of the Attachment Q-set (AQS, Waters, 1995) by describing the child's secure-base behavior (van Doesum, Karin, Riksen-Walraven, Hosman, & Hoefnagels, 2008). The researchers found that the intervention had positive effects on the quality of mother-child interactions. The children receiving home visits had higher levels of attachment security, higher levels of socio-emotional functioning, and higher levels of competence compared to their controls. The investigators found that the intervention was successful in preventing negative mother-child interactions as well. This may be due to the fact that the interventions were tailored specifically to each mother-child dyad that played on each mother's strengths and weaknesses (van Doesum, Karin, Riksen-Walraven, Hosman, & Hoefnagels, 2008). Because the intervention group received feedback that directly related to their interactions with their child, whereas the control group only received general parenting advice, it can be inferred that programs aimed at helping parents improve their interactive behaviors in more specific ways are most beneficial for the mother and the child, compared to programs that merely offer resources and advice.

Another program aiming to promote positive parenting outcomes, specifically in teen mothers, seeks to promote mothers' and children's emotional and behavioral functioning. Barlow et al., (2013) examined the effectiveness of Family Spirit, a paraprofessional-delivered, home

visiting pregnancy and early childhood intervention program. The investigators recruited over 300 pregnant American Indian teens who were randomly assigned equally to either a Family Spirit intervention group or to an optimized standard care group. The Family Spirit intervention program included 43 highly structured one-on-one lessons delivered by trained home visitors that lasted about an hour; occurring weekly through the end of pregnancy, biweekly until 4 months post-partum, monthly between four and twelve months post-partum, and then bimonthly between twelve and 36 months post-partum. These lessons targeted parenting skills across early childhood (0-3 years old), maternal life skills, and positive psychosocial development. The pregnant teens in the optimized standard care group did not receive these lessons, however, they were provided with transportation to prenatal and baby clinics and were offered pamphlets on childcare, community resources, and referrals to local services when needed. The parent and child emotional, psychosocial, and behavioral outcomes were collected at enrollment, two, six, and twelve months post-partum. Parenting outcomes included: parenting knowledge, self-efficacy, maternal acceptance, involvement, responsivity, home safety strategies, internalizing/externalizing problems, and substance use. These were collected via self-report questionnaires, in-person interviews, and observational assessments.

The investigators found that the intervention group showed increases in parenting knowledge, parenting self-efficacy, and home safety attitudes at twelve months postpartum. The mothers and children in the intervention group also showed fewer externalizing and dysregulation problems at 12 months postpartum compared to those in the standard care group (Barlow et al., 2013). These results suggested that participation in a home visiting services program not only increased parental knowledge and improved parent-child relationships, but also

promoted optimal growth and development in children and parents both independently and as a dyad.

Another home visiting program that relates particularly to the proposed study is Healthy Families America (HFA). This national evidence based program serving high-risk, low-income parents is designed to promote optimal child health and development, positive parent-child interaction, prevent child abuse and neglect, and to help parents set and achieve goals for themselves and their children. Under HFA, home visiting services begin prenatally or within three months after birth and can last from three to five years depending on the needs of the family. Home visiting services are delivered by trained professional family support workers and include, but are not limited to, education on proper parenting, information for possible resources and further support for the families, education on child developmental milestones, encouragement and emotional support to parents, and the promotion of the wellness of the parent (Falconer, Clark, & Parris, 2011; Healthy Families America, 2015). Evaluations of HFA have found that program participation leads to positive changes in parenting attitudes and practices, and decreases the risk of developing social, emotional, and behavioral problems in children (Cullen, Ownbey, & Ownbey, 2010; Howard & Brooks-Gunn, 2009). The analyses of the current study draw on a sample of at-risk young mothers participating in Healthy Families Massachusetts (HFM), a modification of HFA (Jacobs, Easterbrooks, Brady, & Mistry, 2005). HFM is a newborn home visiting program that specifically targets a population of first-time parents under the age of 21. HFM provides “parenting support, information, and services to young parents via home visits, goal-setting activities, group-based activities, secondary contacts (i.e., phone calls), and referral services” (Jacobs, et al., 2015).



## PRESENT STUDY

Teenage pregnancy statistics from 2013 found that there were 26.5 births for every 1000 adolescent females (15-19 years old), resulting in 273,105 babies born to teenage mothers (Hamilton, Martin, Osterman, & Curtin, 2015). Previous research has shown that there are different risk factors for teenage pregnancy, primarily low socioeconomic status (Maxwell & Mott, 1987; Miller & Moore, 1990). Homeless/runaways and children of parents with low levels of education are at risk for teenage pregnancies, which also results in a decrease in education for the adolescent mother as well (Greene, & Ringwalt, 1998; Miller & Moore, 1990; Thompson, Bender, Lewis, & Watkins, 2008). Early substance use, lack of knowledge about contraceptive use, and low academic achievement are also linked with teenage pregnancy (Berry, Shillington, Peak, & Hohman, 2000; Sheaff, & Talashek, 1995). Furthermore, family factors such as lack of interfamily support, sexual and/or physical abuse, and single-parent households also put adolescent girls at risk for teenage pregnancy (Berry, Shillington, Peak, & Hohman, 2000; Talashek, Alba, & Patel, 2006; Thompson, Bender, Lewis, & Watkins, 2008). However, high parental involvement in the child's life may act as a protective factor against teenage pregnancy (Russell, 2002). Therefore, it is important for strong familial support, responsive and sensitive parental interactions, and parent-child security to be present in a child's life, in order to prevent teenage pregnancy, but also to influence the development of a secure attachment style, as noted by Bowlby (1969). When a child experiences any of the above risk factors for teenage pregnancy, he/she is also experiencing stressors that influence the development of his/her IWM, which therefore have an impact on the development of either a secure or an insecure attachment style (Waters, Merrick, Treboux, Crowell, & Albersheim, 2000). Although there is literature assessing attachment styles in mothers and the ways in which attachment styles influence parent-

child interactions, there is a need for research on teen mothers' attachment styles and its relation to the quality of their relations and interactions (i.e., dyadic synchrony) with others. Because of the large number of children born to teen mothers, it would be beneficial to assess these constructs (maternal attachment styles and dyadic synchrony) and to understand the relation between the two so that researchers can better understand the ways in which young mothers interact with their children.

It is important to examine the attachment styles of young mothers because of the implications that attachment styles have on building relationships with others, in particular the child. According to Figueiredo, Bifulco, Pacheco, Costa, & Magarinho, (2006), young mothers (< 19 years old) have higher rates of enmeshed, angry-dismissive, and fearful attachment styles compared to older mothers (> 19 years old) and also experience separation from their parents before the age of 18. Given the lack of support and experiences of parental separation in their childhood, teenage mothers may exhibit higher level of negative attitudes about closeness and autonomy (Figueiredo, Bifulco, Pacheco, Costa, & Magarinho, 2006). This in turn will influence the ways in which a young mother will interact with her child. Previous research has shown that children of young mothers are already at risk for developing poor attachment patterns, and if their mothers have insecure attachment styles, it puts these children at an even higher risk for poor attachment building with their mothers (Belsky & Fearon, 2002; Easterbrooks, Chaudhuri, & Gestsdottir, 2005). Furthermore, young mothers are at risk for tackling an inner-conflict: the transition to adulthood which involves the separation from parental figures and developing more autonomy, while simultaneously navigating the transition to parenthood, which involves the nurturing of an infant and caring for his/her physical and emotional needs. This may create a conflict in the young mother between developing her autonomy and the infant's dependency on

her, which can affect her ways of caring for and interacting with her child (Aiello & Lancaster, 2007; Crugnola, Ierardi, Gazzotti, & Albizzati, 2014). Therefore, it is important to further explore the attachment styles of young mothers in order to better understand the ways in which they perceive relationships and how they interact with others, especially their child so that intervention services are better able to support the needs of these young mothers.

Intervention programs/services have been shown to be associated with promoting positive parenting practices. Of note, these parenting practices stem from the parent's attachment security, given that the ways in which individuals interact with others is a result of his/her own attachment style (Howard & Brooks-Gunn, 2009). When parents are taught skills to improve parenting practices, the ways in which they interact with their child improve as well. Kendrick and colleagues (2000) suggested that home visiting programs have been found to promote more positive and reciprocal interactions between a parent-child dyad, lead to greater child responsiveness, increase positive attitudes parents have toward their children, and also lead to greater praise and positive feedback toward their children too (Kendrick et al., 2000). Although young mothers are likely have an insecure attachment style representation, engagement in a home visiting program can help them improve the ways in which they interact with their children. Given that home visiting programs are beneficial for engaging parents in better parenting behaviors, the negative traits of having an insecure attachment style representation may therefore improve as well.

The present study focused on the interactions between mother-child dyads, assessing the ways in which maternal attachment styles predicted the quality of dyadic synchrony between the dyads. Additionally, the study focused on ways in which a home visiting program related to maternal attachment style dimensions and dyadic synchrony. The findings from the current study

may provide valuable information regarding the ways in which participation in a home visiting program may relate to maternal attachment styles and dyadic synchrony. Home visiting programs provide services that promote parent-child interactions, which positively affect the quality of interactions between mother-child dyads. When there are higher levels of dyadic synchrony in mother-child interactions, the child will be more likely to develop emotional and social competence, and less likely to develop pathologies and developmental delays. Therefore, the current study hopes to open an avenue of research exploring the relations between attachment styles of young at-risk mothers and the ways in which these mothers interact with their children.

### **Research Questions and Hypotheses**

Based on the literature of the effectiveness of home visiting services programs, and the relation between maternal attachment styles and dyadic synchrony, the following questions were addressed:

1. Will there be a difference in attachment style dimensions between families enrolled in the treatment condition group (Home Visiting Services (HVS)) and the control condition group (Referrals and Information Only (RIO))?

I hypothesize that mothers enrolled in the RIO program group will receive higher scores on the Attachment Style Questionnaire (ASQ) insecure attachment subscales (Discomfort with Closeness, Need for Approval, Preoccupation with Relationships, and Treating Relationships as Secondary to Achievement) and will receive lower scores on the secure attachment subscale (Confidence in Self and Others) compared to mothers enrolled in the HVS program group.

2. Will there be a difference in dyadic synchrony scores between families enrolled in HVS and families enrolled in RIO?

- I hypothesize that mother-child dyads enrolled in the HVS program group will have higher dyadic synchrony scores than the mother-child dyads enrolled in the RIO program group.
3. What is the relation between maternal attachment style dimensions and mother-child dyadic synchrony?
    - 3a. I hypothesize that there will be a positive correlation between mothers' scores on the Confidence in Self and Others ASQ subscale and dyadic synchrony.
    - 3b. I hypothesize that there will be a negative correlation between mothers' scores on the Discomfort with Closeness ASQ subscale and dyadic synchrony.
    - 3c. I hypothesize that there will be a negative correlation between mothers' scores on the Need for Approval ASQ subscale and dyadic synchrony.
    - 3d. I hypothesize that there will be a negative correlation between mothers' scores on the Preoccupation with Relationships ASQ subscale and dyadic synchrony.
    - 3e. I hypothesize that there will be a negative correlation between mothers' scores on the Treating Relationships as Secondary to Achievement ASQ subscale and dyadic synchrony.
  4. Among those families in HVS, how does program utilization (i.e., duration in the program, number of home visits, and number of secondary activities - non-visit activities conducted by the home visitor or HFM staff with, or on behalf, of the participant) relate to dyadic synchrony?

