

Short-term (Peripartum) Outcome Measures: Hypothesis 1

A variety of measures were selected to measure short-term outcomes. Since these outcomes were partly intended to allow comparisons to previous work, instruments were selected to be consistent with those used in previous studies. For many instruments (as indicated in preceding chart) information was also collected at baseline so that outcomes could be compared not only as scores postpartum, but also as change from baseline.

Labor and delivery outcomes. The medical information system at the University of Chicago Hospitals provides abstracts on key labor and delivery outcomes. From those abstracts, we gathered information on obstetric outcomes that have been the focus of previous research on doula intervention: 1) duration of labor, 2) mode of delivery, 3) use of oxytocin, and 4) use of analgesia and anesthesia. Duration of first stage labor was estimated as time from 4 cm dilation to full dilation. In cases where this estimate could not be used, duration was assessed as time of admission to hospital to full dilation adjusted for dilation at admission. Use of oxytocin for labor initiation and augmentation was recorded separately. Three modes of delivery were recorded: vaginal unassisted, vaginal assisted with forceps or vacuum extraction, and cesarean. Use, timing, type, and dose of analgesia and epidural anesthesia were also recorded.

Maternal well-being. Mother-reported anxiety and fear was measured using the State-Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, & Lushene, 1983). Trait anxiety, which is assumed to be a relatively stable characteristic of personality, was assessed prenatally for purposes of determining successful randomization. State anxiety, which measures temporary feelings of tension, nervousness and worry in response to stress, was assessed in the postpartum period. Test items are structured on 4-point Likert scales. The STAI is the most widely accepted anxiety assessment instrument and has been used in diverse populations. In previous research, reduction in STAI state anxiety scale has been associated with doula support (Hofmeyr et al., 1991).

Parenting stress. The mother's ratings of her infant on the Neonatal Perception Inventory was a key outcome from the antepartum period (Broussard, 1976, 1979). This instrument assesses the mother's perception of her infant relevant to other children in different behavioral domains (feeding, sleeping, crying, elimination) as well as the degree to which she is bothered by her infant's behavior in those domains. Scores from this instrument have been associated with later child development outcomes and sensitive to the effects of prenatal intervention (Broussard, 1976; Wiles, 1984).

Parenting efficacy. Questions addressing women's perceptions of the birth experience, particularly with respect to feelings of control and efficacy during the labor and delivery were drawn from the Labour Agency Scale (Hodnett & Simmons-Tropea, 1989) and the Perception of Birth Scale (Marut & Mercer, 1979).

Experience of birth. The first morning after giving birth, mothers were asked to describe their labor and delivery experience. A series of open-ended questions elicit their personal "birth story." Probes focused on the course of labor and birth, support and help received, and first experiences with the baby. Interviews were audio recorded and transcribed. The transcripts were edited to mask identity of support figures, including the doulas. The transcripts were rated on five dimensions, independently by two research assistants who established inter-rater reliability. These dimensions included positive feelings expressed about the first moments with her baby, expressed level of difficulty of her labor and delivery, reported level of support she received, feelings of efficacy during labor/delivery, and level of the descriptive power of her recounting.

Parental sensitivity and responsiveness. A brief videotape was made of the mother and infant in her room at the hospital. In order to observe the mother handling the infant, researchers gave the new mother a gift of an item of clothing for the infant and asked her to dress the baby in that item during the videotaping. Videotapes were coded using the Parent-Child Observation Guide (PCOG) (see detailed description below).

Feeding practices. Information was gathered regarding the mother's plans for feeding her infant and whether she initiated breastfeeding. Brief probes addressed the mother's reasons for her choice of feeding method. For those mothers breastfeeding, we also asked about perceived efficacy.

Cortisol. Salivary cortisol assays were used as a biological marker of stress. Saliva samples were collected with Salivette (Sartsted Inc.) or other commercially available kits. After the sample collection, Salivettes were centrifuged and frozen at -20 C until assayed. Cortisol was assayed with radioimmunoassay procedures using commercially available kits. Saliva was sampled once each morning following delivery when the mother was in the hospital postpartum.

Long-term Outcome Measures: Hypothesis 2

Long-term outcome measures were gathered at research visits to the Friend Family Health Center when infants were 4, 12, and 24 months of age. Additional information was gathered from breastfeeding mothers through telephone contacts at one, two, and three months postpartum.

Maternal well-being. The Center for Epidemiologic Studies-Depression Scale (CES-D) was administered to assess symptoms associated with depression (Radloff, 1977). The CES-D is a short (20-item) widely-used self-report scale designed for the general population which assesses symptoms experienced in the previous week on 4-point Likert scales. In validation studies with adolescents, CES-D scores were highly correlated with concurrent clinical depression (Lewinsohn, Hops, Roberts, & Seeley, 1992) and alphas for the instrument average around .88 (Aseltine, Gore, & Colten, 1998).

Because symptom check lists only reflect symptoms during the prior week and are not intended to assess whether levels of depression reach clinical significance, following administration of the CES-D, questions from the Diagnostic Interview Schedule (Robins, Helzer, Croughan, & Ratcliff, 1981) designed to assess major depressive disorder were reworded to reflect the postpartum period only (American Psychiatric Association, 1994). These questions included a screening question asking whether during the four months after the birth of the child the mother had ever had a period of two weeks or more when she felt sad, blue, depressed or lost all interest and pleasure in things she usually cared about and enjoyed. For mothers who endorsed the screening question, a series of follow up questions was asked to determine whether diagnostic criteria are met (4 month assessment only).

Parenting stress. The child measures from the short version of the Parenting Stress Inventory (PSI) were used to assess the mother's perception of the child as "difficult" (Abidin, 1983). The PSI has been used with families from a broad socioeconomic range. Extensive validity data are available on the long form of the instrument, including its relation to measures of parenting behavior and its sensitivity to intervention effects. The six subscales for the child include measures of the child's adaptability, acceptability, demandingness, mood, distractibility/hyperactivity, and reinforcement of the parent. Alphas range from .62 (demandingness) to .70 (reinforces parent).

