Minding the Baby: Enhancing reflectiveness to improve early health and relationship outcomes in an interdisciplinary home visiting program

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Abstract

In this paper we focus on the first wave of outcomes in a pilot phase randomized control trial of a home-based intervention for infants and their families, *Minding the Baby*® (MTB), an interdisciplinary, mentalization-based intervention in which home visiting services are provided by a team that includes a nurse practitioner and a clinical social worker. Families are recruited during mother's pregnancy and continue through the child's second birthday. Analyses revealed that intervention families were more likely to be on track with immunization schedules at 12 months, had lower rates of rapid subsequent childbearing, and were less likely to be referred to child protective services. In addition, mother-infant interactions were less likely to be disrupted at 4 months when mothers were teenagers, and all intervention infants were more likely to be securely attached, and less likely to be disorganized in relation to attachment at one year. Finally, mothers' capacity to reflect on their own and their child's experience improved over the course of the intervention in the most high-risk mothers.

The effects of chronic poverty, social and educational disadvantage, and family disruption (separation, abandonment, trauma, community and domestic violence) on infant, parent, and family development are devastating and far-reaching, with the impact reflected across a range of health, as well as emotional, relational, social, and cognitive outcomes (Shonkoff & Phillips, 2000). This impact is felt most powerfully by young parents; in the United States, teenagers continue to bear children in large numbers, especially in neighborhoods populated by poor and minority families (Hamilton & Ventura, 2012). Because complex family, health, and mental health issues often make it very difficult for young parents to use community or school-based supportive parenting programs, one of the most common approaches to supporting high-risk families is home visiting (Howard & Brooks-Gunn, 2009). This kind of direct and sustained service is thought key to promoting healthy parent and child functioning, especially in first time parents, and in the most disenfranchised, disengaged, and traumatized families (Olds, Sadler, & Kitzman, 2007). And yet, as a number of recent reviews have made clear, promoting and maintaining long term changes in both health and socioemotional outcomes in parents and children is quite difficult, even for the most established programs (Eckenrode et al., 2010; Howard & Brooks-Gunn, 2009; Kitzman et al., 2010). This sobering reality makes clear how important it is to continue developing and refining treatment models to meet and address these challenges.

In this paper we will focus on the first wave of outcomes in a pilot phase randomized control trial of a home-based, interdisciplinary intervention for infants and their families, *Minding the Baby* (MTB). In the sections below, we describe the underlying conceptual framework

of the MTB model, our service delivery model and, finally, the results from our first tests of the program's efficacy.

Conceptual Foundations

The intervention was first implemented in 2002 (Sadler, Slade, & Mayes, 2006; Slade, Sadler, de Dios-Kenn, et al., 2005; Slade, Sadler, & Mayes, 2005). It is an amalgam and elaboration of two prominent evidence based early intervention models: 1) nurse home visiting, and particularly the Nurse-Family Partnership (Olds et al., 2007) and 2) infant-parent psychotherapy (IPP) (Lieberman, Silverman, & Pawl, 1999). Taking these two approaches as our foundation, we felt from the beginning as if we were standing on the shoulders of giants.

Pioneered by David Olds and Harriet Kitzman, the Nurse Family Partnership (NFP) is the most widely implemented and tested home visiting model in the United States. Three randomized clinical trials in Elmira, Memphis, and Denver, as well as a number of long term follow-up studies have consistently produced a range of positive health, public health, parenting, developmental, and life course outcomes (Kitzman et al., 2010; Olds et al., 2010; Olds et al., 2007). This model is typically delivered by experienced public health nurses with extensive training in the NFP program and its procedures, who conduct weekly home visits beginning in pregnancy up to the child's first birthday, and then visit biweekly until the child is two.

Infant-parent psychotherapy was pioneered by Selma Fraiberg and her colleagues over 30 years ago while working with young mothers whose infants were in peril as the result of profound disruptions in the mother-child relationship (Fraiberg, 1980). Over the past three decades, the work of Fraiberg and her colleagues has sparked the development of a number of infant mental health home visiting programs around the country (see Zero to Three, June/ July 2002, for a review). But, unlike NFP, which has been widely researched and fully manualized, only two IPP home visiting programs have been tested empirically; these are the programs pioneered by Lieberman and her colleagues (Lieberman et al., 1999; Lieberman, Weston, & Pawl, 1991) and by Heinicke and his colleagues (Heinicke et al., 1999; Heinicke et al., 2000). Both studies linked IPP to increased rates of attachment security, and to the development of a healthy and resilient mother-child relationship. This model is typically delivered by social workers or psychologists who visit dyads in the home weekly; unlike NFP, however, treatment length is not specified.

Both the NFP and IPP models and their various permutations have much to offer high risk families, and indeed they overlap in many ways, particularly in their emphasis on sensitive parenting and the development of a healthy parent-child relationship. Both are also profoundly "relationship-based", in the sense that the parent-clinician relationship is seen as the primary catalyst for change and integration. And yet – when considered separately -- both models have yet to address key needs and vulnerabilities of these same families. On the one hand, nurse home visitors bring a set of skills and information related to infant and maternal health that are much appreciated by young, stressed families; as such, nurses typically have much easier access to mothers than social workers, who are likely to be associated with child welfare authorities or with the stigma of mental health treatment. At the same time, the NFP model has yet to consistently change parenting or attachment outcomes in poor young mothers and their babies, or to meet normative and substantial mental health needs of the population of young parents living in under-resourced communities (Howard & Brooks-Gunn, 2009). The extensive trauma seen in many families living in poverty often manifests as a constellation recently referred to as "complex trauma" (Courtois, 2008), which – among other things -- powerfully influences both early and

cyclical patterns of parenting (Olds et al., 2007); complex trauma and its sequelae also frequently derail a family's capacity to engage in treatment and disrupt the capacity to parent.

There have been a number of efforts to address the mental health needs of infants and mothers within the NFP model, by offering nurses additional training in emotional regulation (Robinson, Emde, & Korfmacher, 1997), adding mental health consultants to treatment teams, (Boris et al., 2006), and by incorporating short term in-home cognitive behavioral treatment for depressed mothers (Ammerman, Putnam, Bosse, Teeters, & Van Ginkel, 2010; Ammerman et al., 2011). The latter approach has met with the most success, with levels of depression significantly reduced in those mothers receiving 15 sessions of in-home CBT in an open trial. These findings lend a great deal of support to the need for mental health treatment within the framework of home visits.

The IPP model clearly focuses quite specifically on trauma related psychopathology, as it manifests in the mother and in the dyad. While these programs typically do not measure mental health outcomes, attachment and parenting outcomes have improved in those programs that have been empirically tested. At the same time, IPP programs do not focus on either health or public health concerns, many of which contribute significantly to a range of poor outcomes in this population. In addition, for the reasons described above, psychotherapists do not have the same access to families enjoyed by nurses.

MTB grew out of the conviction that *both* approaches are crucial to providing the level of comprehensive and diverse care needed by the families we serve, that a truly *interdisciplinary* model combining the strengths and unique approaches of both the nursing and infant mental health approaches would be most likely to both meet our families' multiple layers of need. As Howard and Brooks-Gunn (2009) note, "debate continues about whether health professionals or social professionals are more effective in bringing about positive changes for families. The answer to this question may depend in large part on the overall goals of the families" (p. 136). Thus, if the goal of a program is (as is the case with NFP) to promote positive pregnancy outcomes and child health, the "choice of public health nurses is ideal" (p. 136). If, however, the goal is to address the sequelae of long term trauma and foster attachment security, then master's level mental health clinicians are more suitable. It is for precisely this reason that MTB was developed using an integrated nursing/infant mental health model.