I hypothesize that mother-child dyads who have more program utilization (i.e., longer duration in the program, more home visits, and/or more secondary activities) will have stronger dyadic synchrony.

## METHODS

### **Participants**

The sample for the current study includes first-time mothers under twenty-one years old who were enrolled in the Massachusetts Healthy Families Evaluation (MHFE), an evaluation of the Healthy Families Massachusetts (HFM) home visiting program. Eligibility criteria for the MHFE consisted of either English or Spanish as the mothers' primary language, and mothers had to be between the ages of 16-21 years old. The participants were the children's biological mothers and, for the most part, the primary caretakers of the children in the study; a small percentage of the mothers did not have custody of their children while enrolled in HFM. These children either lived with another relative such as a grandparent, or some other guardian. Reasons for lack of custody ranged from child maltreatment/neglect to insufficient means to take care of the child (e.g., domestic violence, living in a shelter, or losing her home). If eligibility criteria were met, the participants began HFM enrollment during pregnancy and throughout the child's first year of life.

#### *Healthy Families Massachusetts*

Healthy Families Massachusetts is a newborn home visiting program in Massachusetts universally available to first-time parents under the age of 21. The program's main goals are to: (1) prevent child abuse/neglect by supporting effective, positive parenting; (2) achieve optimal health, growth, and development in infancy/early childhood; (3) promote parental health and well-being; (4) encourage education, employment, and life skills for parents; and (5) prevent repeat pregnancies during teenage years.

HFM program recruitment occurs through referrals from pediatricians and other service providers, as well as through self-referrals in response to public advertisements. Parents can

enroll in HFM during the prenatal period up until the child's first birthday and are eligible for services until the child's third birthday. Like HFA, the services provided by HFM include home visits, goal-setting activities, group-based activities, secondary activities/contacts (e.g., phone calls between home visitors and participants), and referrals to additional resources. These services are delivered by paraprofessionals with the objective of providing support and resources for the young mothers and children enrolled in HFM. The paraprofessionals develop a relationship with the young mothers, teach them about proper parenting practices, and model positive parenting behaviors with the aim of promoting the healthy growth and development of both the mother and the child and to improve parent-child interactions.

*Massachusetts Healthy Families Evaluation (MHFE) Phases 1 and 2*

The Children's Trust of Massachusetts, the executor of the HFM program has a long-standing evaluation contract for the HFM program with the Tufts Interdisciplinary Evaluation Research group under the direction M. Ann Easterbrooks, PhD; Francine Jacobs, EdD; and Jayanthi Mistry, PhD. Multiple evaluations have been conducted, with the purpose of evaluating HFM's effectiveness in achieving the five main goals from the start of the program to the present. Phase One study was conducted from 1997-2005 (MHFE-1), and relied on a quasi-experimental design. Participants were recruited for the first phase of evaluation by HFM program staff and the evaluation researchers. The evaluation reviewed the program model and standards, in addition to program outcomes.

Phase Two was conducted from 2008-2013 (MHFE-2). MHFE-2 is a randomized controlled trial evaluation of the program effects on children and mothers, not only evaluating HFM's five main goals, but also examining the influences of participants' personal, family, program, and community contexts on program utilization and program outcomes. Participant

families were randomly assigned to one of two conditions: the treatment condition called Home Visiting Services (HVS), or to the control condition called Referrals and Information Only (RIO). Those participants assigned to HVS received HFM program services (e.g., home visits) while those assigned to RIO did not receive any home visits, however, they were provided with referrals and information regarding other programs and services available to them. Due to the nature of the program services, 60% of enrolled participants were assigned to HVS and 40% were assigned to RIO, rather than a 50-50 distribution. HFM did not want to withhold program services from a large portion of the eligible parents, and therefore preferred that as many families received the intervention as could be accommodated in the research design.

After participants were recruited and assigned to a program group, they were invited by the Tufts research team to complete the following evaluation activities: 1) participate in a half-hour phone intake interview; and 2) sign a release allowing Tufts to access their state agency data from various state agencies (e.g. Department of Public Health, Department of Children and Families). Participants had the option to do one or both of these activities. Of the 837 initially recruited participants, 704 agreed to participate in the study, whom are referred to as the *Impact Study sample*. Of those 704 enrolled in the Impact Study sample, 690 (98%) consented to release their state agency data. Those participants were then presented with the option to participate in an additional 2-hour in-person intake/research interview. Participants who consented to this interview are referred to as the *Integrative Study subsample*. The interview was semi-structured and typically occurred in the participant's homes. During the home visits, both qualitative and quantitative methods were used to collect information about the participants' use and satisfaction with program services (e.g., both HFM and additional programs/services), social relationships, support networks (e.g., family/friends, father of baby, neighborhood/community contexts);



family histories, histories of partner violence; education; and maternal mental health/functioning (e.g., depression, trauma history, stress and coping) (Jacobs, et al., 2015). The intake and research interviews were conducted at four time points: enrollment (Time-1), one-year post enrollment (Time-2), and two years post enrollment (Time-3). Family participation at each time point is presented in Figure 1.

*Massachusetts Healthy Families Evaluation Phase 2 Early Childhood (MHFE-2-EC)*

In order to examine program effects of the children entering early childhood, the research team at Tufts University has been conducting a follow-up study of MHFE-2 sample, called the Massachusetts Healthy Families Evaluation Phase 2 Early Childhood Study (MHFE-2-EC). MHFE-2EC examines the long-term impacts of the Massachusetts Healthy Families home visiting program on children and families. The protocol for the fourth wave of data collection is similar to prior protocols, with a phone intake for everyone (Impact Sample) and mothers consenting to an additional 2-hour in-person interview (Integrative Sample). In addition to the parent interview, assessments of the child were also conducted in the in-person interview. Child protocols included assessments of school readiness, executive functioning, self-regulation, and expressive/receptive language skills. Data for the proposed study were taken from MHFE-2-EC's Time-4 phase of the HFM evaluation study (three years post enrollment).

*Study Sample*

The original sample for this study consisted of 704 mother-child dyads who were randomly assigned to either the HVS program group ( $n = 433$ ) or the RIO control group ( $n = 271$ ). For the current study, participants were drawn from the sample of families who participated during Time-4 of MHFE-2-EC data collection ( $n = 490$ ). Only participants who completed home visit-based data collection (the Integrative Sample at Time-4) were included in

the study ( $n = 433$ ). At Time-4, children were approximately 3 to 6 years old and mothers' ages ranged from 18-25. Additionally, each participating family (mother-child dyad) in the HVS program group (61.5% of the overall Time-4 sample) and the RIO control group (38.5% of the overall Time-4 sample) took part in the following study protocols at Time-4. Additional sample distributions are included in Figure 1.

### **Procedure**

All mothers in both MHFE-2-EC groups (HVS and RIO) were administered the Attachment Style Questionnaire (ASQ) during at-home interviews at Time-4 of the data collection phase. A mother-child structured teaching-task was also video-recorded during the same at-home interview, also completed at Time-4. Dyadic synchrony was assessed based on the interactions between mother-child dyads during this structured teaching-task. Lastly, the BITSEA was administered during the at-home interview at Time-3 of the data collection phase.

### **Constructs and Measures**

The dataset was restricted to those variables from Time-4 that were pertinent to examining the relationship between intervention condition, HVS program effects, maternal attachment style dimensions, and dyadic synchrony. Quantitative data were collected from parent questionnaires and qualitative data were collected from a structured teaching-task between the mother-child dyads.

#### *Demographic Questionnaire*

A demographic questionnaire was used to collect information about mothers' age, race, education, employment, relationship status, as well as children's age, race, and gender during an intake interview with a HFM home visitor.

*Maternal Attachment Styles*

Attachment styles of mothers were measured using Feeney, Noller, and Hanrahan's (1994) Attachment Style Questionnaire (ASQ) (See Appendix C). This questionnaire measures dimensions of adult attachment, including positive and negative views of oneself and others in both adolescents and adults. The ASQ produces measurements of attachment anxiety and attachment avoidance. For the purpose of this study, only mothers completed the ASQ. The 40-item questionnaire is measured on a 6-point Likert scale (1 = totally disagree, 2 = strongly disagree, 3 = slightly disagree, 4 = slightly agree, 5 = strongly agree, 6 = totally agree). The 40 items cluster into 5 subscales, one of which reflects secure attachment (Confidence in Self and Others (8 items; e.g., "Overall I am a worthwhile person")), whereas the other four subscales represent a particular aspect of insecure attachment (Discomfort with Closeness (10 items; e.g., "I find it hard to trust other people"); Need for Approval (7 items; e.g., "It's important to me that others like me"); Preoccupation with Relationships (8 items; e.g., "I find that others are reluctant to get as close as I would like"); and Treating Relationships as Secondary to Achievement (7 items; e.g., "To ask for help is to admit that you're a failure")). The four insecure attachment subscales correspond to two more general styles of attachment: avoidant attachment styles (Discomfort with Closeness and Treating Relationships as Secondary to Achievement) and anxious attachment styles (Preoccupation with Relationships and Need for Approval). High scores on each of the five subscales correspond to having a high level of that attachment style dimension. For instance, higher scores on the Confidence in Self and Others subscale reflects more secure attachment style representations, whereas higher scores on the other four subscales reflects more insecure attachment style representations.

This questionnaire has been widely used with clinical and nonclinical samples and has satisfactory reliability, validity, and test-retest stability ( $\alpha = 0.75-0.80$ ) (Feeney, Noller, &

Hanrahan, 1994; Karantzas, Feeney & Wilkinson, 2010; Strodl & Noller, 2003). In the MHFE-2EC Time-4 Integrative Study sample ( $n = 433$ ), Cronbach's  $\alpha$  were as follows: Confidence in Self and Others:  $\alpha = 0.71$ ; Discomfort with Closeness:  $\alpha = 0.82$ ; Need for Approval:  $\alpha = 0.73$ ; Preoccupation with Relationships:  $\alpha = 0.79$ ; Treating Relationships as Secondary to Achievement:  $\alpha = 0.66$ . Overall, the ASQ is a reliable and easy to administer self-report questionnaire. However, because it is a self-report measure, some limitations may arise during interpretation. Investigators may not know if what is being reported on the ASQ is true and accurate to the individual completing it. There is a risk that participants over-estimate their functioning, and there is a potential of social desirability bias and/or recall bias. Nevertheless, examining the self-reported attachment styles of mothers have been shown to help with examining the relationships between attachment and synchrony in the mother-child dyads.