Parenting efficacy. A major goal of the Chicago Doula Project is to support young mothers in feeling competent and confident in handling the tasks of parenting. Previous research has shown that parents who feel a low sense of efficacy and control specifically related to parenting have difficulties in

interaction with their children (Bugental & Shennum, 1984). To assess mothers' sense of competence and efficacy in parenting, we used the Maternal Self-Efficacy Scale developed by Teti and Gelfand (Teti & Gelfand, 1991) for use with mothers of young infants. This domain specific scale address maternal efficacy in relation to specific domains of infant care such as soothing the baby, understanding what the baby wants, getting the baby to understand mother's wishes, maintaining joint attention and interaction with the baby, amusing the baby, knowing what the baby enjoys, disengaging from the baby, performing daily routine childcare tasks, and getting the baby to show off for visitors. In the authors' work the scale has had good internal scale consistency ($\alpha = .79 - .86$) and has been related to observed maternal behavior as well as maternal risk factors such as depression.

Parent beliefs and behavior. We assessed parents' beliefs and behavior through questionnaires and videotaped observation.

Adult-Adolescent Parenting Inventory (AAPI) is a questionnaire designed to assess parenting attitudes and childrearing practices endorsed by young parents (Bavolek, 1984). The AAPI was originally developed to be sensitive to the parenting and childrearing practices and beliefs of abusive parents. The AAPI consists of 32 items; the respondents indicate agreement with the item on a 5 point scale ranging from strongly agree to strongly disagree. The AAPI has four subscales assessing appropriateness of developmental expectations of children, empathetic awareness of children's needs, use of corporal punishment, and the reversal of parent-child roles. Bavolek reports that internal consistency coefficients for the four constructs range from .75 to .86.

The Parent-Child Observation Guide (PCOG) was used to code parent-child interaction from the videotapes (Bernstein, Percansky, & Hans, 1987). For the proposed research, videotapes of parent-child interaction were made at 4, 12, and 24 months in a playroom setting at the Friend Family Health Center. At each of the ages, dyads were taped while the mother undressed, weighed, and redressed the infant; showed her baby how to play with an age-appropriate toy/book, and engaged in free play. At the 24 month assessment, the mother was also asked to have the child help put the toys away. The full videotaping protocol was designed to take approximately twenty minutes. Typically, videotaping was done at the beginning of the research visit, unless the child was tired and needed a nap, in which case interviews with the mother were to be conducted first. The protocol was administered flexibly to take into consideration children's needs for rest, warm-up, diapering, and snacks. The PCOG coding instrument is a 45-item scale developed in close collaboration with an ethnically diverse group of paraprofessional home visitors at early intervention programs for adolescent mothers in Chicago. When used as a research tool, the maternal sensitive responsiveness scale has been correlated with toddler social competence (Bernstein & Hans, 1994) and has been effective at predicting child behavior problems up to eight years later (Wakschlag & Hans, 1999). The PCOG is coded into two parent strengths scales -- sensitive responsiveness, encouragement/guidance, and a parent negativity scale. Internal reliabilities of the subscales range from .70 to .80. The videotape coders were blind to information about parents' histories or group assignments and were trained to greater than 80% reliability with Dr. Bernstein, one of the co-investigators and a developer of the instrument. The two raters each rated the first twenty tapes in the sample and every fifth tape after that, conferring after these reliability tapes. Inter-rater agreement was greater than 80%.

Feeding practices. At each follow-up visit mothers were asked a series of questions about their infant feeding practices, including breastfeeding if applicable; frequencies and amounts of formula, cow's milk, water, juice or other liquids child received; and consumption of solid foods. In addition, mothers were asked whether they fed their children on demand or according to a schedule. For feeding practices that differ from recommendations made by the American Academy of Pediatrics (e.g., introduction of solid

foods before 4 months, introduction of cow's milks before 12 months), mothers were asked why they made their decisions and who influenced them to make their decisions.

Health care utilization. Through the follow-up interviews, and checks within the University of Chicago medical information system and other providers, we gathered information on utilization of health-care services within the University of Chicago system, and utilization of services at other facilities. We tracked whether infants receive well-child care and immunization at recommended times, and whether families utilized clinics or emergency room care for acute illnesses.

Child health and development. In order to determine whether there were long-term effects of the doula intervention on children's development, our assessments examined child social interaction with the mother, child competence in communication, and early child behavior problems.

The PCOG (see above under maternal responsiveness) was used to assess the child's social interaction with the mother at 4, 12, and 24 months of age. The primary child scale generated from the PCOG evaluated child social engagement with the mother and the toddler version included measures of the child's compliance/assertion and problematic interactive behaviors. The social engagement measure has been related in previous research to other measures of infant social competence, including the Strange Situation (Bernstein & Hans, 1994; Hans, Ray, Halpern, & Bernstein, 1996).

The brief version of the Infant-Toddler Social and Emotional Assessment (ITSEA) (Carter, Little, Briggs-Gowan, & Kogan, 1999) is a standard mother-report instrument for assessment of behavior problems in toddlers. The instrument yields normed scale scores for internalizing and externalizing behavior problems which have been related to laboratory observations of task mastery, emotion regulation, coping behaviors and attachment status. In the present study, mothers answered the ITSEA questions when their children were twelve and twenty-four months.

The Mullen Scales of Early Learning (Mullen, 1995) was administered at twenty-four months to obtain an assessment of child developmental functioning. The Mullen was chosen because it is a standardized assessment specifically designed to measure specific cognitive abilities independently rather than rely on a composite index of mental development. The Mullen was developed for use with children from birth to 68 months and yields t-scores and age equivalents in five domains: gross motor, fine motor, visual reception, expressive language and receptive language. The Mullen was standardized on a nationally representative sample and psychometric properties are sound.

Although we believe the sample is not large enough to test hypotheses regarding effects of doula support on child health, we are gathering information from mothers concerning children's respiratory infections, asthma, diarrheal infections, otitis media, accidents and injuries, and other major illnesses. Charts have been abstracted for children receiving their pediatric care through the University of Chicago Hospital and the Friend Family Health Center.