Given the high levels of need in our families, and the particular challenges of working with high-risk, traumatized families, we also felt it crucial that both the nurses and social workers delivering MTB have masters level training in their disciplines. While clinicians administering IPP have often had advanced training, most of the nurses in the NFP studies have been public health nurses. Following the work Brooten and her colleagues (Brooten, Youngblut, Detrick, Naylor, & York, 2003) demonstrating that patient outcomes are improved when care is provided by advanced practice (APNs) rather than bachelor level nurses, we decided that nurses as well as mental health clinicians should have post graduate training. Thus, not only is MTB an *amalgam* of the NFP/IPP approach, but it is an *elaboration* of both in that it emphasizes the importance of advanced training and experience.

A second crucial component of the MTB model is a focus on the development and enhancement of maternal reflective functioning or mentalization. This is defined as an intra and interpersonal capacity that allows a mother to envision the baby's (as well as her own) internal experience, specifically his/her emotions, thoughts, and intentions (Slade, 2005). Our emphasis on the enhancement of maternal reflective capacities grew out of a body of

literature that links maternal reflective functioning to the intergenerational transmission of attachment, and particularly to the development of secure infant-parent attachment (Fonagy et al., 1995; Slade, Grienenberger, Bernbach, Levy, & Locker, 2005). Equally important, maternal reflective functioning has been negatively correlated with both disorganized infant attachment and disrupted dyadic affective communication in the dyad (Grienenberger, Kelly, & Slade, 2005). The link between low maternal reflective functioning and infant disorganization underscores the relationship between a mother's inability to attune to or imagine her baby's experience and her capacity to frighten or be frightened by her baby (Lyons-Ruth, Bronfman, & Attwood, 1999; Main & Hesse, 1990). Thus, we felt that an approach that would encourage mothers to take note of the baby's experience in a range of ways would diminish the likelihood of her responding in a frightening or frightened way and potentially maltreating her child. We were also strongly influenced by the emerging literature on mentalization-based treatment programs (see Allen & Fonagy, 2006), several of which have been focused specifically on young children and their families (Grienenberger, Denham, & Reynolds, in press; Pajulo, Suchman, Kalland, & Mayes, 2006; Suchman et al., 2010).

In line with this mentalization focus, special emphasis was placed on the enhancement of maternal reflective functioning at every level of service delivery. In our experience, mothers vary greatly from those who have difficulty naming even the most basic of their babies' or their own mental states to those who have a sophisticated capacity to make sense of their children's minds. Once clinicians become adept at evaluating the degree to which a mother can or cannot reflect, and to describing the situations that interfere with such capacities, they are encouraged to engage the mother wondering about the baby's experience in a number of ways. A range of diverse strategies can be used to do this (Sadler et al., 2006). The work is often painstaking and slow, as environmental impingements can be relentless and regressions to a non-reflective, concrete stance are common. In addition, for mothers who have been traumatized, contemplating their own mind or the mind of another can be very challenging and threatening, and can – as noted above -- lead them in many instances to be either frightening to or frightened by their babies (Lyons-Ruth, Bronfman, & Attwood, 1999).

While the constructs of reflective functioning and mentalization are relatively new to the field of infant mental health, a focus on mothers' attunement to their own and their babies' subjective experience is not. Indeed, this focus was at the heart of Fraiberg's model, and was certainly inherent in Ainsworth's thinking about the links between maternal sensitivity and attachment security (Ainsworth, Blehar, Waters, & Wall, 1978). And in fact many contemporary attachment-based interventions revolve around helping mothers become more aware of their babies' experiences, and of the links between their own thoughts and feelings and those of their children e.g., the Circle of Security intervention (Hoffman, Marvin, Cooper, & Powell, 2006). While the bulk of these programs likely influence the development of reflective capacities indirectly, these outcomes have not typically been measured.

Minding the Baby

Service Delivery Model

Families are recruited from prenatal groups offered at their primary health care "home", the clinic at which they receive all of their medical care. In this way, our clinicians are viewed by families as an extension of a familiar and trusted resource. They are then visited weekly beginning in the mother's third trimester of pregnancy up through the child's first birthday, at which point visits take place bi-weekly up through the child's second birthday. Visits are carried out on an alternating basis by a team made up of a nurse practitioner and social

worker; thus, the nurse sees a family one week, the social worker the next, and so on. Home visits last approximately one hour, although this can vary tremendously based on a family's particular needs. At times of crisis or when families require extra supplies or time, home visits can be extended or increased in frequency. The MTB approach has been manualized around a well developed set of principles, protocols, and guidelines contained within a treatment manual(Slade et al., 2010). At the same time, the administration of MTB is highly individualized and shaped by the circumstances of each home visit. The clinicians confer regularly about each of their shared families; they also maintain close contact with health providers at the community health clinics from which families are recruited. In addition, they receive both discipline focused (i.e. nursing or social work) and joint supervision on a weekly basis. Both also attend a weekly meeting of all the intervention teams, supervisors, and select administrative staff.

The roles of the clinicians are both distinct and overlapping. The NP's roles include reinforcing prenatal care and health education (including, for instance, informing mothers about nutrition and fetal brain development, premature labor prevention, developing a labor plan, anticipating newborn ways of communicating, breast-feeding education/support), supporting the child's health and development (by, for instance, assessing the child's development, diagnosing and treating illness, providing education regarding environmental safety and injury prevention, offering anticipatory guidance, and attending to the mother's health) in collaboration with Community Health Center. As a means of delaying subsequent childbearing, the NP works hard to counsel and ensure that MTB mothers are able to select and effectively use a method of contraception after the birth of their child.

The CSW's roles include ongoing assessment of both mother and child, diagnosing perinatal depression, anxiety, and other forms of psychological distress and psychiatric illness, providing a range of treatments as appropriate (infant-parent psychotherapy, dyadic play and developmental guidance, individual, couples and family counseling, crisis intervention, case management and other supportive approaches). Finally, the social worker is available to help mothers negotiate issues involving the legal and court systems. Both clinicians support reflective parenting, promote the mother-infant attachment relationship, and model and foster a range of parenting skills. Both clinicians support reflective parenting, promote the mother-infant attachment relationship, and model and foster a range of parenting skills. The MTB treatment manual guides clinicians as they use various approaches to encourage parents' developing reflective capacity. This process is individualized, as clinicians tailor specific clinical strategies to each parent, drawing information from initial interviews, conversations and observations during home visits.

Clinicians begin their work with mothers by building a therapeutic relationship which involves providing support, empathy, reassurance, and praise for strengths and competencies. "Mentalization arises out of the relationship... The mothers experience themselves as *meaningful* in the eyes of the home visitors; the experience of being held in mind as a coherent, intentional person who is trying to do her best allows mothers to start experiencing themselves and the baby in the same way." (Sadler et al., 2006),p. 278.