#### *Dyadic Synchrony*

Mother-child synchrony was assessed during a five-minute structured teaching task in the family's home during Time-4 of data collection. Observational data were collected from a subset of mothers who consented to being video recorded in their homes ( $n = 346$ ). Mother-child synchrony was coded from the videotaped interactions, and assessed the degree of responsiveness and reciprocity between the dyads during the teaching-task interactions. Trained MHFE coders used the Interactional Synchrony Scale (Mize and Pettit, 1997) to assess dyadic synchrony. Mize and Pettit (1997) created a parent-child dyadic reciprocity "synchrony" coding scale which rates the extent to which a parent and child are mutually engaged and focused, participating in dyadic, responsive, and reciprocal behavioral exchanges using a 0-5 Likert scale. This scale holds good inter-rater reliability ( $\alpha = 0.82$ ) for parent-child dyadic synchrony. Conversation, social exchange, and control were assessed during the five-minute teaching-task,

and rated and coded for levels of synchrony. During the assessment, mothers were allowed to teach and interact with their child in any way they wanted, providing a good opportunity to assess synchrony (See Appendix D).

When the parent and child were characterized as sensitive, shared the same focus of attention, mirrored each other's emotions, and were responsive to the other's cues, a high rating was assigned (e.g., 5). When the parent and child were not engaged in the same activity, unresponsive during interactions, or were ignoring one another, a low rating was assigned (e.g., 0 for no interactions or 1 for low activity in the interactions). Raters could assign half points (e.g., 1.5) as well. Videotaped mother-child interactions were coded for dyadic synchrony by a team of three trained coders. Coders followed a three-step procedure for each videotaped interaction. First, coders watched the five-minute teaching-task session to gain an overall impression of the dyad and the interaction. Next, the coders watched the video again and took detailed notes about the interaction, focusing on aspects of the interaction that indicated coordination and balance (or lack of coordination and balance). Finally, coders watched the video a third time and assigned the appropriate code based on the above criteria (Mize & Pettit, 1997). It is important to note that coders were blind to program assignment, and assigned a single score to each parent-child dyad.

Interrater reliability was assessed using average absolute agreement intraclass correlation coefficients (ICC) in a two-way random effects model (McGraw & Wong, 1996). ICC for Raters 1, 2, and 3 = .92; ICC for Raters 1 and 2 = .89; ICC for Raters 1 and 3 = .94; ICC for Raters 2 and 3 = .97, indicating excellent reliability. Of the 346 videos that were coded, 143 videos (41%) were coded by two or three raters. All three coders met on a regular basis to code independently and then to discuss the assigned ratings. If ratings for a dyad differed by half of a point (e.g., 1 and 1.5) between coders, the scores were averaged and the averaged score was used as the

overall rating. Discrepancies in codes that were beyond half of a point were discussed until an agreement was reached.

Eighty-eight participants in the Integrative Study sample at Time-4 were missing dyadic synchrony data. Videotaped interactions were not completed if the mothers 1) did not consent to the video recordings, 2) the research interview was completed over the phone, 3) or if no child data was collected in the home (e.g., child was not present). Additionally, three videos were missing from the database.

#### *Child Developmental Delays*

The Brief Infant Toddler Social Emotional Assessment (BITSEA) was used to identify children (1-3 years) at risk for/with social-emotional and behavioral problems or delays using a 3-point Likert scale (0 = not true/rarely, 1= somewhat true/sometimes, 2=very true/often). (Briggs-Gowan, & Carter, 2006). Two supplemental questions, not used in the scoring, ask parents to indicate how worried they are about a particular problem using a 4-point Likert scale (1 = not at all worried, 2 = a little worried, 3 = worried, and 4 = very worried). The 44-item BITSEA is drawn from the longer Infant-Toddler Social and Emotional Assessment (ITSEA), and comprises a 31-item Problem Behavior subscale and an 11-item Competence subscale. Because the BITSEA was being used to identify children whose dyadic synchrony scores might be affected by developmental delays, only the Competence subscale was used to identify children who were in the range of possible deficit/delays. The Competence subscale assesses social-emotional abilities such as empathy, prosocial behaviors, and compliance; lower scores indicate lesser competence. The BITSEA was used to identify these problems rather than the ITSEA because it is a much shorter, easier to complete, but still reliable, measure of the possibility of a problem or delay. The BITSEA has excellent test-retest reliability ( $r = 0.79$ –

0.92), very good interrater reliability ( $r = 0.55-0.78$ ), and adequate internal consistency (Cronbach's  $\alpha = .65$  for the competence scale) (Briggs-Gowan & Carter, 2006). Moreover, the BITSEA has demonstrated validity in discriminating children with clinically significant problems from matched control subjects (See Appendix E).

In addition to the competence subscale, a dichotomous score indicates whether the child is in the clinical cutoff range for developing deficit/delays (1 - in the range; 0 - not in the range). Clinical cutoff points for BITSEA scale scores were calculated according to the child's gender by using cutoff points established with the national standardization sample. For the BITSEA competence scale, the clinical cutoff point is any score below the 15th percentile. A score below the clinical cut-off for competence suggests that delays in social-emotional competence may be present (Briggs-Gowan & Carter, 2006).

The BITSEA is not intended to be a diagnostic tool; rather, the BITSEA is intended to indicate the need for further testing (Briggs-Gowan & Carter, 2006), although it has been used as such by others (Briggs-Gowan & Carter, 2008; Edelsohn, 2012). Knowledge gained from the BITSEA provides the examiner with insights that can guide conversation with the parents about their child's behavior and social-emotional development, in order to determine whether a more comprehensive assessment of social-emotional behavior problems and competence is needed. Screening for social-emotional and/or behavioral problems in pediatric primary care has been shown to be feasible and effective in enhancing detection rates. The BITSEA has demonstrated validity in discriminating children with clinically significant problems from matched control subjects. In addition, the BITSEA demonstrated fair to good sensitivity and good specificity in detecting children with high ITSEA internalizing, externalizing, and/or dysregulation domains. Findings provide preliminary support for the BITSEA as a reliable and valid brief screener for

infant-toddler social-emotional and behavioral problems and delays in competence (Briggs-Gowan & Carter, 2008; Briggs-Gowan, et al., 2004).

#### *Home Visiting Program Participation*

Program participation was assessed two ways. First, participants were randomly categorized based on program group (HVS or RIO). Second, for the research question examining within intervention group differences, program participation factors included: mother-child's duration in the program (number of days enrolled in the program through the discharge date), number of home visits received, total groups participated in (i.e., parenting education classes and social outings; any HFM program activities that occurred outside of the home visit), and total number of secondary activities participated in (i.e., non-visit activities conducted by the home visitor or HFM staff with, or on behalf, of the participant). These program participation factors were taken from administrative data that was previously recorded by HFM home visitors in the Participant Data System (PDS). HFM home visitors had previously recorded this information about all aspects of the participants' service utilization during the home visits (Jacobs et al., 2015).

#### **Missing Data**

There were missing data in the current study's sample due to some families attriting from Time-1 to Time-4. The sample size decreased from 704 at Time-1 to 490 at Time-4 (Impact Sample). Of the 490 participants in the Time-4 Impact Sample, 88.3% agreed to participate in an in-person interview (Integrative Sample,  $n = 433$ ) after the initial phone interview. For the purpose of this study, only those participants in the Integrative Sample at Time-4 were considered in the overall study sample.



Reasons for attriting were unknown; however, three sets of attrition analyses were conducted in order to determine whether there were significant differences between those who attrited from the start of enrollment and those who remained at Time-4. First, cross-tabs and chi-square analyses compared the number of participants in the Integrative sample at Time-4 who were missing dyadic synchrony and ASQ scores and the number of participants who had complete dyadic synchrony and ASQ scores. Second, crosstabs were conducted to compare the number of HVS and RIO participants who had missing data on the 5 ASQ subscales and dyadic synchrony. These comparisons were made using the full MHFE sample ( $n = 704$ ) as well as the Time-4 Integrative Sample ( $n = 433$ ). Third, analyses comparing demographic differences between those with full Time-4 data in the Integrative sample ( $n = 312$ ) and those missing either dyadic synchrony or ASQ scores ( $n = 121$ ), using ethnicity/race, mother-child age, child gender, and maternal employment. Crosstab results of ethnicity/race, child gender, and maternal employment revealed that all chi-square tests were not significant,  $p > .05$ . Additionally, results of an independent samples t-test revealed that there were no significant differences in mother-child age, suggesting that there were no significant differences between those Time-4 participants who were missing ASQ or dyadic synchrony scores and participants with those data.

## RESULTS

### **Preliminary Analyses**

#### *Sample Size and Demographics*

Descriptive analyses were conducted in order to finalize the sample size and gather more information about the sample for the present study. The final sample included 312 mother-child dyads of the original 433 participants in the Integrative Sample enrolled in MHFE at Time-4.

The HVS group included 182 mother-child dyads, whereas the RIO group included 130 mother-child dyads. Only the mother-child dyads who completed the ASQ and participated in the Dyadic Synchrony videotaped interaction at Time-4 of the MHFE study were included in the final study sample. Participants were excluded if they did not participate in the dyadic synchrony measure ( $n = 88$ ) or complete the ASQ ( $n = 33$ ).

Child participants were represented relatively evenly between males (54%) and females (46%). The majority of the sample self-identified as either Hispanic (37.4%) or White (non-Hispanic) (35.2%), with 20% self-identified as Black (non-Hispanic) and 6.8% classified as Other (non-Hispanic). Mothers were single (36%), committed/married to the baby's father (26%), or committed/married to someone other than the baby's father (38%). Slightly more than half of the mothers (58%) were employed and 42% had dropped out of high school. The highest level of education completed ranged from 5<sup>th</sup> grade to some college or college degree attainment. Just over half (57%) of the mothers had at a high school education (or GED equivalent), 25% were currently in school, 15% had not completed high school, and 12% completed 1-4 years of college. Of the 182 participants receiving HFM program services, 36% had low overall program usage, 32% had high overall program usage/low participation in secondary activities, 25% had moderate program use, and 7% had high overall program usage/high participation in secondary activities. Additional sample descriptives are presented in Table 1.

#### *Normality Assumptions*

In order to determine whether the data were normally distributed, frequency distributions were conducted for ASQ and dyadic synchrony to examine Skewness and Kurtosis values. All skewness values were in-between -.3 and .3, and Kurtosis values were between -.8 and .8, revealing that the data were normal (See Table 3).