Background Variables as Moderators: Hypothesis 3

During the baseline interview conducted prior to randomization, the mother was interviewed and assessed on a variety of background characteristics including maternal demographics, personal psychological resources, past and present social support network, and health practices during pregnancy. These background variables were used to 1) to check on success of randomization, 2) to get pre-intervention assessments of key outcome measures from which to assess change, 3) to collect data on factors other than intervention that might explain outcomes, 4) to gather data on variables that might moderate the effects of program outcomes as stated in Hypothesis 3. Instruments used to collect data for potential

moderating factors focused on 1) mothers' personal psychological resources / characteristics, and 2) mothers' interpersonal networks. All of these assessments were made prenatally and were updated at each long-term follow-up assessment.

Mother personal psychological resources. Mother's verbal abilities were estimated using the Peabody Picture Vocabulary Test – Third Edition (PPVT), which is a widely used and in its revised form has attempted to be sensitive to issues of cultural bias. In exploring the role of intelligence as a potential moderator of the intervention we considered both uncorrected scores as well as age-corrected scaled scores.

Questions regarding delinquent and antisocial behavior were selected from the National Longitudinal Survey of Youth Survey to address mother's involvement during the prior year in delinquent/criminal behavior (including contacts with the juvenile or adult justice system), history of risky sexual activity, use of substances, and experience of victimization (Card, 1993; Chase-Lansdale, Mott, Brooks-Gunn, & Phillips, 1991; Windle, 1990).

To measure locus of control, the Pearlin Mastery Scale was used (Pearlin, Menaghan, Lieberman, & Mullan, 1981). This brief (7-item) instrument is widely used and has well-documented psychometric properties.

To measure mother's psychological readiness for parenting, questions related to mothers' worries, self confidence, body image, feelings about children, and denial were asked from the Childbearing Attitudes Questionnaire (Ruble et al., 1990). Additional questions were asked to determine the teenager's previous experience in caring for children (Deutsch, Ruble, Fleming, Brooks-Gunn, & Stangor, 1988).

Mother relationships with family, partner, and peers. The mother's history of her relationships with her caregivers during childhood was assessed using the Rohner Parental Acceptance Rejection Questionnaire (Rohner, 1980). This instrument assesses three aspects of the respondent's views of their childhood relationships with caregivers: acceptance, rejection, and physical punishment. The instrument has good psychometric characteristics and has been used with urban minority populations (McGuire & Earls, 1993).

Aspects of the mothers' general orientation to relationships was assessed by The Relationship Orientation Inventory (also known as the Adult Attachment Style Scale), a 13-item 7-point Likert format scale (sample item: "I find it difficult to trust others completely.") (Simpson, Rholes, & Nelligan, 1992). Although the scale was originally developed to assess orientation toward romantic relationships, it can with minor revision be used to refer more generally to relationships with members of a support network. Cronbach's alphas range from .58 to .81 for the subscales.

Quality of the mothers' attachments toward specific people such as their own mothers and their babies' fathers was assessed using the Inventory of Parent and Peer Attachment (Armsden & Greenberg, 1987). This instrument was designed to assess adolescents' security with varied attachment figures, including peers. It includes a series of items addressing the respondent's trust that attachment figures understand and respect her needs and desires, and perceptions that attachment figures are sensitive and responsive to her emotional states and helpful with concerns. The instrument has three subscales: trust, communication, and alienation that have adequate psychometric properties and have been related in previous research to measures of adolescent well-being (Crowell, Fraley, & Shaver, 1999).

Questions were asked to determine the mother's living arrangements and in particular whether she resides with her own mother and/or her baby's father.

Supportive as well as stressful aspects of the mother's current relationship with her own family and her baby's father were assessed using questions developed for a survey of unmarried African American parents in Chicago (Hans et al., 1996). These questions include a modified version of the Conflict Tactics Scale (Straus, 1979), a standard assessment of domestic violence on which extensive reliability and validity data are available, that was shortened for use in the Early Childhood Longitudinal study (ECLS) program sponsored by the National Center for Education Statistics of the U.S. Department of Education. Questions also included a shortened version of the Arizona Social Support Scale (Barrera, 1981), a tool developed for assessing support networks in pregnant and parenting adolescents. In addition, questions were asked of mothers still living with their own families regarding negotiation of decisions and issues of autonomy (Kalil, Spencer, Spieker, & Gilchrist, 1998; Lamborn, Dornbusch, & Steinberg, 1996).

Questions were developed to determine whether the mother's own mother breastfed her children and whether the mother has others in her social network who breastfeed. Questions were developed to determine the mother's perception of her mother's and her baby's father's attitudes toward breastfeeding and other feeding practices.

Implementation of Intervention: Hypothesis 4

This study had two levels of data collection, with uniform quantitative data collected on all participating families, and in-depth qualitative data collected on a subset of cases. On the quantitative level, doulas tracked the amount, type, and quality of contact that they had with families on client contact sheets. This record-keeping system allowed researchers to determine the amount and frequency of contacts doulas had with mothers and with other family members. The content of the contacts (in other words, what doulas actually do with families) for the prenatal period, labor and delivery, and the postnatal period was also recorded by doulas using a checklist. Doulas used five-point scales to rate the emotional engagement of mothers and others family members on a visit-by-visit basis as well as mothers' understanding of session and conflict/tension during the session. These scales are modifications of those developed for nurse and paraprofessional home visitors (Korfmacher et al., 1999). Drafts of the client contact sheets were developed during the pilot phase of work.

Periodically, doulas also filled out the 12-item version of the Working Alliance Inventory (Horvath & Greenberg, 1989), a summary measure of helping relationships that exists in comparable provider and client versions. In outcome assessments, mothers rated the quality of the relationship with their doula using the client version of the WAI, as well as a relationship inventory developed for nurse home-visiting (Barnard, 1998), and also used with paraprofessional programs (Korfmacher et al., 1999). This enabled researchers to compare the doula's perspective with the mother's perceptions of the emotional qualities of the intervention.

On the qualitative level, a subset of cases were selected, where doulas and mothers were interviewed in a semi-structured format about the developing helping relationship. These interviews covered each party's subjective impression of the relationship formation, the doula's interaction style with the family, intervention content, the influence of the extended family, and how critical or difficult moments were handled. Two interviews were conducted per participant, one at the beginning of the alliance (before the birth of the child), and the second within one month of the mother's exit from the program. The interviews were audio-recorded and transcribed for later review and coding.