Both the nurse and the social worker model a reflective stance during their home visits. This involves being curious with the mother about the child's and parent's thoughts and feelings. Clinicians often use "wondering" statements and questions to allow mothers to explore their inner life as well as the child's feelings, wants and needs. For example, "I wonder what it feels like to you when your child cries every time you leave her sight?" or "What do you imagine your child is feeling when he hears the family argue?" Clinicians may also describe or interpret behavior in terms of the child's and parent's beliefs, feelings and intentions. They

can also use their own reactions, feelings and experiences in their interactions with mothers and infants.

Other approaches home visitors use to foster the development of RF with new parents include facilitating opportunities for hands-on play and observation of the parent-infant dyad, making and watching digital videos of play and care routines between mother and infant, and offering mothers activities such as journaling and scrapbooking with suggested statements to draw out the mother's RF. These activities create moments for mothers to enjoy their babies and enable the clinicians to narrate the activity as well as some of the feelings experienced by the mother and the baby. The goal is to provide gentle opportunities for the mother to name her feelings and experiences, and develop curiosity about her baby's developing inner emotional life.

Research Aims—The aim of this pilot study was to evaluate the differences between a cohort of families receiving the MTB intensive home visiting program and another receiving usual care at an urban community health center. Two broad domains were examined. The first was health and public health outcomes; families were compared in the degree to which they maintained a schedule of regular pediatric visits and immunizations, the timing of subsequent childbearing, and the frequency of referrals to child protective services for abuse or neglect. The second domain examined was attachment and the parent-child relationship; in these analyses, we examined whether – relative to controls -- the intervention influenced the quality of affective communication in the dyad at 4 months, whether infants in the intervention group were more likely to be securely attached to their mothers at 12 months, and whether mothers in the intervention group showed greater change in level of reflective functioning when their children were two years of age.

Methods

Design

This study utilized a (nested) two group experimental design with random assignment of prenatal care groups (sealed envelope method) to test the effects of the MTB program with young families. The community health center (CHC) conducts 6 prenatal care groups per year, with 15-25 women in each group. Of these about 50-75% of the women are primiparous. Because all routine prenatal care is delivered in a group format (as contrasted with individual patients meeting with individual clinicians) designed to develop close and supportive relationships among the women in the groups, we used a nested randomization, or cluster randomization approach (Hauck, Gilliss, Donner, & Gortner, 1991) therefore, group status (intervention or control) was randomly assigned to each prenatal care group before the women were invited to join the study.

Sample

Primiparous women attending nurse-midwifery group prenatal care sessions at the CHC were approached to assess their interest in participating in the study. All participants who met inclusion criteria were invited into the study and assigned either to the treatment or control condition based on the research condition to which their prenatal group had been randomly assigned. Inclusion criteria include the following: 1) able to speak and understand English; 2) 14-25 years of age; 3) having a first child; 4) no active heroin or cocaine use [pre-screened by the CHC as criteria for entry into group prenatal care]; 5) no DSM-IV psychotic disorder, and 6) no major or terminal chronic condition in the mother (AIDS, cancer, etc. [pre-screened by the CHC]). In this paper, we present data on 60 families in the intervention group, and 45 in the comparison group; some measures were unavailable for

individual families due to issues of families' mobility, time constraints, and missed appointments. Some parents declined videotaped procedures.

In order to ensure continued enrollment and retention of *intervention* participants, home visits were set up at the mother's convenience around school and work schedules, and phone contacts were made to reschedule missed or cancelled visits. This process applied to research visits as well. In order to ensure continued enrollment and retention in the project of *control group* members, a staff member maintained phone and mail contact on a regular basis. All participants were reimbursed for completion of research sessions.

Setting

The CHC from which subjects were recruited serves a medically-underserved population of families, most of whom live at or below the poverty line and have diverse cultural and ethnic heritages, including African-American, Caribbean American, Puerto-Rican, Mexican, and Honduran. Home visits took place in participants' homes, and most research instruments were administered during the course of separate home visit research sessions conducted by a research assistant (RA) for the sole purpose of data collection. Research sessions were also conducted for control group mothers in participants' homes. For both intervention and control group mothers, the mother-child assessments and infant developmental testing took place in a laboratory space located within a five to ten minute car ride from most families' homes. Study variables and measures are presented in Table 1.

Procedures

Recruitment—The study was approved by the university and CHC research review committees. All participants had the choice of whether they wished to participate in the study. Recruitment began in mid-pregnancy when according to HIPAA guidelines the CHC midwives contacted potential research participants about their interest in the study. Those who expressed interest were then approached by MTB staff who explained the project. Those who volunteered and met inclusion criteria, gave informed consent (or if younger than age 18 a parent provided written consent and the participant provided assent) were enrolled into the study. Both groups were followed for 27 months.

One hundred and thirty-nine families met criteria for the study and were invited to join the study. Of this group, 67 were randomized into the control group and 72 were randomized into the intervention group. Of the control group, 21 families declined the invitation to join the study and of the intervention group, nine families declined the invitation. Sixty-three families were consented into the intervention and subsequently one family could not be contacted and two families declined to continue the intervention after the first several months due to time constraints, leaving 60 families in the intervention group who received the intervention and participated in data collection. Of the control group, one family declined to continue in the study shortly after consenting, leaving 45 families who participated in data collection. Despite repeated attempts and follow up by the research team, not all data collection sessions were completed by all families due to scheduling difficulties, frequent moves in and out of the state, and conflicting demands and time constraints reported by the families. Sample sizes for each component of the data analysis are presented in Tables 3 and 4.

Data collection—Baseline data collection included a demographic interview, the written research instruments, and a clinical interview regarding the young women's experience of pregnancy and expectations about the baby. At 12 and 24 months the health records were reviewed. Mothers and infants were invited to the lab at the Yale Child Study Center where mothers and infants were videotaped and observed at 4 months in a face-to-face interaction,

and at 12-14 months for the Strange Situation Procedure. At 12 and 24 months, there were additional written questionnaires and at 24 months mothers the Parent Development Interview was administered. Participants were paid $25.00 for their time for each of the research data collection visits. When travel to the lab was required, they were paid an additional $15.00 for transportation costs. Data were collected by experienced female RAs very familiar with high-risk populations and the special issues they raise for data collection. Attempts were made to keep RAs blind to the group status of participants, although this information was commonly disclosed inadvertently by participants.

Implementation of Home Visitation Clinical Program (intervention participants only)—As previously described, the team of home visitors began weekly home visits in the late second or early third trimester of pregnancy. These continued until the child's first birthday at which point there was a celebratory "transition" visit acknowledging the growth and progress of the first year and setting goals for visits in the second year. After this point the home visits occurred every other week until the child was 24 months old at which point there was a joint visit by both home visitors for the family's graduation from the program. For this sample, the mean number of home visits per month was 3.4 (*s.d.*=1.5) lasting between 45-90 minutes. During visits, content areas were recorded by home visitors and use of time was documented as the following; child health and development- 19%; maternal mental health- 18%; parenting- 15%; social support- 12%; maternal life course- 12%; maternal health- 10%; infant mental health- 10%; environment and safety- 4% of time. During the intervention, families continued to receive their routine prenatal, primary care and pediatric care from the CHC clinicians.