### *Assessing Developmental Functioning*

Descriptive analyses were conducted in order to identify the number of participants in the Competence clinical cutoff range on the BITSEA, ( $n = 26$ ). A one-way ANOVA was conducted to examine whether there were any significant differences in dyadic synchrony scores between the 26 participants falling into the Competency clinical cutoff range, and those who were not in the Competency clinical cutoff range. Results revealed that there was a significant difference in dyadic synchrony scores  $F(1, 250) = 6.106, p = .014$  between the two groups. However, after conducting research question analyses with the 26 cases ( $n = 312$ ), and then again without those 26 cases ( $n = 286$ ) to compare dyadic synchrony scores between the two study sample groups, results revealed that there was not a difference in dyadic synchrony scores between the full sample ( $n = 312, M = 3.05$ ) and the sample excluding the BITSEA competency cutoff cases ( $n = 286, M = 3.09$ ). Because there was not a significant difference, the 26 cases were included in the research question analyses.

### *Covariate Analyses*

Analyses were conducted to determine which covariates to include in the research question analyses with dyadic synchrony, maternal attachment style dimensions, and program utilization. Table 4 contains correlations among the demographics and ASQ subscales and dyadic synchrony. Results of a one-way ANOVA revealed that there was a significant group difference in dyadic synchrony scores between the ethnicity/race groups (White, Black, Hispanic, Other),  $F(3, 309) = 2.850, p = .038; \eta^2 = .03$ , reflecting a small effect size. Levene's F tests revealed that the homogeneity of variance assumption was met ( $p = .104$ ). As such, Tukey post-hoc comparisons were used to determine which groups of ethnicity/race dyadic synchrony means differed significantly. The Tukey post-hoc tests revealed that White mothers' dyadic

synchrony scores ( $M = 3.25$ ,  $SD = .933$ ) were significantly higher than Black mothers' scores ( $M = 2.86$ ,  $SD = .980$ ),  $p = .039$ ;  $d = .40$ , reflecting a moderate effect size. There were no significant differences in scores between the white and "other" mothers ( $p = .199$ ).

There was a significant group difference in the Confidence in Self and Others ASQ subscale scores due to ethnicity/race,  $F(3, 309) = 4.90$ ,  $p = .002$ ;  $\eta^2 = .05$ , reflecting a small effect size. Levene's F tests revealed that the homogeneity of variance assumption was met ( $p = .854$ ). As such, Tukey post-hoc comparisons were used to determine which groups of ethnicity/race Confidence in Self and Others ASQ mean scores differed significantly. The Tukey post-hoc tests revealed that White mothers' scores on the Confidence in Self and Others ASQ subscale ( $M = 4.27$ ,  $SD = .655$ ) were significantly lower than Hispanic mothers' scores ( $M = 4.51$ ,  $SD = .586$ ),  $p = .017$ ;  $d = .35$ , reflecting a small effect size, and significantly lower than Black mothers' scores ( $M = 4.60$ ,  $SD = .612$ ),  $p = .004$ ;  $d = .52$ , reflecting a moderate effect size. There were no significant differences in scores between the White and Other mothers ( $p = .110$ ). These results suggest that White mothers scored less securely than Black and Hispanic mothers. There was also a significant group difference in the Treating Relationships as Secondary to Achievement ASQ subscale scores due to ethnicity/race,  $F(3, 309) = 3.563$ ,  $p = .015$ ,  $\eta^2 = .03$ , reflecting a small effect size. Levene's F tests revealed that the homogeneity of variance assumption was met ( $p = .100$ ). As such, Tukey post-hoc comparisons were used to determine which groups of ethnicity/race Treating Relationships as Secondary to Achievement ASQ mean scores differed significantly. The Tukey post-hoc tests revealed that White mothers' scores on the Treating Relationships as Secondary to Achievement ASQ subscale ( $M = 2.77$ ,  $SD = .643$ ) were significantly lower than Hispanic mothers' scores ( $M = 3.03$ ,  $SD = .860$ ),  $p = .039$ ;  $d = .35$ , reflecting a small effect size. These results suggest that Hispanic mothers scored more insecurely

than White mothers. There were no significant differences in the other three ASQ subscales due to ethnicity/race.

There were significant group differences in the Treating Relationships as Secondary to Achievement ASQ subscale scores due to maternal employment status (yes or no),  $F(1, 311) = 8.364, p = .004; d = .33$ ; child gender  $F(1, 311) = 4.005, p = .046; d = .23$ ; and maternal age,  $r = -.115, n = 301, p = .047$ , all results reflecting small effect sizes. There were no significant differences in the other four ASQ subscales due to employment, gender, or maternal age.

After conducting the prior ANOVAs, analyses were conducted with the significant ASQ covariates (ethnicity/race, employment, child gender, and maternal age) in order to see if there was any relation between those demographic variables. These analyses guided decisions about which demographic variables to include in the research question analyses. There was a significant difference in maternal age between the separate ethnicity/races groups  $F(3, 298) = 3.922, p = .009; \eta^2 = .04$ , reflecting a small effect size for this analysis. Levene's F tests revealed that the homogeneity of variance assumption was met ( $p = .341$ ). As such, Tukey post-hoc comparisons were used, and the results revealed that White mothers were significantly older ( $M = 21.06, SD = 1.26$ ) than Hispanic mothers ( $M = 20.55, SD = 1.41$ ),  $p = .025; d = .34$ , reflecting a small effect size. Additionally there was a trend level difference in age between White mothers and Other mothers ( $M = 20.30, SD = 1.22$ ),  $p = .078; d = .59$ , reflecting a moderate effect size.

Correlation analyses among the 5 ASQ subscales are presented in Table 5. There were negative correlations between Confidence in Self and Others and the other four ASQ subscales. This suggests that those individuals who had a higher score on the secure subscale scored lower on the insecure subscales. Additionally, the four insecure subscales (Treating Relationships as Secondary to Achievement, Need for Approval, Preoccupation with Relationships, and

Discomfort with Closeness) were positively correlated with each other, suggesting that an individual with high scores on one of the insecure subscales also had high scores on other insecure subscales.

There were no significant demographic differences in program utilization (duration total in days, total home visits, total groups participated in, and total secondary activities) ( $p > .05$ ), except for significant ethnicity/race differences in Total Secondary Activities. The Levene's  $F$  test revealed that the homogeneity of variance assumption was not met ( $p = .009$ ) when assessing ethnicity/race differences in Total Secondary Activities. As such, the *Welch's F* test was used. An alpha level of .05 was used for the following analyses. A one-way ANOVA examining ethnicity/race group differences in Total Secondary Activities revealed a statistically significant main effect, *Welch's F*(3, 44.69) = 3.021,  $p < .05$ . Post-hoc comparisons, using the Games-Howell post-hoc procedure, were conducted to determine where the difference occurred. These results revealed that there was a trend level difference between the number of secondary activities that White mother-child dyads participated in ( $M = 54.09$ ,  $SD = 49.17$ ) compared to Hispanic dyads ( $M = 85.15$ ,  $SD = 88.23$ ). White mother-child dyads participated in fewer secondary activities than Hispanic dyads ( $p = .061$ ,  $d = .42$ ), revealing a small effect size.

### **Research Question Analyses**

*Research Question #1: Will there be a difference in attachment style dimensions between HVS and RIO families?* In order to determine whether a significant relation existed between attachment style dimensions and program group, a one-way MANCOVA with intervention condition as the grouping variable and ethnicity/race, employment, and maternal age as covariates was conducted. Results showed that there was a significant difference in the Treating Relationships as Secondary to Achievement ASQ subscale scores between program groups,  $F(1,$

298) = 3.995,  $p < .05$ ;  $d = .243$ , reflecting a small effect size. Mothers in the RIO program group had significantly higher scores on the Treating Relationships as Secondary to Achievement ASQ subscale ( $M = 3.04$ ,  $SD = .753$ ) compared to mothers in the HVS program group ( $M = 2.85$ ,  $SD = .751$ ), rejecting the null hypothesis. There was a significant difference in the Need for Approval ASQ subscale scores between program groups,  $F(1, 298) = 9.06$ ,  $p < .05$ ;  $d = .37$ , reflecting a small effect size. Mothers in the RIO program group had significantly higher scores on the Need for Approval ASQ subscale ( $M = 2.90$ ,  $SD = .818$ ) compared to mothers in the HVS program group ( $M = 2.61$ ,  $SD = .714$ ), rejecting the null hypothesis. There was also a trend level difference in the Preoccupation with Relationships and Others subscale,  $F(1, 298) = 3.03$ ,  $p < .05$ ;  $d = .22$ ) revealing a small effect size. Mothers in the RIO program group had higher scores on the Preoccupation with Relationships ASQ subscale ( $M = 3.34$ ,  $SD = .855$ ) than did mothers in the HVS program group ( $M = 3.17$ ,  $SD = .785$ ), rejecting the null hypothesis. There were no significant differences in the Confidence in Self and Others [RIO: ( $M = 4.40$ ,  $SD = .583$ ); HVS ( $M = 4.49$ ,  $SD = .669$ )] or the Discomfort with Closeness and Others [RIO: ( $M = 3.96$ ,  $SD = .768$ ); HVS ( $M = 3.92$ ,  $SD = .769$ )] subscale scores between program groups,  $p > .05$ . Table 6 presents the results of these analyses.

*Research Question #2: Will there be a difference in dyadic synchrony scores between HVS and RIO families?* In order to determine whether a significant relation existed between dyadic synchrony scores and program group, an ANCOVA with intervention condition and ethnicity/race as the grouping variable was conducted. Results revealed that there was not a significant difference in dyadic synchrony scores between program groups,  $F(1, 310) = .063$ ,  $p > .05$ ,  $d = .033$ , reflecting a small effect size. Although mothers enrolled in the RIO program group had higher dyadic synchrony scores ( $M = 3.07$ ,  $SD = .913$ ) than mothers enrolled in the HVS

program group ( $M = 3.04$ ,  $SD = .923$ ), the difference was not significant, which failed to reject the null hypothesis (See Table 2). However, the covariate, ethnicity/race was significantly related to dyadic synchrony,  $F(3, 310) = 2.893$ ,  $p < .05$ . Levene's F tests revealed that the homogeneity of variance assumption was met ( $p = .249$ ). As such, Tukey post-hoc comparisons were used to determine which groups of ethnicity/race dyadic synchrony means differed significantly. These results revealed that White mothers' dyadic synchrony scores ( $M = 3.25$ ,  $SD = .933$ ) were significantly higher than Black mothers' scores ( $M = 2.86$ ,  $SD = .980$ ),  $p < .05$ ;  $d = .40$ , reflecting a moderate effect size. Although White mothers' scores were higher than Hispanic or Other mothers, there were no significant differences in these scores ( $p = .199$ ). These results suggest that White mother-child dyads had stronger dyadic synchrony in their interactions than Black mothers. Because of this significant relation, an interaction effect between program group and ethnicity/race was examined, yet revealed a non-significant interaction between program group and ethnicity/race,  $F(3, 310) = .166$ ,  $p > .05$ .