Between two to four families were selected from each doula's caseload, split between the first year and second year of program services. Intake data, specifically scores on The Relationship Orientation Inventory (Simpson et al., 1992), were used to select mothers at higher or lower risk for difficulties in

interpersonal relationships in order to compare mothers who were strongly engaged with their doula to those teen's with more ambivalent doula relationships. Using these selection criteria we were able to purposefully sample certain families who were likely to contrast each other in terms of issues of program implementation and service (Patton, 1987).

E. Data Analysis

Analysis of quantitative data. All interview, chart, and videotape coding data are stored in a password-protected, HIPAA compliant, ACCESS relational data base. From this data base, files can be derived for use in a variety of statistical software packages. Research staff are currently using SPSS, SYSTAT, STATA, and AMOS software. Data through 12 months have all been entered into the data base. Data entry for the 24 month follow up is ongoing. Data cleaning is ongoing for 12 and 24 month data sets.

Although hypotheses will eventually be tested with a variety of multivariate statistical techniques, including, as appropriate, multivariate logistic and multinomial regression, hierarchical linear modeling, structural equation modeling, and survival analysis, preliminary findings in this report are presented using simple univariate statistics such as chi square, t-tests, that allow for straightforward testing of differences between the two groups.

Analysis of qualitative implementation data. Content analysis is being used to identify recurrent themes and patterns in the interview narratives. Regular themes lead to an inductive classification system that will classify families based upon their experiences. These classifications are "analyst-constructed typologies" developed by coders in successive passes over the transcribed interviews. Credibility checks are being performed by alternate coders to ensure that there is consistency in interpreting the data.

IV. Presentation of Findings (detailed)

Labor, Delivery and Birth Outcomes

237 infants were delivered at the hospital associated with the research study, and 10 at varied other community hospitals. One mother was lost to followup before the birth, and it is not known where she delivered. Deliveries at these hospitals were usually the result of a mother who was not at her own home when labor started or who called an ambulance that transported her to the nearest hospital.

At the hospital where the study was based, mothers were routinely given an intravenous line at admission and infants are monitored continuously during labor. Although the hospital had birthing rooms, most of the mothers in this study were assigned to small labor rooms. All these factors limited doulas' ability to encourage mothers to walk during labor. When mothers reached four centimeters dilation, medical staff typically offered or encouraged epidural anesthesia for relief of pain unless it was medically counter-indicated.

Up to two family members or friends were allowed to be present in the labor rooms at any one time, and most women had family members or friends present with them at birth. Only 11 had no family member or friend with them in the hospital. Most infants were delivered by residents or attending physicians with whom the mother had not had prior contact.

Information was abstracted from each mother's medical chart by an experienced nurse working as a research assistant. Because the charts did not contain information about the presence of the doula, she

was blind to which group the mother was in. In addition to examining single obstetric outcome variables, Höbel scores for prenatal, labor, and newborn complications were calculated to give an overall level of obstetric risk. The groups did not differ with respect to prenatal complications or gestational age at the time of delivery. The average Höbel pregnancy complication score was greater than 10, suggesting an average of two complications before the onset of labor. Although at the time we began the study, we had intended, as in previous doula studies to only include obstetrically and medically low-risk mothers. Early during the implementation of the study we realized that many of the mothers we randomized developed complications after randomization, and we decided not to exclude mothers who had complications at the time of recruitment. Thus the sample included mothers with hypertension, sickle cell, diabetes, seizure disorder, and asthma. Ten of the births occurred when the infants were less than 34 weeks gestation (5 in each of the two groups).

Based on previous doula studies we hypothesized that mothers would use and need less medical intervention during labor (oxytocin and epidural anesthesia), that labors would be shorter, and that there would be fewer surgical deliveries. In the present study, it was difficult to assess duration of labor. Previous doula studies only included women who were admitted to the hospital in early labor. The mothers in our study arrived at the hospital in late labor, early labor, and prior to the beginning of labor. Medical charting for variables related to onset of labor was erratic. The length of labor variable below excluded mothers whose charts were missing relevant data, whose labors were induced, and for whom attempts were being made to slow preterm labor.

None of the labor and delivery variables showed statistically significant differences between the two groups, although there was a strong trend for women in the doula group to use less epidural anesthesia than comparison group women.

Table: Comparison of intervention and control groups on obstetric procedures and outcomes

		Control Group	n	Doula Group	n	Statistical significance
<i>Labor procedures and events</i>						
Artificial oxytocin used in induction	n (%)	30 (24.2%)	124	26 (21.1%)	123	NS
Artificial oxytocin used as enhancement	n (%)	63 (50.8%)	124	68 (55.3%)	123	NS
Epidural anesthesia	n (%)	94 (76.4%)	123	82 (67.2%)	122	NS
Epidural anesthesia –Caesareans excluded	n (%)	75 (75%)	100	64 (64%)	100	X ² (1)=2.85 , p=.09
Any analgesia/anesthesia	n (%)	112 (91.1%)	123	105 (86.1%)	122	NS
Length of labor total	M (SD)	13.8 (11.2)	85	13.9 (9.3)	86	NS
Length of labor (in hospital)	M (SD)	9.2 (9.7)	85	8.7 (5.7)	87	NS
Höbel labor complication score	M (SD)	22.8 (15.3)	121	23.3 (16.1)	121	NS
<i>Birth type</i>			124		123	NS
Unassisted vaginal	n (%)	92 (74.2%)		84 (68.3%)		
Assisted vaginal (forceps or vacuum extraction)	n (%)	9 (7.3%)		17 (13.8%)		
Unscheduled Caesarean	n (%)	17 (13.7%)		17 (13.8%)		
Scheduled Caesarean	n (%)	6 (4.8%)		5 (4.1%)		

Although we had not had specific hypotheses about infant outcomes at birth, the table below shows data indicating that there were no differences between the two groups with respect to infant health at the time of birth.