Control Group Treatment—Control group participants received routine prenatal and post natal well-woman health visits, and well-baby health care visits as dictated by clinical guidelines and infant/child immunization schedules in place at the CHC. Control Group families were sent monthly information sheets from Healthy Steps (Kaplan-Sarnoff & Zuckerman, 2007) materials, about child rearing and health and were sent birthday and holiday cards. We maintained phone contact with control group families to schedule research sessions at baseline, 4, 12, and 20-24 months.

Measures

Selected research measures are presented in this paper even though additional research instruments were collected during the larger study (reference deleted for purposes of blind review). Research measures and timing of data collection are presented in Table 1.

Mothers' Demographic Information regarding age, family background, educational background, medical history, was collected at baseline (20-24 weeks of pregnancy) by interview and health record reviews. Child protection cases that were active were noted (all open cases at enrollment were aimed at the parents of the mothers in the study). Subsequent health record reviews were completed at 12 and 24 months after the infants' birth.

Maternal-child Health Outcomes—The main maternal health outcome was childbearing patterns; these were determined by interview and health center record review at 24 months. Rapid subsequent childbearing was defined as the birth of a second child within 24 months of the index birth.

Infant health outcomes were collected through a record review of the infant's pediatric CHC health record and maternal interviews at 12 and 24 months. Variables included birth outcomes and immunization records (to ascertain whether an infant was up to date or delayed in accord with Centers for Disease Control Immunization Guidelines); together

these were used to assess compliance levels with pediatric well-child visits. A key child health outcome was the frequency of open child protective services case, indicating the presence of child maltreatment or neglect.

Maternal Mental Health Measures

Center for Epidemiological Studies Depression Scale (CES-D) (Radloff, 1977)
—The CES-D consists of 20 items selected from other depression scales; the six major symptom areas assessed include depressed mood, guilt/worthlessness, helplessness/ hopelessness, psychomotor retardation, loss of appetite, and sleep disturbance. The reliability of the CES-D has been documented with high internal consistency reliability, acceptable test-retest stability, and construct validity in both clinical and community samples and has been used successfully with urban adolescents and adolescent mothers. In this sample the Cronbach's alpha coefficient is equal to .89.

Brief Symptom Inventory Short form (BSI) (Derogatis, 1993)—This is a widely used self-report measure of psychopathology. This 18 item measure yields a Global Severity Index, an indicator of current overall symptomatology across multiple domains experienced during the preceding 2 weeks. In addition, the measure yields three other subscales indicating somatization, depressive and anxiety symptoms. The BSI has been shown to be reliable and a valid measure of current global psychological distress. In this sample the coefficient alpha for the GSI was .90.

Parental Bonding Instrument (PBI) (Parker, Tupling, & Brown, 1979)—This 25-item questionnaire was used to assess mothers' recollections of the care and protection they received from their own mothers; each item is rated on a 5 point scale. The PBI has demonstrated satisfactory reliability and validity in other samples similar to the current sample and in this sample the coefficient alpha was equal to .78 for the Overprotection subscale and .90 for the Care subscale.

Infant Measures

Mother-infant Interaction

Atypical Maternal Behavior Instrument for Assessment and Classification (AMBIANCE) Scale (Bronfman, Parsons, & Lyons-Ruth, 1999): This scale is used to assess the quality of affective communication between mother and infant. Videotaped face-to-face interactions, collected when babies are 4 months old, were coded on a 7 point scale, with a higher score denoting more disrupted communication. This measure has been validated against the Strange Situation, and with maternal and infant behavior observed in the home (Lyons-Ruth, Bronfman, & Attwood, 1999). We used a version of the AMBIANCE scale developed for 4 month-old infants and their mothers (Kelly, Slade, & Lyons-Ruth, 2003). The trained and certified coder was naive to the group status of infant-mother dyads.

Infant attachment

The Strange Situation Procedure: (Ainsworth et al., 1978) is a 30-minute laboratory separation procedure aimed at assessing the quality of the child's attachment to his caregiver. The procedure yields one of four primary attachment classifications: secure, avoidant, resistant, and disorganized. This well-validated and reliable procedure has been used in studies of attachment for 30 years. This has been used successfully with low-income mothers and mothers from various cultural backgrounds (Carlson & Sroufe, 1995). This procedure is conducted and videotaped by a trained team at the YCSC. Coding was performed by certified coders naive to the group status of the participants.

Maternal Reflective Functioning

Pregnancy Interview (PI) (Slade, 2003): This is a 22 item clinical interview designed to assess a woman's emotional experience of pregnancy and the nature of her developing relationship with her baby. This interview has been used in a number of samples, and predicts to adult attachment classification (Slade, Director, Grunebaum, Huganir, & Reeves, 1991). Audio-taped responses were transcribed verbatim and the transcript was scored by coders blind to group status, using the RF scoring system described below.

Parent Development Interview – Revised (PDI) (Slade, Aber, Bresgi, Berger, & Kaplan, 2004): This is a 20 question interview that assesses parents' representations of their relationships with their child. The interview takes approximately 45 minutes to administer and parents are asked to describe their experience of the child, their relationship with the child, their own internal experience of parenting, and the child's reactions to normal separations, routine upsets, and parental unavailability. Transcribed interviews were scored for RF. Initial studies testing the validity of this measure have linked it to adult attachment, child attachment, and parental behavior both in normal and drug using samples (Levy, Truman, & Mayes, 2001; Slade, Belsky, Aber, & Phelps, 1999; Slade, Grienenberger, et al., 2005). RF is scored on a scale of 1-9 with higher scores reflecting higher levels of RF (Slade, Bernbach, Grienenberger, Levy, & Locker, 2005) . Average scores on non-stressed samples of mothers are 6 and average scores in poverty samples are 4 (Grienenberger et al., 2005; Levy et al., 2001). Coders, who were blind to the group status of all interview transcripts, were trained to reliability on a subset of sample transcripts; the criterion for reliability was 80% agreement on individual variable and overall scores.

Analysis—Sample size was determined on three outcomes including maternal RF, secure attachment rates in the children and incidence of rapid subsequent childbearing using a two-group univariate repeated measures ANOVA power analysis with compound symmetry. Estimates of change over time were based on pilot data in which we saw effect sizes of .78, .82, and .93 respectively for the above measures. Analyses indicated that a sample between 25-27 per group would provide 80% power to detect group by time differences with the three outcomes. We purposely oversampled since we knew that it would be difficult to retain all subjects within our community sample for all data collection points. In fact, despite persistent efforts and our use of many strategies developed to retain community samples (Sullivan, Rumptz, Campbell, Eby, & Davdison, 1996), a number of our families failed to keep all of their research appointments.

Descriptive statistics and comparisons were calculated between intervention and control groups with respect to demographic characteristics and baseline measures to determine the equivalency of the two groups. Bivariate analyses were computed to detect differences between the groups with respect to the research measures and health outcomes, and these were computed with T tests, Chi Square and Fisher's Exact Tests. Because this was a pilot study, effect sizes were also computed for key outcome variables. Multivariate analysis included Generalized Estimation Equations (GEE) using robust standard errors to account for non-normally distributed RF findings as well as logistic regression to examine particularly high risk sub-groups within the sample. GEE are a form of semiparametric regression techniques; an extension of generalized linear models, they can accommodate correlated data (Liang & Zeger, 1986), They do not require specification of the form of the distribution, and are less sensitive to covariance specification, thereby allowing for more flexibility in modeling non-normal data.