*Research Question #3: What is the relation between maternal attachment style dimensions and mother-child dyadic synchrony?* In order to determine whether a significant relation existed between maternal attachment style dimensions and dyadic synchrony, a Pearson's correlation between each of the five ASQ subscales and dyadic synchrony was conducted. Results revealed a non-significant relation between maternal attachment style dimensions and mother-child dyadic synchrony ( $p > .05$ ). A Hierarchical Regression analyses was then conducted to examine whether maternal attachment style dimensions predicted dyadic synchrony scores after controlling for ethnicity/race (See Table 7). The initial model (Model 1) examined ethnicity/race as a predictor of dyadic synchrony scores ( $n = 309$ ). Results revealed that ethnicity/race explained a significant amount of the variance in dyadic synchrony scores ( $F$



(1, 309) = 4.176,  $p < .05$ ,  $R^2 = .013$ ), reflecting a small effect size. However, after adding the five ASQ subscale variables to the final model (Model 2), the regression was no longer significant,  $p > .05$ . Results of Model 2 also showed that ethnicity/race significantly predicted dyadic synchrony scores ( $Beta = -.128$ ,  $t(309) = -2.159$ ,  $p < .05$ ), yet maternal attachment styles did not ( $p > .05$ ). However, the Need for Approval ASQ subscale showed a trend level relation to dyadic synchrony ( $Beta = -.151$ ,  $t(309) = -1.920$ ,  $p = .056$ ).

*Research Question #4: Among those families in HVS, how do program utilization: duration in the program, number of home visits, and number of secondary activities (i.e., non-visit activities conducted by the home visitor or HFM staff with, or on behalf, of the participant) relate to dyadic synchrony?* In order to determine whether program utilization predicted dyadic synchrony scores, a Hierarchical Regression was conducted. Table 8 presents the results of these analyses. The initial model (Model 1) examined ethnicity/race as a predictor of dyadic synchrony scores ( $n = 179$ ). Results revealed that ethnicity/race did not explain a significant amount of variance in dyadic synchrony scores ( $p > .05$ ). The final model (Model 2) included duration total in days, total home visits, total groups participated in, and total secondary activities in order to examine whether program utilization predicted dyadic synchrony scores. However, results suggested that program utilization did not explain a significant amount of variance in dyadic synchrony scores ( $p > .05$ ). Moreover, ethnicity/race and program utilization together did not significantly predict dyadic synchrony scores ( $p > .05$ ). Additional analyses were conducted to see if there was a relation between program utilization class (high overall usage, low secondary activities; low use; high overall usage, high secondary activities; moderate usage) and dyadic synchrony scores. The HVS mothers who utilized both HFM services and secondary activities/services ( $n = 13$ , 7%) had the highest dyadic synchrony scores ( $M = 3.19$ ,  $SD = .771$ )

compared to the rest of the sample enrolled in HVS ( $M = 3.04$ ,  $SD = .928$ ). However, these differences were not significant ( $p > .05$ ).

In sum, the research question analyses revealed significant differences in the Treating Relationships as Secondary to Achievement ASQ subscale scores and the Need for Approval ASQ subscale scores between program groups. RIO mothers had significantly higher scores on these insecure ASQ subscales than HVS mothers, rejecting the null hypothesis. Regarding dyadic synchrony, there were no significant program group differences, which failed to reject the null hypothesis. There was also a non-significant relation between maternal attachment style dimensions and mother-child dyadic synchrony. Additionally, program utilization did not significantly predict dyadic synchrony scores. However, mothers utilizing both HFM services and secondary activities/services had the highest dyadic synchrony mean scores compared to the rest of the sample enrolled in HVS, although the differences were marginal.

## DISCUSSION

The present study aimed to investigate the relations between maternal attachment style dimensions and the quality of mother-child dyadic synchrony in a sample of young mothers enrolled in a home visiting program. Additionally, the present study examined group differences in maternal attachment style dimensions and dyadic synchrony between mothers receiving home visits (HVS) and mothers receiving referral information only (RIO). The analyses revealed that mothers in the RIO program group had significantly higher scores on the Treating Relationships as Secondary to Achievement and the Need for Approval ASQ subscales compared to mothers in the HVS program group. These findings suggested that mothers in RIO self-reported as more

insecure anxious and insecure avoidant compared to mothers in HVS. There were no significant group differences in mean scores on the Confidence in Self and Others or the Discomfort with Closeness ASQ subscale, but a trend level difference in scores on the Preoccupation with Relationships ASQ subscale. There was not a significant difference in dyadic synchrony scores between program groups, and a non-significant relation between program utilization and dyadic synchrony. Lastly, there was a non-significant relation between attachment style dimensions and dyadic synchrony.

Because there was no Time-1 assessment of attachment style or dyadic synchrony, it is unclear whether the lack of significant findings were due to the nature of the HFM intervention program, personal characteristics of these young mothers, or if they occurred by chance. However, it is important to note that this was a sample of high-risk first time adolescent mothers. These young mothers were at a developmental stage in their lives where they were transitioning from adolescence to adulthood, which involves the separation and individuation from parents and caregivers. Additionally, these young mothers were simultaneously transitioning to parenthood, which involves the nurturing of an infant and caring for his/her physical and emotional needs (Aiello & Lancaster, 2007; Crugnola, Ierardi, Gazzotti, & Albizzati, 2014).

These simultaneous transitions may have caused an internal conflict in the young mother between her development of autonomy and her child's dependency on her. This intrapersonal conflict may have then lead to parenting stress, depression, and low self-esteem, which in turn, may have affected the ways in which she related to and nurtured her infant (Crugnola, Ierardi, Gazzotti, & Albizzati, 2014; Osofsky, Hann, & Peebles, 1993). Furthermore, the cognitive and neurophysiological development of these young mothers was still evolving, which may have also affected the ways in which she interacted with her child (Steinberg, 2005). For instance, a young

mother who was still going through cognitive and developmental changes, may not have developed the cognitive competencies in regards to taking on the parenting role, or have the knowledge of the stages of development of her child (Whitman, Borkowski, Keogh, & Weed, 2001). Because of this intrapersonal conflict, the ways in which these young mothers interacted with their children, engaged in the services offered to them, and responded to the MHFE questionnaires may have been affected by their developmental status, potentially explaining this thesis's findings.

Without Time-1 data, it was not possible to examine any longitudinal change in attachment style dimensions or dyadic synchrony, nor was it possible to examine any HFM intervention effects. The type and amount of services the mothers in RIO may have participated in based on the HFM referrals were unknown as well. Therefore, the RIO program group acted as a control group specifically for HFM services. These mothers could have received services from other agencies, , posing a limitation to the study. Given the lack of Time-1 data and lack of data pertaining to RIO mothers' service engagement, the following interpretations of the thesis findings are speculative.

#### *The Relation Between Maternal Attachment Style Dimensions and Dyadic Synchrony*

Contrary to previous research, there was a non-significant relation between maternal attachment style dimensions and dyadic synchrony. Previous research suggests that the quality of interactions between a mother-child dyad is related to the attachment style representation of the mothers (Crandell, Fitzgerald, & Whipple, 1997). However, because the population of the current study included only young mothers, who may have been experiencing the intrapersonal conflict between the transition to parenthood and the transition to adulthood, it could be that the attachment style representations assessed among this at-risk sample were not reflected in the

quality of interactions between the mothers and their children. Therefore, the ways in which the young mothers interacted with their children may not have been related to their attachment style, as their own representations of attachment representations may not have been solidified or consolidated.

Given the lack of research on the relation between maternal attachment styles and dyadic synchrony in young mothers, as well as the negative trend level relation between the Need for Approval ASQ subscale and dyadic synchrony, these results point to further research into these two constructs. Previous research suggests that the high levels of distress expressed by anxiously attached individuals, in particular the expression of negative affect, are a key indicator for seeking the support and acceptance from others. The negative expressions may have been apparent in the mother-child interactions, which could potentially explain the trend-level relation between having an insecure anxious attachment style representation and the quality of interactions between a dyad (Cassidy, 1994; Fantini-Hauwel, Boudoukha, & Arciszewski, 2012; McCarthy & Taylor, 1999; Sochos & Yahya, 2015). Nevertheless, these were trend level differences; more research is necessary to understand the ways in which maternal attachment style dimensions relate to dyadic synchrony in young mother-child dyads.

#### *Attachment Style Dimensions and Program Group Differences*

Mothers in the RIO program group had significantly higher scores on the Need for Approval and the Treating Relationships as Secondary to Achievement ASQ subscales compared to mothers in HVS, rejecting the null hypothesis. There was also a trend level difference in scores on the Preoccupation with Relationships ASQ subscale: mothers in RIO had higher scores compared to mothers in HVS. These findings suggested that mothers in RIO self-reported as more insecure anxious and insecure avoidant. Given the lack of Time-1 data, it is unclear

whether the difference in ASQ subscale scores between program groups was directly related to the HFM intervention services. However, if these differences were related to the HFM intervention services, the following speculation may be appropriate.

The group differences in ASQ subscale scores may be related to the types of services the mothers in HVS were receiving, and the support they received from the HFM home visitor. Mothers in HVS received home visits and support from a HFM paraprofessional, and the development of this relationship may have been related to the types of attachment style representations reported. Berry and Danquah (2015) suggested that therapeutic relationships may provide a “secure base” for mothers, which is important for promoting change, and therefore provide a platform for the mothers to develop a more secure attachment style. Furthermore, insecure attachment security has been found to be reduced by an increased level of social support given in the context of support-based interventions, such as home visiting programs. (Green, Furrer, & McAllister, 2011). Mothers in HVS received home visits, services, and parenting education that pertained to improving parenting practices and promoting optimal health and well being, which could have been related to the ways in which mothers self-reported on the ASQ. It could be that the HFM services helped the mothers develop a more secure representation of themselves and in others, which could have had an association to the development of a less insecure attachment style representation.

Adolescents are highly attuned to how others view them, and typically care a great deal about what others think of them (Somerville, 2013). These characteristics relate to the Need for Approval ASQ subscale, which includes scenarios relating to other’s perceptions of the self (e.g., “It’s important for me that others like me”) (Feeney, Noller, & Hanrahan, 1994). With the stigmas that are linked to adolescent parenting, the young mothers in the current study may have

had heightened attachment anxiety, worried how others viewed them as a young mother. However, because mothers in HVS were receiving direct support from an HFM home visitor, one can speculate that the decrease in anxious attachment insecurity in mothers in HVS may be due to the support provided by the HFM home visitor.

Furthermore, the Treating Relationships as Secondary to Achievement ASQ subscale measures attachment avoidance and includes questions regarding the mothers' views on relationships (e.g., "I am too busy with other activities to put much time into relationships") (Feeney, Noller, & Hanrahan, 1994). These young mothers may be battling the intrapersonal conflict, busy with work, school, and/or caring for their child, so they may not have time to sustain relationships with others. However, support from an HFM home visitor for HVS mothers may provide the necessary support these young mothers need, potentially increasing the attachment security these mothers feel, and reducing their levels of attachment avoidance.