Table: Newborn outcomes

		Control Group	n	Doula Group	n	Statistical significance
Fetal heart tones	n (%)	39 (31.5%)	124	34 (27.6%)	123	NS
Live birth	n (%)	123 (99.2%)	124	122 (99.2%)	123	NS
Male infant	n (%)	68 (45.2%)	124	64 (48.0%)	123	NS
Gestational age at delivery in weeks	M (SD)	38.8 (2.1)	124	38.6 (2.5)	123	NS
Birth weight	M (SD)	3083.9 (547.8)	124	3090.7 (653.2)	123	NS
Birth weight < 2500 gm	n (%)	14 (11.3%)	124	14 (11.4%)	123	NS
Birth weight < 1500 gm	n (%)	1 (0.8%)	124	4 (3.3%)	123	NS
Mean 1 minute Apgar	M (SD)	8.0 (1.6)	121	7.9 (1.6)	121	NS
1 minute Apgar < 7	n (%)	15 (12.4%)	121	19 (15.7%)	121	NS
Mean 5 minute Apgar	M (SD)	8.6 (1.2)	121	8.7 (1.0)	121	NS
5 minute Apgar < 7	n (%)	5 (4.1%)	121	2 (1.7%)	121	NS
Resuscitation required	n (%)	25 (20.2%)	124	35 (28.5%)	123	NS
Höbel newborn scale	M (SD)	20.4 (21.8)	121	22.0 (19.9)	121	NS
Baby admitted to NICU	n (%)	38 (31%)	121	30 (25.4%)	118	NS
Days infant hospitalized	M (SD)	4.32 (5.84)	121	4.7 (6.1)	118	NS

The mother's experience of the birth was measured through both a structured instrument assessing her sense of efficacy during the birth and through the open ended "birth stories" which were coded by coders masked to group status on several dimensions, including: difficulty of the labor, efficacy at the birth, feelings of having been supported at the birth, positive feelings toward the infant. Mothers in the doula group were more likely on both the structured instrument and the birth story to receive higher efficacy scores. They were more likely to discuss feelings of having been supported during the birth stories. They did not differ in terms of the difficulty of the birth experience or positive feelings toward the baby. Mothers who had had a doula provided richer narrative depictions of their birth experiences.

Table: Mothers' experience of the birth

		Control Group	n	Doula Group	n	Statistical significance
Labour agency scale	M (SD)	34.3 (6.0)	102	36.5 (6.4)	109	t(209)=2.58, p = .006
Birth story: Difficulty of labor	M (SD)	2.2 (0.8)	120	2.3 (0.8)	120	NS
Birth story: Efficacy during labor	M (SD)	3.1 (0.8)	120	3.3 (0.8)	120	t(238)=1.7, p = .045
Birth story: Support during labor	M (SD)	3.1 (0.9)	120	3.7 (0.9)	120	t(238)=4.9, p < .000
Birth story: Richness of story	M (SD)	3.4 (0.9)	120	3.6 (1.0)	120	t(238)=1.8, p = .04
Birth story: Feel positive about baby	M (SD)	3.6 (0.9)	120	3.7 (0.9)	120	NS

Maternal Well-being

During the post-partum period, maternal well-being was measured as state anxiety. At follow-up, it was measured as depression. The table below provides mothers' mean anxiety and depression scores at these follow-up assessment periods, as well as during the prenatal baseline assessment.

All mothers in the study showed notable declines in depression from the prenatal period through their infants' first birthdays. Prenatally, 50% of the young women had CES-D depressive symptom scores above the level considered clinically significant (≥ 16). 28% had scores above the clinical level postpartum. Prenatal depressive symptoms were correlated with depressive symptoms at four months ($r=.43$). Approximately three quarters of the women who had levels of depressive symptoms above the clinical level at four months had also had clinically significant levels of prenatal depression (27 out of 37).

There were no differences between the two groups with respect to depression, except at twelve months, where the mothers in the doula groups reported fewer depressive symptoms.

Table: Maternal well-being

		Control Group	n	Doula Group	n	Statistical significance
State anxiety (prenatal)						
State anxiety (Day 1)	M (SD)	15.6 (4.8)	117	15.0 (4.4)	119	NS
State anxiety (Day 2)	M (SD)	15.1 (4.9)	116	14.8 (4.6)	107	NS
Depressive symptoms (prenatal)	M (SD)	16.5 (8.9)	124	16.4 (9.3)	124	NS
Depressive symptoms (4 months)	M (SD)	12.0 (9.1)	112	12.1 (9.9)	107	NS
Depressive symptoms (12 months)	M (SD)	12.4 (10.0)	110	9.9 (7.7)	105	t(213)=2.0, p=.02

Parenting Stress

During the newborn period, on the second day, parenting stress was measured by the Neonatal Perception Inventory, a structured questionnaire assessing the mother's perception of how difficult it is to take care of her newborn. At subsequent ages, parenting stress was measured by the Parenting Stress Inventory which included subscales related to perception of child difficulty and mother-infant interaction difficulty.

At twelve months, mothers in the doula group were less likely than other mothers to report difficulties in interaction with their infants.

Table: Parenting stress

		Control Group	n	Doula Group	n	Statistical significance
Newborn: Neonatal Perception Inventory, difficulty caring for baby	M (SD)	14.7 (3.5)	118	15.0 (3.3)	117	NS
Four Months: Parenting Stress Inventory, difficult interaction scale	M (SD)	16.5 (4.0)	113	16.0 (4.5)	108	NS
Four Months: Parenting Stress Inventory, difficult child scale	M (SD)	22.7 (7.0)	113	21.9 (5.9)	108	NS
Twelve Months: Parenting Stress Inventory, difficult interaction scale	M (SD)	17.0 (4.7)	112	16.0 (4.4)	106	t(213)=2.0, p=.02
Twelve Months: Parenting Stress Inventory, difficult child scale	M (SD)	23.9 (6.8)	112	23.5 (6.9)	105	NS

Parenting Efficacy

At the postnatal followup points, mothers were asked to complete the Maternal Self-Efficacy Scale to evaluate their sense of efficacy with respect to parenting. There were no group differences in these measures.