Findings

The sample included 60 families in the intervention group and 45 families in the control group. Even though families did not drop out of the study, they would intermittently miss multiple rescheduled research appointments beyond the time frame when the data could be collected. This pattern resulted in sample sizes that were smaller than planned for and an attrition rate that was relatively high (see Table 2). Thirty of those in the study did not complete the 24 month research measures, 16 (27%) of those in the intervention group and 14 (31%) of those in the control group. There was no significant differential attrition between treatment groups (p=.85). To explore further, we conducted an attrition analysis. Table 3 presents a comparison of selected demographic and related factors among those who completed a 24 month interview compared to those who did not. There was no significant difference between those who completed the study and those who did not (including treatment group assignment), with the exception of race/ethnicity and caesarean section.

The mean age of the mothers in our sample was 19.6 (*s.d.*=2.5) with 60% of the mothers under the age of 20. Participants described their marital status (see Table 4) at the beginning of the study, although the nature of the couple relationships were quite fluid over the course of the study period. The highest grade level attained was a mean of 11.4 (*s.d.*=2.0) years of education. The sample was predominantly Latina (62%), while 28% of the sample was African-American or of Caribbean descent, and a small percentage 10% described themselves as having mixed ethnic and racial backgrounds. All of the participants were enrolled in the Women's Infants' and Children's (WIC) nutritional program (proxy measure for income) and at the time of enrollment into the study 7% of the intervention families and 4% of the control group families had active child protective services cases. In all situations, these cases involved charges of abuse or neglect *on the part of the parents of the* study participant mothers.

In comparing the baseline demographic characteristics and participants' scores on baseline research measures, there were no significant differences between the intervention and control group except for their scores on the Parental Bonding Index (Overprotective subscale- the intervention mothers reported higher levels of Overprotection when they were growing up) and the Brief Symptom Inventory (Intervention mothers reported higher levels of psychological distress on the Global Severity Index [GSI] and lower levels of somatic complaints on the Somatic Symptom Scale [SOM]), which are displayed in Table 5. These three baseline subscale scores were therefore used as covariates in subsequent analyses of maternal infant relationship outcomes. Finally, we then conducted a subset analysis of only those subjects who completed the 24 month measures, examining any differences between the intervention and control group on baseline outcome measures. The purpose was to ensure that randomization was effective in this subset as well as with all participants in the study. There were no differences between the treatment groups at baseline on measures on depression (CES-D), Brief Symptom Inventory (SOM, DEP, ANX, GSI), or Pregnancy Interview ratings for RF. Using a Wilcoxon Mann-Whitney U test, there were significant differences between the treatment groups with respect to the Parental Bonding Index Care (p=.05) and Overprotection (p=.007), with the intervention group having higher scores. Parental Bonding Index Overprotection was found to be significantly higher in the intervention group in the full sample, and was used as a covariate in the main analyses along with GSI and SOM.

Maternal-child Health Outcomes

With respect to birth outcomes, all enrolled women were classified as medically low risk at the time they were enrolled into the study. Both groups had mean infant birth weights that

were in the healthy range and although the MTB mothers had a lower Caesarean section rate, this difference was not statistically significant (see Table 4).

Immunizations and pediatric check ups were reviewed in the infants' health records at 12 and 24 months and immunization patterns were compared with the Center for Disease Prevention and Control (CDC) immunization schedule. The MTB group was significantly more likely than the control group to be up-to-date at 12 months, but by 24 months both groups were up to date with the immunization schedule. In examining patterns of rapid subsequent child-bearing (within 24 months), the Intervention group mothers had fewer instances of rapid subsequent childbearing (n=1;1.6%) in comparison with Control group mothers who had a 15% rate (n=7) and this difference was statistically significant (Fishers exact test, p = .019). With respect to patterns of child abuse/maltreatment, the MTB group had no open cases with child protective services, while the control group had 5% (n=2) open cases; the difference was not significant but reflects a trend (Fishers exact test, p = 0.1).

Maternal Mental Health

There were no significant group by time findings with respect to the measures of maternal depression (CES-D) or psychological distress (BSI). The descriptive statistics for these measures are presented in Table 5.

Maternal-Child Relationship Outcomes

Mother-child face to face interaction at 4 months—In examining the measure of early mother-infant affective communication (AMBIANCE) the scores were grouped into the following two categories for analysis: 1-4 = healthy communication; and 5-7 = disrupted communication. There was less disrupted communication among MTB families such that in the Intervention group (n=45) there were 60.5% of the dyads vs. 73% of the dyads in the Control group (n=31) who scored in the disrupted range. However, when controlling for the three covariates (SOM, GSI, PBI- Overprotection), the difference was not significant (Wald X^2=1.6; p=.20; OR= 0.48, 95% CI=0.16-1.5).. When these analyses were repeated for the teen mothers only (age 20), there were 66.6% of the Intervention group dyads (n= 27) vs 93.8% of the Control group dyads (n=15) with scores in the disrupted range. This difference bordered on significance (Wald X^2 =3.80, p=.05; OR=0.084, 95% CI=0.01-1.01). Therefore, Intervention group teen mothers were 11.9 times more likely to have healthy communication patterns than the Control group dyads. These findings are presented in Table 6.

Infant attachment quality at 12 months—There was a significantly higher percentage of secure infants in the MTB group (n=41, 64.4%) vs. the control group dyads (n=30, 48.4%), controlling for the three covariates (Wald X^2= 4.83, p=.028; OR=0.29, 95% CI=0.10-0.88). The Intervention group was 3.4 times as likely as the Control group to have infants who had secure attachments. When only the teen mother dyads were examined, the analyses revealed non-significance (p=.10; OR= 0.26, 95% CI= 0.06-1.27). However, the direction of the differences seen are consistent with what one would expect with a successful intervention, with 72% of the Intervention group children (n=25) rated as securely attached and 52.9% of the Control group children (n=16) rated as securely attached.

There was also a significantly lower percentage of children (27%) who were classified as being disorganized in relation to attachment in the Intervention group dyads. Compared with the Control group dyads (43%), when controlling for the three covariates in the logistic regression (Wald X^2= 3.86, p=.049; OR=3.10, 95% CI= 1.00- 9.53), the Control group children were 3.1 times more likely to have a disorganized attachment classification as were the Intervention group children. Among teen mother dyads, 25% of Intervention group dyads (n=25) vs 40% of Control group dyads (n=16) had a child classified with disorganized

attachment. However, the differences were not significant (p=.12; OR =3.62, 95% CI= 0.69-19.04) These findings are presented in Table 6.

Parental Reflective Functioning—Reflective functioning scores in both intervention and control groups improved significantly over the course of the intervention. However, there were no group by time effects, as noted in Table 7, indicating that Intervention mothers' RF scores did not improve relative to those of Control mothers over the course of the intervention. However, when certain aspects of maternal risk were accounted for in an exploratory analysis, there was a greater improvement in RF at 24 months for Intervention than for Control group mothers. With mothers who had less than a 12th grade education, bivariate analysis demonstrated a significant improvement in the Intervention group (n=20). RF scores mean scores in the Intervention group changed from 3.0 in pregnancy to 3.8 at 24 months (t= −2.1, df=19, p = .05). By contrast, there was no significant improvement in the RF scores (mean scores of 2.9 at both time points) in the Control group (n=9). In GEE analysis, controlling for BSI, SOM, and PBI, these effects were not seen although there was a trend (p=.09). Among mothers whose PI transcripts revealed no efforts at mentalization at intake (i.e., very low [<3] RF scores) bivariate analysis showed a significant improvement in the Intervention group (n=7), with mean scores changing from 2.0 in pregnancy to 3.6 at 24 months (t=−4.0, df=6, p = .016). There was, however, no significant improvement in the Control group (n= 7), with the mean scores changing only slightly between pregnancy (2.1) and 24 months (2.3). GEE analysis, controlling for the three covariates, provided results consistent with bivariate analyses, with a significant group by time interaction (p=.0007).