Although RIO mothers were offered referrals to outside services, it is unclear whether these mothers utilized these services, and if so, whether these referred services had any direct relation to a change in their attachment style dimensions. It would be beneficial to understand the nature of the services the RIO mothers participated in, in order to better understand the impact of HFM on attachment security in this sample of young mothers. If RIO mothers did not receive home visiting services elsewhere, it could potentially explain their higher insecure attachment scores. Although a speculation, given the lack of Time-1 data, it is possible that the support from an HFM home visitor offered greater support to the young mothers that lead to a decrease in attachment insecurity in the mothers in HVS.

*Dyadic Synchrony and Program Group Differences*

There was a non-significant difference in dyadic synchrony scores between HVS and RIO mothers. Given the lack of Time-1 data, it is unclear whether there was a direct effect of HFM intervention services on dyadic synchrony, therefore the following explanation of this finding is speculative. HFM services are aimed at supporting effective, positive parenting, however, these services may not have been directly related to improving the interactions that take place between mother child dyads, let alone an interaction where the mother has to teach her child how to build a structure. It may be that the intervention services did not fully engage mothers in learning the skills necessary to enhance parent-child interactions and encourage strong dyadic synchrony. Perhaps the lack of group differences in dyadic synchrony scores occurred because the HFM intervention services were not actually targeted at improving dyadic synchrony. There is the possibility that the services provided were aimed at supporting the mothers in different ways, and focusing on improving dyadic synchrony may not have been one of them. For example, young mothers have been found to: be of low socioeconomic status (e.g., Maxwell & Mott, 1987); have low levels of education (e.g., Miller & Moore, 1990); experience elevated levels of stress and anxiety; and show moderate to severe levels of depressive symptoms (e.g., Easterbrooks, Chauduri, & Gestsdottir, 2005). As a result, their children are at a higher risk of experiencing abuse and neglect (e.g., Barnett, Liu, Devoe, Alperovitz-Bichell, & Duggan, 2007) and for developing negative long-term deficiencies in adaptive, cognitive, and behavioral development (e.g., Belsky & Fearon, 2002).

Given these negative correlates of teenage pregnancy, the home visiting services provided by HFM may have focused on providing services to better support the mothers' finances and living situations, improving the mental health of the young mothers, and preventing child abuse and neglect. Therefore, there may not have been a strong focus on providing support



to improve the mother-child interactions. Of note, these factors affecting the young mothers' lives also pose as a limitation to the study findings as well, for they may have limited the effectiveness and accessibility of the intervention program services.

### *Program Utilization*

There was no relation between program utilization and dyadic synchrony in this sample of mother-child dyads; as previously discussed, the intervention services may not have fully engaged mothers in learning the necessary skills to enhance parent-child interactions and encourage strong dyadic synchrony. There is the possibility that within this sample, the home visiting services did not directly relate to the quality of interactions between the mother-child dyad. Given that dyadic synchrony was assessed only at Time-4, it is difficult to determine whether program utilization had a direct relation to the quality of mother-child interactions. Without a priori assessments of the parent-child interactions during Time-1, it is not possible to assess the direct impact of intervention services on dyadic synchrony. This poses a limitation for the study, and informs future studies to examine dyadic synchrony longitudinally, to see if program utilization directly influences the quality of mother-child interactions.

There is also the possibility that mothers did not fully engage in the services offered to them. Previous research has found that a mother's history with forming relationships, the ability or inability to form trusting relationships, housing situations, changes in the mother's relationship status, as well as the mother's work or school schedule, can impact or act as a barrier for the mother's accessibility to receive the intervention services or as a barrier against the potential for a relationship to form between a mother and her home visitor (Dmytryshyn, Jack, Ballantyne, Wahoush, & MacMillan, 2015). Given these different factors influencing the effectiveness of the intervention services and the development of a relationship with the home

visitor, the ways in which the mothers interacted with their home visitor, or the extent to which the mothers were responsive to the services offered to them could have been affected, potentially explaining the nonsignificant relation between program utilization and dyadic synchrony.

### **Intervention Issues**

When thinking about the results of the current thesis, and trying to understand the reasons behind the lack of significant group differences in dyadic synchrony a few issues arise. First, it is important to note that the HFM program services were terminated two years before the MHFE-2EC Time-4 assessment. Therefore, any results of the current study may have been affected by the fade-out of any program impact given the length of time between HFM enrollment and Time-4 data collection. Given the lack of Time-1 data specifically on dyadic synchrony and attachment style dimensions, it is unclear whether there were any direct HFM intervention effects. The following interpretations are offered if a relation could be established between HFM intervention services, attachment style dimensions, and dyadic synchrony.

Previous research suggests that home visiting services are shown to be beneficial for families, however, without sustained support, these positive effects may fade (Lagerberg, 2000). It is possible that HFM program impacts had diminished before the Time-4 evaluation, potentially explaining the lack of significant results in the current study. Given the lack of assessments at Time-1 and at the end of home visiting, it cannot be determined whether the HFM services had a positive impact on dyadic synchrony between mother-child dyads. If there had been an intervention effect, then these findings would point to a fade effect of the intervention services, given that dyadic synchrony was assessed two years after the end of the HFM program. If this is the case, this could explain why there was a lack of group differences in dyadic synchrony scores. It could be that the home visitation services did in fact improve dyadic

synchrony, however two years after the program ended, may have been enough time for these effects to decrease. Without baseline Time-1 data, it is difficult to determine whether this reasoning is possible or not.

Furthermore, another factor to consider is that the types and amount of services given to each mother-child dyad varied. The amount of time invested into participating in the services ranged from family to family and this could have been influenced by external factors in the families' lives. As noted, there was a wide range of program utilization from the families enrolled in HVS, and this variation could potentially explain the lack of significant group differences in some of the ASQ subscales and dyadic synchrony, as well as the lack of a significant relation between attachment style dimensions and dyadic synchrony.

### **Limitations**

Given that attachment style dimensions and dyadic synchrony were only assessed at Time-4 (three to four years post enrollment) of data collection, it was not possible to examine direct impacts of the home visiting services program, limiting the results of this study and making it impossible to assume any causality. Instead, this thesis was able to examine the relations between attachment style dimensions and dyadic synchrony and make suggestions for further investigation.

The fact that the current study focused on the assessment of young mothers, results may not be generalizable to all populations of mothers (i.e., older mothers or non-at-risk mothers), but may yield important data for this at-risk population. Another limitation was the use of several self-report measures in this study. Because the mothers reported on these measures based on their own experiences and views, there is an increase in the potential for social desirability bias, confirmation bias, response inflation, false reporting, and recall bias. The ASQ addresses

questions about the mother's view of herself and her view of others, and she might have felt the need to underreport any possible problems/concerns she has with herself or others, in fear that she may be criticized for poor parenting or personal issues if the scores reveal that she has attachment avoidant/anxiety behaviors. Of note, the ASQ is a measure of general attachment, assessing positive views of the self and in others, but is not specific to the child (Feeney, Noller, & Hanrahan, 1994). The lack of a significant relation between maternal attachment styles and dyadic synchrony may in part be explained by the fact that the ASQ only measures general attachment, rather than attachment style dimensions toward the child. This may suggest that a more specific measure of attachment security should be used when assessing the relation between dyadic synchrony in parent-child interactions and parental attachment style.

There is also the possibility of measurement error in the dyadic synchrony assessment scale. Mize and Pettit's (1997) Interactional Synchrony Scale was designed to examine the extent which a parent and child are mutually engaged and focused, participating in dyadic, responsive, and reciprocal behavioral exchanges; however this scale may not be applicable to clinical and/or diverse populations. The current study consisted of a diverse sample of at-risk young mother-child dyads; therefore, this particular dyadic synchrony coding scale may not provide an accurate representation of the quality of dyadic synchrony in the mother-child interactions.

Furthermore, the original coding scale developed by Mize and Pettit (1997) assessed parent-child dyadic synchrony through videotaped observations of an open free-play task between a parent-child dyad, whereas in the current study, dyadic synchrony was assessed via a teaching-task. The fact that the current study measured dyadic synchrony in a way that is different from the original coding scale may also provide a reason for measurement error. It may

also provide a possible reason for the lack of program group differences in dyadic synchrony scores and lack of a significant relation between attachment style dimensions and dyadic synchrony. Given that the child is put into a situation where he/she is asked to build a structure that is purposely made to be challenging without the help of the mother, the quality of dyadic synchrony may be minimized based on the assessment requirements. Therefore, the quality of interactions during the specific interaction task that MHFE adapted from Mize and Pettit's (1997) original coding scale may have been affected by a number of external factors, further explaining the lack of differences in dyadic synchrony scores between program groups and even the lack of a significant relation between attachment style dimensions and dyadic synchrony.

### **Implications and Future Research**

The goals of the current study were to examine the relation between maternal attachment style dimensions and dyadic synchrony in a sample of young mothers enrolled in HFM, in addition to examining group differences in attachment style dimensions and dyadic synchrony between mothers receiving home visiting services and mothers receiving referral information only. Due to the risk factors leading to teen pregnancy, young mothers are at greater risk for having insecure attachment style representations than older mothers; it is therefore beneficial that there are home visiting programs available for young mothers to enroll in. The home visiting program of the current study was found to be positively related to mothers having reduced insecure attachment style dimensions among the mothers receiving home visiting services. Results from the current study suggest further investigation into the relations between a home visiting program and the attachment style representations of young mothers, as well as the behaviors that stem from secure vs. insecure attachment style representations. Additionally, it would be beneficial for a further investigation into the ways in which the different contexts of

young mothers' lives (e.g., intrapersonal conflict, social support; quality of support; maternal mental health) influence the ways in which the young mothers participate in intervention services as well as how they interact with their children.

It is also imperative for future research to conduct baseline assessments of attachment style dimensions and dyadic synchrony, in order to examine intervention program impacts over time. With Time-1 data, future researchers may be able to examine the particular ways in which intervention services influence attachment style dimensions and dyadic synchrony, but it is also important to note that a deeper investigation into the services that mothers in RIO receive will better enable researchers to explore intervention effects. And when researchers are better able to examine direct effects of the intervention services, then they may be better suited to examine the ways in which the services may improve.

Future research examining the relation between attachment style representations and dyadic synchrony can potentially enable clinicians organizing intervention services to better inform home visiting paraprofessionals on ways in which they can improve parent-child interactions. It is important for services that are specific to young mothers to focus on promoting positive parent-child interactions and to enhance the quality of these interactions given that young mothers have more avoidant attachment styles (Figueiredo, Bifulco, Pacheco, Costa, & Magarinho, 2006). It is important to teach positive parenting practices to young mothers so that they learn skills that allow them to better engage in higher quality interactions with their children. These skills can teach mothers to become more warm, sensitive, and affectionate, which could improve the quality of interactions with their children.