		Control Group	n	Doula Group	n	Statistical significance
4 month parenting efficacy	M (SD)	34.9 (2.6)	113	34.8 (2.7)	108	NS
12 month parenting efficacy	M (SD)	34.7 (2.7)	110	34.7 (2.5)	106	NS

Parenting Attitudes and Behavior

At each assessment, newborn, four months, and twelve months, videotaped observations of mother-child interaction were recorded. Two dimensions were coded: 1) sensitive responsiveness and 2) encouragement and guidance. Sensitive responsiveness is a scale that characterizes child-centered interaction on the part of the parent. It includes items related to careful handling, affection, and recognizing and responding appropriately to the infant's signals during the newborn period. At ages four and 12 months it expands to include a child-centered approach to learning activities such as interacting at

the child's pace, allowing the infant time to explore toys in his/her own way, and joining an activity where the child's attention is directed. Encouragement (Inviting Involvement) is a scale that examines how the parent actively engages with the child. It includes items that examine how the parent tries to get the infant's attention and make eye contact, has a conversation with the infant, and imitating the baby. At 4 and 12 months, it expands to include items such as helping the infant learn to talk, and teaching the child how to play with objects.

Data analysis showed that, with respect to observed behavior, mothers who had a doula showed more encouragement and guidance with their infants at four months than other mothers.

Parenting attitudes were assessed at four months using the Adult-Adolescent Parenting Inventory (AAPI). High scores on this self-report instrument measure undesirable parenting attitudes, including advocacy of corporal punishment, inability to show empathy, role reversal, and inappropriate developmental expectations.

Data analysis showed that, with respect to parenting attitudes, mothers in the doula group were less likely to endorse items suggestive of role reversal (e.g., “Children should know when their parents are tired,” and “Children should offer comfort when their parents are sad.”). Mothers in the doula group were also less likely to have unrealistic developmental expectations for their children (e.g., “Children should be taught to obey their parents at all times,” and “Parents spoil babies by picking them up when they cry”). Both of these variables, in the instruments’ validation sample, were shown to be correlated with child abuse and neglect.

Table: Parenting Attitudes and Behavior

		Control Group	n	Doula Group	n	Statistical significance
<i>Newborn behavior</i>						
PCOG Sensitive responsiveness	M (SD)					NS
PCOG Encouragement guidance	M (SD)					NS
<i>Four months behavior</i>						
PCOG Sensitive responsiveness	M (SD)					NS
PCOG Encouragement guidance	M (SD)					YES
<i>Twelve months behavior</i>						
PCOG Sensitive responsiveness	M (SD)					NS
PCOG Encouragement guidance	M (SD)					NS
<i>Four month attitudes</i>						
Total score	M (SD)	32.4 (5.7)	113	31.1 (5.1)	108	$t(219)=1.9, p=.03$
Corporal punishment	M (SD)	7.8 (2.2)	113	7.6 (2.2)	108	NS
Inability empathy	M (SD)	5.8 (1.8)	113	5.7 (1.6)	108	NS
Role reversal	M (SD)	8.7 (2.4)	113	8.0 (2.4)	108	$t(219)=2.0, p=.03$
Inappropriate developmental expectations	M (SD)	10.2 (2.2)	113	9.8 (2.2)	108	$t(219)=1.4, p=.07$

Feeding Practices

Although extensive data were gathered on feeding and other child-rearing practices, for this report we focus on breastfeeding initiation and duration. Data were derived from mother report and medical charts abstraction.

A minority of young women in the study (35%) indicated that their own mothers had breastfed. However, a majority (61%) indicated that they knew someone personally who had breastfed.

Mothers in the doula group were more likely to initiate breastfeeding than the mothers without the doula intervention. The doula group also had longer durations of breastfeeding. It should be noted, however, that despite the success doulas had to getting mothers to initiate breastfeeding in the hospital, only a minority of mothers breastfeed after leaving the hospital.

Table: Breastfeeding initiation and duration

		Control Group	n	Doula Group	n	Statistical significance
Initiated feeding breast milk	N (%)	61 (49.2%)	124	78 (62.9%)	124	$X^2(1)=4.7, p = .03$
Mean weeks breastfeeding	M (SD)	2.9 (7.1)	121	4.9 (10.0)	118	$t(237) = 1.8, p = .04$
Breastfeed after leaving hospital	N (%)	41 (33.9%)	121	48 (40.7%)	118	NS

Health Care Utilization

Since pediatric chart data abstraction was only recently completed, analyses of pediatric care utilization reported below are limited to mother reports of pediatric visits and immunizations.

There were no differences between the groups in pediatric well baby visits and immunization rates during the first year of life.

Table: Pediatric visits and immunizations

		Control Group	n	Doula Group	n	Statistical significance
At least 3 well baby visits by 4 months	n (%)	68 (60%)	113	72 (69%)	105	NS
Up to date on shots by 4 months	n (%)	79 (70.5%)	112	78 (73.6%)	106	NS
At least 6 well-baby visits by 12 months	n (%)	51 (46.8%)	109	44 (42.3%)	104	NS
Up to date on shots by 12 months	n (%)	77 (73%)	105	70 (70%)	100	NS

Child Development

Developmental assessments of the children are being conducted at twenty-four months and are ongoing.

Child behavior was assessed by maternal report at the twelve-month assessment, using the BITSEA. There were no differences between the two groups in mother perception of child competence or problem behavior.

Table: Child behavior problem and competence

		Control	n	Doula Group	n	Statistical significance
BITSEA problems 12 months	M (SD)	21.8 (9.2)	111	22.3 (8.6)	112	NS
BITSEA competence 12 months	M (SD)	16.1 (3.2)	112	16.1 (2.8)	107	NS

Cortisol Values

Saliva samples were gathered prenatally, on each of the first two postpartum days, and at four months. We had hypothesized that mothers with doula support would show neuroendocrine changes indicative of lower stress. We saw no differences between the two groups with respect to salivary cortisol levels.

Table: Salivary cortisol

Cortisol Values		Control Group	n	Doula Group	n	Statistical significance
Prenatal	M (SD)	5.9 (5.7)	121	5.6 (3.8)	123	NS
Day 1 postpartum	M (SD)	6.0 (7.1)	104	6.5 (7.5)	100	NS
Day 2 postpartum	M (SD)	5.9 (4.9)	109	5.5 (4.6)	105	NS
Four months	M (SD)	6.8 (7.9)	107	5.9 (6.8)	104	NS

There were limited correlations between cortisol levels and some measures related to parenting. Notably, prenatal cortisol levels were positively related to maternal report of fondness for children. These analyses are ongoing.