Discussion

The results described above provide preliminary evidence in a pilot sample that the MTB intervention – an interdisciplinary, mentalization-based home visiting program–is having a positive effect on both health and attachment/parenting outcomes. The trajectory of our results, with a move toward less disrupted interactions at 4 months, higher rates of secure attachment and lower rates of disorganized attachment at 12 months, and a strong trend toward lower rates of child protective service referrals at 24 months, suggests that MTB mothers, despite the many challenges facing them on a daily basis, are parenting in more sensitive, and presumably less frightening ways. That they are also attending to their children's pediatric health visits and delaying subsequent childbearing likewise suggests that they are managing to approach both childrearing and their own lives in a more organized and planful way, which we expect will impact the both mothers and children positively in the long term.

Our first research aim was to document the impact of the intervention upon health and public health outcomes. Infants in the MTB group were significantly more likely to be up to date on pediatric immunizations and well baby visits at 12 months, but not at two years. The convergence of the two groups at this second data point was likely due to the fact that the CHC had implemented a funded statewide outreach program aimed at immunizing all children by age two. The impact on immunization rates at one year is significant, however, as it suggests that intervention mothers are attending to their child's health needs in a timely way, no small feat for this population. In the only Olds' trial to evaluate immunization rates (Kitzman, Olds, Henderson, & al., 1997), no program benefits were found in this area. Mothers in the intervention group were also less likely to bear a second child within 24 months from the birth of their first baby. MTB intervention mothers in this pilot study had a 1.6% rate of having a second child within 24 months of the birth of their first child, which compares favorably with the rates reported in the Memphis trial of the Nurse Family Partnership findings with the Memphis study (Kitzman et al., 1997). In the Memphis trial, within the overall intervention group, 22% of mothers had a second child by 24 months, and

in a sub analysis of intervention mothers with higher levels of psychological resources, 14% of the women experienced a second childbirth by 24 months. The delay of subsequent childrearing until the first child is at least two has been repeatedly found to predict a range of positive health and socioemotional outcomes in mothers and children (Klerman, 2004). These outcomes reflect the major thrust of the nurses' efforts, namely to improve the quality of the child's health care and to attend to the mothers' own reproductive health and health care.

The comparison between intervention and control families with respect to child protective service referrals just missed significance. Given that intervention mothers were slightly more likely to enter the program with active child protective service cases (against their own caregivers), the fact that none of our mothers had active open child protective cases is striking, although only continued assessment with more subjects will confirm our success in this area. In the two open cases in the control group, both families had children removed from their custody due to neglect. As noted by Howard and Brooks-Gunn (2009), most studies have not found differences between intervention and control subjects in rates of child abuse referrals, as the reporting and documenting of abuse is complex and the base rate in both intervention and control samples is low (as was the case in our sample). Thus, the trends observed in this area are most encouraging.

Our second research aim was to demonstrate the impact of the intervention on a range of parenting and attachment outcomes, including mother-infant communication, infant attachment and maternal RF. Mothers in the MTB group demonstrated the impact of the intervention upon both the nature of their evolving relationship with the child, as well as their own capacity to make meaning of their own and the infant's subjective experience. When differences in patterns of mother-infant affective communication were measured at 4 months, the MTB intervention was associated with significantly lower rates of disrupted interactions in teen mothers and their babies; differences between the intervention and control mothers was in a positive direction but not significant when the whole group was considered. That the Intervention and Control groups began to distinguish themselves with respect to this kind of negative parenting as early as 4 months suggests that the intervention was beginning to have an effect within a fairly short time window, particularly for teen mothers.

With respect to attachment quality, intervention infants were more likely to be securely attached, and less likely to be disorganized in relation to attachment than the control infants. The results with respect to security of attachment are consistent with results reported by Lieberman and her colleagues (Lieberman et al., 1991) and Heinicke and his colleagues (Heinicke et al., 1999). As has been well documented for the past three decades (Carlson & Sroufe, 1995; Weinfield, Sroufe, Egeland, & Carlson, 2008), security of attachment is associated with a range of positive social and emotional outcomes throughout childhood. The intervention results that specifically point to lower rates of disorganized attachment are unique to this study. As has been described repeatedly in the attachment literature (Carlson, 1998; Van Ijzendoorn, Schuengel, & Bakermans-Kranenburg, 1999), disorganized attachment is prevalent in high-risk samples, and is of all the insecure attachment classifications the most pernicious with respect to long term outcomes. The antecedents for these lower rates of disorganized attachment may well be the tendency toward less disrupted communication at 4 months, which – as noted -- was significant in teen mothers (Grienenberger et al., 2005; Lyons-Ruth, Bronfman, & Parsons, 1999).

Finally, the RF scores for all mothers – whether control or intervention – increased significantly over the course of the 24 month time period. Reflective functioning on the PI was assessed on the basis of a mother's ability to envision her own mental states in relation

to pregnancy, to envision the mental states of those closest to her (her own parents, the father of the baby), and to imagine that baby, after s/he is born, as having thoughts and feelings. That is, a reflective pregnant woman represents herself, her partner, her family and the baby as having an internal, psychological life. Reflective functioning on the PDI when the child was two years old was assessed on the basis of a mother's ability to envision her own and the baby's mental states; does she, for instance, see the baby's behavior in light of thoughts and feelings? (E.g.: "He is clinging to me because he doesn't want me to go to work.") It is likely that the increase across both groups was to some degree a function normal development; RF is thought to continue developing throughout adolescence, in conjunction with the development of other executive capacities (Kriss, Steele, & Steele, 2012). It is also likely that the presence of an actual baby accounted for the increase in RF across both groups. In a study of the development of RF on the PDI in a low-risk, non-intervention sample, Poznansky found similar increases in RF between 10 and 28 months, as the baby became increasingly known to the mother (Poznansky, 2010).

Thus, there are likely a number of factors at work in our failure to discern intervention effects on maternal RF, except in a small subgroup of parents whose RF was particularly low in pregnancy. As noted above, maternal RF appears to develop as the parent becomes more experienced with the baby. This alone would make it difficult to detect changes in RF in the Intervention group over and above those in the Control group. Another complicating factor in assessing outcomes using RF on the PDI is the fact that, as can be seen from an examination of Table 7, the ranges on both RF measures were extremely restricted in both Intervention and Control groups. Thus, mothers' responses typically fell between 2.5 and 4.5 on a 9 point scale. This restriction of range obviously had an impact on our capacity to detect differences between the two groups using this measure, and in fact it was when a wider spread of scores was studied in the mothers whose RF was very low at enrollment that the effect of the intervention was apparent.