More research is needed to determine the best approaches for mothers with high insecure attachment styles in the context of existing and emerging models of home visiting programs

(Cluxton-keller, 2014). Barnes and Freude-Lagevardi (2003) further explain that there is no single approach that is most effective for all populations in enhancing attachment security; however, the quality of the relationship that is established between the mother and home visitor/practitioner can be more effective in improving attachment security than the theoretical orientation of the intervention itself. They also explain that interventions that focus on enhancing positive mother-child interactions with a strengths based approach can also be highly effective. And when combined in high-intensity services, the mother-child dyads are found to have more positive parent-child interactions, and the mother is shown to have improved attachment security (Barnes, & Freude-Lagevardi, 2003). This suggests for future home visiting services to establish case specific interventions in high doses that have a strong focus on supporting the mother, establishing a strong relationship between the home visitor and the mother, highlighting the mother's strengths and supporting her weaknesses, and provide skills that will help improve parent-child interactions.

### References

- Abidin, R. R. (1986). Parenting Stress Index. *Pediatric Psychology Press*.
- Adams, J. (1992). The relationship between parental perception of child behavior and parental childhood memories: A comparison of mothers of conduct disturbed and non-conduct disturbed boys. Unpublished doctoral dissertation, Michigan State University, E. Lansing.
- Aiello, R., Lancaster, S. (2007). Influence of adolescent maternal characteristics on infant development. *Infant Mental Health Journal*, 28(5) 496–516
- Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). Patterns of attachment: A psychological study of the strange situation. Lawrence Erlbaum, Oxford.

- Ambrose, H. N. (2013). Young children's emotion regulation and social skills: The role of maternal emotional socialization and mother-child interactional synchrony. *Health & Medicine; ProQuest Dissertations & Theses Global: Social Sciences*.
- Ambrose, H.N., & Menna, R. (2013). Physical and relational aggression in young children: the role of mother-child interactional synchrony. *Early Child Development and Care, 183*, 207-222.
- Avellar, S. A., & Supplee, L. H. (2013). Effectiveness of home visiting in improving child health and reducing child maltreatment. *Pediatrics, 132* (Supplement 2), S90-S99.
- Barlow, A., Mullany, B., Neault, N., Compton, S., Carter, A., Hastings, R., . . . Walkup, J. T. (2013). Effect of a paraprofessional home-visiting intervention on American Indian teen mothers' and infants' behavioral risks: A randomized controlled trial. *The American Journal of Psychiatry, 170*(1), 83-93.
- Barnes, J., & Freude-Lagevardi, A. (2003). From pregnancy to early childhood: early interventions to enhance the mental health of children and families. London, UK: Mental Health Foundation.
- Barnet, B., Liu, J., Devoe, M., Alperovitz-Bichell, K., & Duggan, A. K. (2007). Home Visiting for Adolescent Mothers: Effects on Parenting, Maternal Life Course, and Primary Care Linkage. *The Annals of Family Medicine, 5*(3), 224-232.
- Belsky, J., & Fearon, R. M. P. (2002). Early attachment security, subsequent maternal sensitivity, and later child development: Does continuity in development depend upon continuity of caregiving? *Attachment & Human Development, 4*(3), 361-387.
- Belsky, J., Youngblade, L., Rovine, M., & Volling, B. A. (1991). Patterns of marital change and parent-child interaction. *Journal of Marriage and the Family, 53*, 487-498.



- Bengtsson, H., & Psouni, E. (2008). Mothers' representations of caregiving and their adult children's representations of attachment: Intergenerational concordance and relations to beliefs about mothering. *Scandinavian Journal of Psychology, 49*(3), 247-257.
- Berry, K., & Danquah, A. (2015). Attachment - informed therapy for adults: Towards a unifying perspective on practice. *Psychology and Psychotherapy: Theory, Research and Practice.*
- Berry, E. H., Shillington, A. M., Peak, T., & Hohman, M. M. (2000). Multi-ethnic comparison of risk and protective factors for adolescent pregnancy. *Child & Adolescent Social Work Journal, 17*(2), 79-96.
- Bifulco, A., Moran, P. M., Ball, C. & Bernazzani, O. (2002). Adult attachment style: Its relationship to clinical depression. *Social Psychiatry & Psychiatric Epidemiology, 37*: 50–59.
- Bowlby J. (1969). Attachment. Attachment and loss: Vol. 1. Loss. New York: Basic Books.
- Bowlby, J. (1980). Attachment and loss: Loss (Vol. 3). London: Hogarth Press.
- Brennan, K. A., & Shaver, P. R. (1995). Dimensions of adult attachment, affect regulation, and romantic relationship functioning. *Personality and Social Psychology Bulletin, 21*, 267-283.
- Brooks-Gunn, J., McCarton, C. M., Casey, P. H., McCormick, M. C., Bauer, C. R., Bernbaum, J. C., ... & Tonascia, J. (1994). Early intervention in low-birth-weight premature infants: Results through age 5 years from the Infant Health and Development Program. *Jama, 272*(16), 1257-1262.
- Cassidy, J. (1994). Emotion regulation: Influences of attachment relationships. *Monographs of the Society for Research in Child Development, 59*(2-3), 228-249.

- Cluxton-keller, F., Burrell, L., Crowne, S. S., Mcfarlane, E., Tandon, S. D., Leaf, P. J., & Duggan, A. K. (2014). Maternal relationship insecurity and depressive symptoms as moderators of home visiting impacts on child outcomes. *Journal of Child and Family Studies, 23*(8), 1430-1443.
- Coley, R.L., & Chase-Lansdale, P.L. (1998). Adolescent pregnancy and parenthood: Recent evidence and future directions. *American Psychologist, 53*, 152– 166.
- Crandell, L. E., Fitzgerald, H. E., & Whipple, E. E. (1997). Dyadic synchrony in parent–child interactions: A link with maternal representations of attachment relationships. *Infant Mental Health Journal, 18*(3), 247-264.
- Crugnola, C. R., Ierardi, E., Gazzotti, S., & Albizzati, A. (2014). Motherhood in adolescent mothers: Maternal attachment, mother–infant styles of interaction and emotion regulation at three months. *Infant Behavior & Development, 37*(1), 44-56.
- Cullen, J. P., Ownbey, J. B., & Ownbey, M. A. (2010). The effects of the Healthy Families America home visitation program on parenting attitudes and practices and child social and emotional competence. *Child & Adolescent Social Work Journal, 27*(5), 335-354.
- de Montigny, F., & Lacharité, C. (2005). Perceived parental efficacy: Concept analysis. *Journal of Advanced Nursing, 49*(4), 387-396.
- Dmytryshyn, A. L., Jack, S. M., Ballantyne, M., Wahoush, O., & MacMillan, H. L. (2015). Long-term home visiting with vulnerable young mothers: an interpretive description of the impact on public health nurses. *BMC nursing, 14*(1), 1.
- Duggan, A. K., Berlin, L. J., Cassidy, J., Burrell, L., & Tandon, S. D. (2009). Examining maternal depression and attachment insecurity as moderators of the impacts of home

- visiting for at-risk mothers and infants. *Journal of Consulting and Clinical Psychology*, 77(4), 788-799.
- Duggan, A. K., McFarlane, E. C., Windham, A. M., Rohde, C. A., Salkever, D. S., Fuddy, L., ... & Sia, C. C. (1999). Evaluation of Hawaii's healthy start program. *The Future of Children*, 66-90.
- Easterbrooks, M. A., Chaudhuri, J. H., & Gestsdottir, S. (2005). Patterns of emotional availability among young mothers and their infants: A dyadic, contextual analysis. *Infant Mental Health Journal*, 26(4), 309-326.
- Eamon, M. K. (2001). Antecedents and socioemotional consequences of physical punishment on children in two-parent families. *Child Abuse and Neglect*, 25(6), 787-802.
- Falconer, M., Clark, M. H., & Parris, D. (2011). Validity in an evaluation of healthy families Florida—A program to prevent child abuse and neglect. *Children And Youth Services Review*, 33(1), 66-77.
- Fantini-Hauwel, C., Boudoukha, A. H., & Arciszewski, T. (2012). Adult attachment and emotional awareness impairment: A multimethod assessment. *Socioaffective Neuroscience & Psychology*, 2, 10744.
- Feeney, J. A., Noller, P., & Hanrahan, M. (1994). Assessing adult attachment. In M. B. Sperling & W. H. Berman (Eds.), *Attachment in adults: Clinical and developmental perspectives* (pp. 128-152). New York: Guilford Press.
- Figueiredo, B., Bifulco, A., Pacheco, A., Costa, R., & Magarinho, R. (2006). Teenage pregnancy, attachment style, and depression: A comparison of teenage and adult pregnant women in a portuguese series. *Attachment & Human Development*, 8(2), 123-138.

- Flaherty, S. C., & Sadler, L. S. (2011). A review of attachment theory in the context of adolescent parenting. *Journal of Pediatric Health Care, 25*(2), 114-121.
- Gomby, D. S. (1999). Understanding evaluations of home visitation programs. *The future of children, 27*-43.
- Green, B. L., Furrer, C. J., & McAllister, C. L. (2011). Does attachment style influence social support or the other way around? A longitudinal study of early head start mothers. *Attachment & Human Development, 13*(1), 27-47.
- Greene, J. M., & Ringwalt, C. L. (1998). Pregnancy among three national samples of runaway and homeless youth. *Journal of Adolescent Health, 23*(6), 370-377.
- Hamilton, B.E., Martin, J.A., Osterman, M.J.K., & Curtin, S. C. (2015). Births: Final Data for 2013. Hyattsville, MD: National Center for Health Statistics. Retrieved from [http://www.cdc.gov/nchs/data/nvsr/nvsr64/nvsr64\\_01.pdf](http://www.cdc.gov/nchs/data/nvsr/nvsr64/nvsr64_01.pdf)
- Harrist, A. W., & Waugh, R. M. (2002). Dyadic synchrony: Its structure and function in children's development. *Developmental Review, 22*(4), 555-592.
- Healthy Families America. (2015). Retrieved from <http://www.healthyfamiliesamerica.org/>
- Heinicke, C. M., Fineman, N. R., Ponce, V. A., & Guthrie, D. (2001). Relation - based intervention with at - risk mothers: outcome in the second year of life. *Infant Mental Health Journal, 22*(4), 431-462.
- Howard, K. S., & Brooks-Gunn, J. (2009). The role of home-visiting programs in preventing child abuse and neglect. *The Future Of Children, 19*(2), 119-146.
- Im-Bolter, N., Anam, M., & Cohen, N. J. (2014). Mother–child synchrony and child problem behavior. *Journal of Child and Family Studies.*

- Jacobs, F., Easterbrooks, A., Mistry, J., Bumgarner, E., Fauth, R., Goldberg, J., ... Scott, J. (2015). The Massachusetts healthy families evaluation-2 (MHFE-2): A randomized, controlled trial of a statewide home visiting program for young parents. Report to the: *Children's Trust of Massachusetts*
- Karantzas, G. C., Feeney, J. A., & Wilkinson, R. B. (2010). Does less mean more? A confirmatory factor analytic study of the Attachment Style Questionnaire and the Attachment Style Questionnaire - Short Form. *Journal of Social and Personal Relationships, 27*, 749-780.
- Ketterlinus, R.D., Lamb, M.E., & Nitz, K. (1991). Developmental and ecological sources of stress among adolescent parents. *Family Relations, 40*, 435– 441.
- Kohlhoff, J., & Barnett, B. (2013). Parenting self-efficacy: Links with maternal depression, infant behaviour and adult attachment. *Early Human Development, 89*(4), 249-256.
- Lagerberg, D. (2000). Secondary prevention in child health: effects of psychological intervention, particularly home visitation, on children's development and other outcome variables. *Acta Paediatrica, 89*(s434), 43-52.
- Leclère, C., Viaux, S., Avril, M., Achard, C., Chetouani, M., Missonnier, S., & Cohen, D. (2014). Why synchrony matters during mother-child interactions: a systematic review. *PloS one, 9*(12).
- Lyddon, W. J., Bradford, E., & Nelson, J. P. (1993). Assessing adolescent and adult attachment: A review of current self-report measures. *Journal of Counseling and Development: JCD, 71*(4), 390.