Analysis of Moderation Effects

We have only begun to explore whether mothers' personal characteristics and social relationships may moderate effects of the doula intervention. For purposes of this report, a set of possible moderating variables measured at the baseline, pre-randomization interview session were included in a principal components analysis. This analysis suggested that there were five dimensions of background characteristics: relationship with primary caregiver, relationship with baby's father, mental health, maturity (age and education), and vocabulary. The variables were standardized. Unit-weighted sums were computed and then dichotomized at the mean. To examine moderation, ANOVAs were computed on parenting behavior and attitudes at 4-months, as well as breastfeeding duration, entering doula group and a dichotomous risk factor in each analysis. Similar logistic regression was computed on breastfeeding initiation. There were no significant interaction effects involving relationship with primary caregiver, relationship with baby's father, and mother mental health.

There were a number of interaction effects involving mother maturity and vocabulary. Specifically, it appears that the intervention was effective with respect to breastfeeding for only the older, better educated mothers and those with high vocabulary test scores. More mature and more verbally skilled mothers who had a doula, were more likely to breastfeed than mature and more verbally skilled mothers without a doula and were more likely to breastfeed than less mature and less verbally skilled mothers who received the intervention.

There was also evidence of moderation with respect to parenting behavior and attitudes. Here the pattern of effects was somewhat different, with effects concentrated in the less mature and less verbal mothers, with the doula intervention appearing to prevent poor parenting in those more vulnerable parents.

Table: Significant moderation effects for breastfeeding and 4-month parenting variables

		n	PCOG: Encouragement and guidance	AAPI: Total problem attitudes		Duration breastfeeding (weeks)		Breastfeeding ever	
Low maturity	Control	60	2.5 (1.9)	***				55%	ns
Low maturity	Doula	48	3.7 (2.0)					58%	
High maturity	Control	48	3.0 (1.8)	ns				41%	**
High maturity	Doula	58	3.1 (2.0)					67%	
Low PPVT	Control	59			33.6 (5.8)	*	3.4 (9.3)	ns	48%
Low PPVT	Doula	53			31.1 (5.6)		2.8 (5.7)		51*
High PPVT	Control	49			31.2 (5.4)	ns	2.2 (4.3)	**	49%
High PPVT	Doula	53			31.0 (4.7)		7.2 (12.8)		76%

Implementation Analyses

Data on program implementation has been collected throughout the study. Sources include:

- Baseline information collected from each mother regarding their motivation for being part of the study;
- Careful tracking of program use for all mothers in the treatment group via doula record-keeping, including the intensity of mother's participation (across home, clinic, hospital, and phone contacts), the mother's emotional engagement during visits, the content or topics covered in visits, and the participation and engagement of other family members;
- Intensive qualitative interviewing with a sub-sample of 12 mothers and their doulas about the quality of the helping relationship, both prenatal and postnatal;
- Wrap-up summaries from doulas regarding each of their client's program involvement;
- Monthly group interviews with doulas, providing details of their duties and activities;
- Retrospective caseload review with each doula at the end of the program, where they reflected

- overall on their entire caseload;
- g. Collecting “birth stories” from each mother immediately after birth that included questions regarding the role and helpfulness of the doula;
 - h. Interviewing mothers as part of the overall study’s follow-up interviews (4, 12, and 24 months postpartum) about their perception of their doula, their satisfaction services received, what aspects of the program were most helpful, and how much they continue to think about their doula after the program is over.

As can be seen, this is a very rich and comprehensive collection of both qualitative and quantitative longitudinal implementation data, from both the perspective of the mother and of the doula. It is certainly the most data ever collected about the inner-workings of a doula program. Analysis of this data will provide crucial context for understanding the outcomes of the participating families.

Preliminary analyses have been conducted with many of these datasets. To date, emphasis has been placed on aggregating and summarizing data from the doula’s recordkeeping system (b & d), and coding and analyzing the qualitative helping relationship interviews (c). Summaries of these analyses are reported below:

Mothers’ participation in the program. Doulas had flexibility in how the program was individualized to each mother, but there was an expectation of weekly contact, preferably in-person. On average, doulas managed weekly contact with the mothers in their caseload, although a considerable proportion of that contact was conducted by phone, which tended to be shorter contacts than in-person home or clinic visits.

Table: Number of Length of Program Contacts: M (SD), n=124

	Home	Clinic	Phone	Other ¹	Total
Prenatal: # Visits	2.49 (2.59)	3.65 (2.77)	5.04 (5.38)	.79 (.98)	11.98 (9.31)
Postnatal: #Visits	3.82 (2.93)	1.50 (1.23)	4.88 (4.50)	1.96 (.90)	12.17 (6.49)
Prenatal: Av. Length (min)	56 (50)	61 (45)	17 (16)	30 (73)	39 (30)
Postnatal: Av. Length (min)	57 (35)	51 (42)	20 (17)	32 (36)	38 (19)

As part of their record-keeping, doulas estimated the percentage of time spent during each visit on the major program areas. During *prenatal* contacts, doulas and mothers spent the greatest proportion of their time covering topics related to having a healthy pregnancy (34%), followed by preparing for labor and delivery (24%), support around personal concerns (23%), preparing for parenting and child care (11%), and mother’s own development (7%). During *postnatal* contacts, doulas and mothers spent the greatest proportion of their time covering topics related to parenting and child care (39%), support around personal concerns (30%), the mother’s own development (14%), mother’s postpartum health (12%), and revisiting the birth experience (5%). These numbers are not surprising, with the possible exception that the doulas spent a greater time on health issues prenatally than preparing for labor and delivery.

On average, the program was implemented according to the program’s general guidelines: doulas managed to stay in regular contact with mothers both prenatally and postnatally, and they covered topics important to the program model. Future analyses will focus on specific checklist items that were used in

¹ Includes hospital visits

the record keeping, permitting more detailed report of what topics were covered (e.g., breastfeeding, use of specific comfort measures).

Quality of the helping relationship. In addition, doulas and mothers both reported positive relationships with each other using a standardized measure of the helping relationship (the Working Alliance Inventory) that was adapted for this program. Mothers on average rated the relationship more positively than the doulas did (averaging 3.54 on a 4-point scale, versus 2.65 by doula report). This is not unusual for this measure. Clients often show strong positive bias in their reports, while service providers—who have a larger number of clients and relationships to use as a comparison show greater range in their responses.