These complications clearly raise the possibility that measuring change in RF on the PDI may not be the best way to assess outcomes in this study. It also makes clear that much work needs to be done to better understand developmental and clinical aspects of improvements in maternal reflective functioning in the child's first two years of life, with or without intervention. We believe that one of the primary limitations of using the PDI with this population is that RF scoring is so dependent on language. Young mothers who have had limited education and who struggle with trauma and environmental adversity may use language more instrumentally and less as a means of communicating and describing more complex emotional and cognitive experiences. Also, many of our mothers were bilingual and may not have felt as comfortable or facile with the expression of their feelings and ideas in English. These issues might well have to do with the restriction of range observed across the whole sample. Finally, the lower end of the RF scale may not adequately distinguish levels of pre-mentalizing, such that clinically meaningful distinctions in the capacity to make sense of mental states are lost. Thus, it might be more appropriate to use a nonverbal measure of mentalization, such as that developed by Dana Shai or a more behaviorally based measure such as Meins' measure of mind-mindedness (Meins, Fernyhough, Fradley, & Tuckey, 2001; Shai & Belsky, 2011). In any event, these complexities of measuring change in RF must be addressed in further research.

Clearly, it could be argued that – even with these complexities in mind – the intervention did not alter mothers' fundamental appreciation of their babies' subjective experience. However, we do think there is evidence to suggest that it did. The interactions of Intervention group mothers and babies were less disrupted at 4 months, and Intervention infants were less likely to be insecure and/or disorganized in relation to attachment. Both findings suggest that mothers in the Intervention group were more responsive to and sensitive to their babies'

needs. Maternal RF and infant attachment have consistently been correlated in low-risk samples (Fonagy et al., 1995; Slade, Grienenberger, et al., 2005). That mothers were more reflective was also repeatedly borne out by clinical observation.

MTB had no discernible effects on the measures of depression or other psychiatric symptomatology. This is a complex issue. For one, the mean depression and BSI scores for both intervention and control mothers did not at any data point meet criteria for clinical depression or general psychiatric distress, although intervention mothers had higher scores on the Global Severity Index than did controls. The finding that our sample's level of depression and psychiatric symptomatology is not in the clinically significant range is inconsistent with both the levels of psychological distress in general and depression in particular reported in the literature on home visiting (Ammerman et al., 2011). Nor did this finding reflect our clinical experience with families. It was clear to the home visitors, often within weeks of enrolling mothers, that many were very distressed psychologically; this manifested not only as depression and anxiety, but in a range of other symptoms and difficulties. In line both with the Ammerman studies and our own observations, it seems possible that our primary measure of depression (the CES-D) did not in fact capture the level of depression in our sample. Alternatively, we have begun to consider the possibility that the symptoms we see consistently in so many of our mothers are characteristic of what Courtois (2008) has described as "complex trauma". Complex trauma is the "result of cumulative and repeated trauma, usually within a period of time and within specific relationships and contexts (2008, p. 86). Individuals suffering from complex trauma (which stems, among other things, from repeated child abuse, domestic violence, community violence) show signs of many psychiatric disorders, but rather than being *comorbid* disorders, these are linked in complex trauma to the "underlying posttraumatic adaptation" (p. 87). That is, depression and anxiety are symptoms of a more pervasive disorder, which Courtois describes as leading to a range of alterations: "alterations in a range of affective impulses, alterations in attention and consciousness, alterations in self-perception, alterations in perceptions of the perpetrator, alterations in relationships to others, somatic and/or medical problems, alterations in systems of meanings" (p. 88). These descriptions are very consistent with our experience of the intervention mothers in our study, some of whom improved, and some of whom continued to struggle throughout the study, with continued personal, interpersonal, and familial crises and upheavals.

As Courtois (2008) notes, complex trauma is difficult to assess, because – as we discovered time and again – traumatized individuals do not necessarily reveal their trauma histories at intake, and may in fact often not disclose highly traumatic events until they are certain of the clinician's trustworthiness. In our experience, this can often take place toward the end of treatment. Thus, the typical measures used to evaluate psychiatric symptoms may be unsuited to assessing the kinds of symptoms and states of mind associated with complex trauma; rather, it is only over the course of a treatment relationship that complex trauma can be assessed (Courtois, 2008). This suggests that going forward, both in our, as well as, in other studies, the presence of complex trauma ideally must be assessed and treated as a covariate in outcome analyses. However, given the current difficulty of assessing and measuring complex trauma, work is needed to determine possible new ways of measuring trauma that are amenable to 'brief research encounters'.

It is important to note that while our program is not geared specifically toward the alleviation of mental health symptoms, we do regularly provide individual and dyadic therapy as part of home visits, and it had certainly been our hope that treatment would in fact have secondary impacts on the range of psychological distress our mothers experienced. And what we observed– as has been the case with other programs – is that mothers make gains in parenting sensitivity, even if their depression does not remit (Howard & Brooks-

Gunn, 2009; Mayers, Hager-Budny, & Buckner, 2008). Nevertheless, the complex issues involved in alleviating the symptoms of psychological distress that characterize samples such as ours require further study. We have consistently maintained that these are best addressed by familiar and trusted social work clinicians within the framework of the home visit, yet it must be acknowledged that this poses quite a challenge in working with some families, whose needs are so deep and wide.

The limitations of the study include incomplete data on the longitudinal measures. As is noted in our attrition analysis, women who self-identified as being Black were more likely to complete a 24 month interview compared to Latinas. It is unclear what is influencing this, and if it is related to the study specifically. A greater proportion of those who completed a 24 month interview delivered their infants by caesarean compared to those that did not. One possible explanation is that those who delivered by caesarean may have been more engaged in the study, or many have felt more vulnerable as their recovered from their births and appreciated the support from the intervention so that they were more willing to complete the 24 month research measures.

While attrition was high in this pilot study, there were few differences between those who completed and did not complete the study. Future studies should examine the possible role of differential race and ethnicity attrition in the evaluation of the program. Baseline measures among the subset of those who completed were different compared to the full sample in that Parental Bonding Index Care also was significantly different, and GSI and SOM at baseline were not. These differences may be due to a small sample inherent in pilot studies.

As we would expect to be the case in any analysis of pilot data, our preliminary investigations have yielded as many questions as answers. Clearly, many of the patterns we are beginning to see must be confirmed in a larger sample, and the questions we have raised here about the differences between teens and more mature mothers, about the process whereby the intervention "takes hold" (i.e., does it take more time for different mothers, can we discern non-verbal mentalizing processes, etc.), and about the nature and impact of trauma upon all outcomes must be examined. In addition, the mechanisms of change (i.e., intervention dose, quality of relationship to home visitors, etc.) must be assessed. In view of the issue of complex trauma, there remain a number of questions as to how best to implement treatment for these issues within the framework of a home visit.

Overall, we see our early outcomes as quite encouraging, and indicative of the fact that an intensive, interdisciplinary program that encourages mothers to attend to their own and their babies' physical health and internal experience can affect both health and attachment/ parenting outcomes. To return to the point made by Howard and Brooks-Gunn (2009), complex goals require complex interdisciplinary work. As our aim was to affect both health and attachment/parenting outcomes, bringing together nursing and mental health practitioners was crucial. Using an interdisciplinary team, we have preliminary evidence that, at least in some areas, we are beginning to succeed.