- Magai, C., Cohen, C., Milburn, N., Thorpe, B., McPherson, R., & Peralta, D. (2001). Attachment styles in older European American and African American adults. *The Journals of Gerontology: Series B: Psychological Sciences and Social Sciences*, 56B(1), S28-S35.
- Main, M., & Goldwyn, R. (1984–1996). Unpublished Adult Attachment Interview scoring and classification manual, Department of Psychology, University of California, Berkeley.
- Maxwell, N. L. and Mott, F. L. (1987). Trends in the determinants of early childbearing. *Population and Environment* 9(2): 59-73
- McCarthy, G., & Taylor, A. (1999). Avoidant/ambivalent attachment style as a mediator between abusive childhood experiences and adult relationship difficulties. *Journal of Child Psychology and Psychiatry*, 40(3), 465-477.
- McGraw, K. O., & Wong, S. P. (1996). Forming inferences about some intraclass correlation coefficients. *Psychological methods*, 1(1), 30.
- Mickelson, K. D., Kessler, R. C., & Shaver, P. R. (1997). Adult attachment in a nationally representative sample. *Journal of Personality and Social Psychology*, 73(5), 1092-1106.
- Miller, B. C. and Moore, K. A. (1990). Adolescent sexual behavior, pregnancy, and parenting: Research through the 1980s. *Journal of Marriage and the Family* 52(4):1025-1044
- Mize, J., & Pettit, G. S. (1997). Mothers' social coaching, mother-child relationship style, and children's peer competence: Is the medium the message? *Child Development*, 68, 312–332.
- Moss, E., Dubois-Comtois, K., Cyr, C., Tarabulsky, G. M., St-Laurent, D., & Bernier, A. (2011). Efficacy of a home-visiting intervention aimed at improving maternal sensitivity, child attachment, and behavioral outcomes for maltreated children: A randomized control trial. *Development And Psychopathology*, 23(1), 195-210.

- Olds, D., Henderson Jr, C. R., Cole, R., Eckenrode, J., Kitzman, H., Luckey, D., ... & Powers, J. (1998). Long-term effects of nurse home visitation on children's criminal and antisocial behavior: 15-year follow-up of a randomized controlled trial. *Jama*, *280*(14), 1238-1244.
- Osofsky, J. D., Hann, D. M., & Peebles, C. (1993). Adolescent parenthood: Risks and opportunities for mothers and infants.
- Pasiak, C., & Menna, R. (2015). Mother-child synchrony: Implications for young children's aggression and social competence. *Journal of Child and Family Studies*.
- Raikes, H., Green, B. L., Atwater, J., Kisker, E., Constantine, J., & Chazan-Cohen, R. (2006). Involvement in early head start home visiting services: Demographic predictors and relations to child and parent outcomes. *Early Childhood Research Quarterly*, *21*(1), 2-24.
- Robinson, J., Emde, R.N. (2004). Mental health moderators of Early Head Start on parenting and child development: Maternal depression and relationship attitudes. *Parenting: Science and Practice*, *4*, 73-97.
- Russell, S. T. (2002). Childhood developmental risk for teen childbearing in Britain. *Journal of Research on Adolescence*, *12*(3), 305-324.
- Sheaff, L., & Talashek, M. (1995). Ever-pregnant and never-pregnant teens in a temporary housing shelter. *Journal of community health nursing*, *12*(1), 33-45.
- Sochos, A., & Yahya, F. (2015). Attachment style and relationship difficulties in parents of children with ADHD. *Journal of Child and Family Studies*
- Somerville, L. H. (2013). The teenage brain sensitivity to social evaluation. *Current directions in psychological science*, *22*(2), 121-127.
- Steinberg, L. (2005). Cognitive and affective development in adolescence. *Trends in cognitive sciences*, *9*(2), 69-74.

- Strodl, E. & Noller, P. (2003). The relationship of adult attachment dimensions to depression and agoraphobia. *Personal Relationships, 10*(2), 171-185.
- St. Pierre, R. G., Layzer, J. I., Goodson, B. D., & Bernstein, L. (1997). National impact evaluation of the Comprehensive Child Development Program: Final report. Cambridge, MA: Abt Associates.
- Sweet, M.A. & Appelbaum, M.I. (2004). Is home visiting an effective strategy? A meta-analytic review of home visiting programs for families with young children. *Child Development, 75*(5), 1435–1456.
- Talashak, M. L., Alba, M. L., & Patel, A. (2006). Untangling the health disparities of teen pregnancy. *Journal for Specialists in Pediatric Nursing, 11*(1), 14-27.
- Thompson, S. J., Bender, K. A., Lewis, C. M., & Watkins, R. (2008). Runaway and pregnant: Risk factors associated with pregnancy in a national sample of runaway/homeless female adolescents. *Journal of Adolescent Health, 43*(2), 125-132.
- van IJzendoorn, M. H. (1995). Adult attachment representations, parental responsiveness, and infant attachment: A meta-analysis of the predictive validity of the Adult Attachment Interview. *Psychological Bulletin, 117*, 387–403.
- van Doesum, Karin T. M., Riksen-Walraven, J., Hosman, C. M. H., & Hoefnagels, C. (2008). A randomized controlled trial of a home-visiting intervention aimed at preventing relationship problems in depressed mothers and their infants. *Child Development, 79*(3), 547-561.
- Waters, E., Merrick, S., Treboux, D., Crowell, J., & Albersheim, L. (2000). Attachment security in infancy and early adulthood: A 20-year longitudinal study. *Child Development, 71*, 684–689.



Whitman, T. L., Borkowski, J. G., Keogh, D. A., & Weed, K. (2001). *Interwoven lives: Adolescent mothers and their children*. Psychology Press.

APPENDIX A  
Tables and Figures

Table 1

*Sample Descriptives*

Construct	Variable	N	Mean	Percent	SD	Range
Program Assignment (T4)	HVS vs. RIO	312		58% HVS ( <i>n</i> = 182) 42% RIO ( <i>n</i> = 130)		
Child Age	Age (in years) at T4 RI	310	4.91		.463	3.75 – 6.49
Mother Age	Age (in years) at T4 RI	301	20.79		1.35	19.14 – 25.17
Child Sex	Male vs. Female	312		M: 54% F: 46%		
Ethnicity/race	White (non-Hispanic)	310		35.2%		
	Black (non-Hispanic)			20%		
	Hispanic			37.4%		
	Other			6.8%		
T4 Mother Employment	Yes vs. No	312		Y: 58% N: 42%		
T4 Mother in School	Yes vs. No	312		Y: 25% N: 75%		
T4 Dyadic Synchrony	Mean rating score for dyadic synchrony	312	3.05		.920	.5 – 5.0

## Program Utilization

Duration in Days	Total number of days enrolled in HFM	182	538.60		431.344	1 - 1363
Total Home Visits*	Total home visits	182	29.70		29.730	0 - 118
Total Groups *	Total groups participated	182	2.53		4.923	0 - 28
Total SA *	Total secondary activities participated	182	74.41		74.031	1 - 467
Program Utilization Class**	High Use/Low SA	58		31.9%		
	Low Use	65		35.7%		
	Moderate Use	46		25.3%		
	High Use/High SA	13		7.1%		

Key: T4: Time-4; RI: Research Interview; Total SA: Total secondary activities participated in; \*for all enrollments Time-1 – Time-4; \*\*HVS program utilization

Table 2

*Means, standard deviations, and ranges for constructs examined in the analyses exploring group differences in attachment style dimensions and dyadic synchrony*

Program Group	Construct	N	Mean	SD	Range
HVS	Confidence in Self and Others	173	4.4917	.66940	1 – 6.0
	Treating Relationships as Secondary to Achievement	173	2.8533	.75070	1 – 6.0
	Need for Approval	173	2.6144	.71415	1 – 6.0
	Preoccupation with Relationships	173	3.1671	.78455	1 – 6.0
	Discomfort with Closeness	173	3.9210	.76905	1 – 6.0
	Dyadic Synchrony	180	3.0361	.92667	0 – 5.0
RIO	Confidence in Self and Others	126	4.3991	.58255	1 – 6.0
	Treating Relationships as Secondary to Achievement	126	3.0363	.75334	1 – 6.0
	Need for Approval	126	2.8953	.81827	1 – 6.0
	Preoccupation with Relationships	126	3.3426	.85498	1 – 6.0
	Discomfort with Closeness	126	3.9643	.76842	1 – 6.0
	Dyadic Synchrony	130	3.0731	.91264	0 – 5.0
Total	Confidence in Self and Others	299	4.4527	.63488	1 – 6.0
	Treating Relationships as Secondary to Achievement	299	2.9304	.75599	1 – 6.0
	Need for Approval	299	2.7328	.77106	1 – 6.0
	Preoccupation with Relationships	299	3.2411	.81818	1 – 6.0
	Discomfort with Closeness	299	3.9392	.76779	1 – 6.0
	Dyadic Synchrony	310	3.0516	.91951	0 – 5.0

Table 3

*Normality Assumptions for the Attachment Style Questionnaire and Dyadic Synchrony (n = 312)*

	T4 Dyadic Synchrony	Confidence in Self and Others	Treating Relationships as Secondary to Achievement	Need for Approval	Preoccupation with Relationships	Discomfort with Closeness
Skewness	-.332*	-.361*	.355*	.324*	.036*	-.319*
Std. Error of Skewness	.138	.138	.138	.138	.138	.138
Kurtosis	-.191*	.465*	.392*	.264*	-.212*	.239*

\*Normality assumptions met