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Table 1

Minding the Baby: Schedule of Administering Research Interviews and Instruments

Participant	Variables	Pregnancy	4 months	12 Months	24 Months
Mother and Child	Demographic characteristics	Demographic characteristics			Demographic changes & life course outcomes
	Relationship quality/interaction		AMBIANCE Taped mother-infant interaction		
Mother	Mental Health	CES-D, BSI, PBI		CES-D, BSI	CES-D, BSI
Mother	Reflective Functioning	Pregnancy Interview			Parent Development Interview
Child	Attachment quality			Strange Situation Procedure	
Child	Abuse and Neglect			Child Protective Referral	Child Protective Referral
Child	Health Outcomes			Health Record Review	Health Record Review

Table 2

Study Attrition Rate Over Time by Intervention Group Assignment

	Baseline (pregnancy)	**12 months**	**24 months**
Intervention	60 (100%)	44 (73%)	44 (73%)
Control	45 (100%)	34 (76%)	31 (69%)
Total	105 (100%)	78 (74%)	75 (71%)

Chi-square test for trend: $x^2 = .03$, $p = .85$

Table 3

Comparison of Demographic Measures Among Those Completing 24 month Research Measures and Those Who Did Not

Variable	Did not complete 24 month interview (*n*=30)	Completed 24 month interview (*n*=75)	Sig
Maternal Age in Years at Intake- Mean (*sd*)	19.7 (2.9)	19.5 (2.7)	.82
Highest Grade in Years- Mean (*sd*)	11.2 (1.8)	11.5 (2.0)	.46
Race/Ethnicity %			.03
Black	14%	33%	
Latina	83%	55%	
Other	3%	12%	
Marital Status %			.86*
Never married/single	96%	86%	
Married	4%	10%	
Divorced		3%	
Engaged		1%	
Infant Gender %			.99
Male	52%	52%	
Female	48%	48%	
Infant Birth weight grams- Mean (*sd*)	3079.3 (650.9)	3212.2 (554.4)	.32
Gestational Age in Weeks- Mean (*sd*)	38.4 (3.1)	39.2 (2.1)	.18
Caesarean Section %	10%	28%	.05
Child Protection Case Open at Enrollment into Study	2 (7)%	4 (5%)	1.0*
Group Assignment			.62
Intervention	16 (27%)	44 (73%)	
Control	14 (31%)	31 (69%)	

Chi-square tests used for categorical variables unless indicated by an asterisk, which indicates Fishers Exact. T-test and Wilcoxon Mann-Whitney U tests performed for continuous variables. P-values are for t-tests.

Table 4

Demographic and Birth Outcome Characteristics of Sample

Variable	Total Sample (n=105)	Intervention Group (n=60)	Control Group (n=45)
Maternal Age in Years at Intake- Mean (*sd*)	19.6 (2.9)	19.5 (2.6)	19.7 (2.8)
Highest Grade in Years- Mean (*sd*)	11.4 (2.80	11.3 (2.0)	11.6 (1.9)
Race/Ethnicity %			
Black	28%	22%	35%
Latina	62%	67%	58%
Other	10%	11.7%	6.7%
Marital Status %			
Never married/single	83.8%	80.3%	88.6%
Married	7.6%	8.2%	6.8%
Divorced	1.9%	3.3%	
Engaged	6.7%	8.2%	4.5%
Infant Gender %			
Male	52%	51%	52%
Female	48%	49%	48%
Infant Birth weight grams- Mean (*sd*)	3178.5 (577.5)	3138.72 (602.3)	3235 (542.1)
Gestational Age in Weeks- Mean (*sd*)	39 (2.4)	39 (2.6)	39 (2.0)
Caesarean Section %	24%	20%	30%
Child Protection Case Open at Enrollment into Study	6%	7%	4%

Table 5

Variables Measured at Baseline, 12 months, 24 months

Variable	Intervention Group			Control Group		
	Baseline (pregnancy) n=60	12 months n=44	24 months n= 44	Baseline (pregnancy) n=45	12 months n=34	24 months n=31
Maternal Depression (CES-D)	13.5 (8.2)	13.4 (10.9)	12.8 (10.4)	13.9 (8.3)	11.3 (7.8)	10.8 (8.9)
Brief Symptom Inventory - GSI	50.8 (9.6) [*]	48.4(11.4)	48.1 (10.5)	54.2 (9.4) [*]	47.3 (10.9)	46.9 (9.7)
Brief Symptom Inventory-SOM	55.9 (10.3) [+]	50.6 (10.9)	51.1 (9.8)	60.4 (9.8) [+]	52.9 (11.4)	51.0 (10.2)
Brief Symptom Inventory-DEP	48.6 (8.4)	48.5 (9.1)	48.6 (9.9)	50.9 (8.4)	46.7 (8.9)	46.5 (7.9)
Brief Symptom Inventory-ANX	47.4 (8.5)	48.1 (10.4)	47.1 (8.0)	49.0 (9.6)	45.8 (9.6)	45.4 (9.0)
Parental Bonding Index- CARE	29.4 (7.9)			27.7 (7.8)		
Parental Bonding Index-OVERPROTECTION	16.1 (6.9) [++]			13.7 (6.9) [++]		

Baseline only Comparisons:

Note: these variables were included in models as covariates

[*] (t=−1.8, df=101, p=07)

[+] (t= −2.2, df=101, p= .03)

[++] (1=2.3, df=100, p=03)

Table 6

Program Impact on Mother Child Communication at 4 Months and Infant Attachment at 12-14 Months

Measure	Group	Difference in Scores Intervention vs Control		
	Classification	Wald ^{2}[*], p Value	OR	95% CI
Strange Situation Procedure- Secure Attachment Classification	Intervention (n=41) 64.4% secure			
	Control (n=30) 48.4 % secure	4.83, 028	0.29	0.10-0.88
Strange Situation Procedure- Disorganized Attachment Classification	Intervention (n=41) 27% disorganized attachment			
	Control (n=30) 43% disorganized attachment	3.86, .049	3.10	1.00-9.53
AMBIANCE Total Sample	Intervention (n=45) 60.5% disrupted communication			
	Control (n=31) 73.3 % disrupted communication	1.58, NSD	0.48	0.16-1.5
Teen Mothers Only	Intervention (n=27) 66.6% disrupted communication			
	Control (n=15) 93.8 % disrupted communication	3.8, .05	0.08	0.01-1.01

[*]Logistic regression controlling for SOM, GSE and PBI-Overprotection

Table 7

Program Impact on Parental Reflective Functioning- Difference in RF Level from PI to PDI

Sample	Group	PI Score	PDI Score	GEE *p* value [**]
All Mothers	Intervention	3.1 (0.6)		
	n=60 at pregnancy			
	n= 45 at 24 months		3.6 (0.8)	
	Control			
	n=45 at pregnancy	3.0 (0.6)		
	n= 30 at 24 months		3.7 (1.5)	
				.38
Only Mothers with less than grade 12 education	**Intervention** n=20	2.9 (.51)	3.4 (.78)	
	Control n=9	2.9 (.89)	2.9 (.95)	.09
Only Mothers with low RF levels in pregnancy (PI < 3)	Intervention n=7	2 (.0)	3.6 (.89)	
	Control n=7	2.1(.20)	2.3 (.52)	.0007

GEE controlling for GSI, SOM and PBI-Overprotection

[**]
p-value of group by time interaction term.