Our review of the in-depth qualitative interviews conducted with the doulas and 12 of their clients suggest that doulas and mothers both viewed the relationship in very personal terms: they often noted that the doula was like a member of the family or a close friend. It was not unusual for the mother or the client to use the word “love” when the relationship was particularly strong, as these examples shows:

Doula: “It [labor and delivery] almost made me go against my big rule [to] never cry. And I was just like okay, I just couldn’t believe it and after everything was over she hugged me so tight and she says, ‘I love you.’ And I said, Oh I love you ...”

Mother: “...I’ve been knowing her for the longest and that’s just how we communicate, but she’s just like a friend. We’ve been through like everything, labor was really hard, but she was there for me though. I actually asked if she would be my baby’s godmother. That’s because I feel that close to her now.”

Sometimes, however, doulas could have positive relationships with their clients and still feel as though they did not accomplish what they hoped to. A clear message from the interviews was that doulas took care to treat the mothers with respect and acceptance, a deliberate strategy given their belief that young mothers (especially young, low-income African-American mothers) often do not have the experience of service providers treating them this way. This meant, however, that doulas had to accept that mothers were not always going to follow their advice, as this example shows regarding breastfeeding:

Doula: “She said I’m not going to do it. I said but you haven’t even given it a try. ‘Why should I try something that I know I’m not going to finish?’ And so I tried to go through the whole thing about the baby being healthy. ‘Well I had a bottle and I’m pretty healthy. I know other people that had a bottle and they’re healthy.’ So it was just that constant back and forth...”

Mother: “That’s the only thing we disagreed about...I didn’t do it, I didn’t want to go through it...I was just like hm, hm, hm, hm, hm, hm. I listened to her, and I’m like I’m still not doing it. And you know she finally accepted the fact that this girl has made up her mind”

It is clear from these interviews that the doulas had to be particularly careful in providing support or guidance that may contrast with family beliefs, and we are currently analyzing how the doula’s relationship with the members of the extended family (in particular, the child’s grandmother) impacts the mother’s acceptance of the program.

Predicting differential program participation. Analyses are underway examining how variables related to mother’s motivation (such as her general anxiety or specific fears regarding pregnancy, her

sense of support from family or friends, and her specific interest in the program) relate to her participation and engagement in the program. Our initial analyses suggest that although these baseline variables relate to the quality of the relationship reported by both parties (and especially by the doula), they do not relate to the amount of program contact the mother has. In general, doulas reported stronger alliances with mothers who were older, more educated, showed more mastery, fewer worries, less anxiety, and more general social support. Mothers who reported stronger relationships were older and had more social support. There was no relation between reporting a desire to get support or have a doula and either amount of contact or strength of alliance; however, mothers who came into the study reporting a stronger desire to be paid or get a videotape had less contact with their doula.

Interestingly, doula report of the alliance is strongly associated with amount of contact (both prenatal and postnatal). Client report is associated as well with amount of contact, but less so. We are currently conducting more in-depth analyses to understand why mother baseline characteristics predict the quality of the helping relationship but not program contact, even though the quality of the helping relationship also predicts program contact.

Linking program implementation to client outcomes. These analyses are planned, but have yet to be conducted. In particular, we are interested in examining whether: a) participants at higher risk (using baseline measurements) who do develop a positive relationship with their doula will have better outcomes in feelings of parenting mastery and parenting sensitivity than those who do not, and b) when doulas are unable to resolve conflicts with the client's extended family and support system, whether clients will have less engagement and more negative outcomes.

V. Discussion of Findings

A. Conclusions to be drawn from findings (with reference to supporting data and other studies)

Birth outcomes. Previous randomized trials have shown a variety of positive effects on medical and psychosocial birth outcomes, including notably shorter length of labor, less use of epidural anesthesia, less use of oxytocin to augment labor, and mother experience of labor and delivery (see more thorough review of literature in section II).

The present study, using a greater number and variety of measures than previous studies, found consistent effects of the doula intervention across different measures of maternal experience. Mothers who had a doula reported greater labor agency when responding to a structured questionnaire, used more themes of efficacy in narrating their birth experience, and spoke of feeling more supported during labor and delivery. In doula work, providing support and allowing empowerment are two central goals. There is a fine balance between these two goals – too much of one can undermine the other. Yet, in the present intervention, the program was successful at achieving both goals.

In the present study, there was no evidence that the doulas had an impact on obstetric outcomes such as length of labor, use of oxytocin, or rate of surgical delivery. There was a strong trend for fewer women to elect epidural anesthesia if they had a doula. Although meta-analyses suggest effects of doula intervention on such obstetric outcomes, a close look at the literature, shows that few individual studies have shown consistent patterns of effects across these domains. It is likely that hospital obstetric practice plays a strong role in whether doula effects can be observed. In the present study, aggressive active management of labor was practiced. Mothers were routinely provided intravenous lines and received fetal monitoring. Only those who arrived at the hospital in advanced labor or who signed waivers did not

receive those interventions. Labor augmentation was common. The small size of most labor rooms and nursing procedures usually prohibited mothers from standing or walking during labor. Epidural anesthesia was offered by medical staff with strong encouragement to all mothers in active labor. The doulas in the study often felt frustrated, because many of the best practices they had learned in their training, such as encouraging mothers to walk and explore alternative labor positions, were more often than not impossible to implement. Doula support most typically involved provision of emotional support, advocacy, and physical comfort measures such as massage and back pressure. Given the context of obstetric practice at this hospital, it may not be surprising that the doula intervention had no impact on most obstetric variables. Notably, the one variable on which there seemed to be an effect was use of epidural anesthesia, with mothers in the doula groups tending to use less anesthesia. It is notable that of the obstetric outcomes investigated, anesthesia use is the only one around which mothers are offered a choice, and in this study, they were more likely to choose natural childbirth if they had worked with a doula. There is currently controversy in the obstetrics literature about the consequences of anesthesia use. Natural childbirth advocates often point to literature suggesting that epidural use may result in a slowing of labor that ultimately may increase the risk of surgical delivery (Thorp & Breedlove, 1996), while other studies suggest that the risks of epidural use are minimal (Liu & Sia, 2004). It is also claimed that natural childbirth is associated with a greater experience of maternal efficacy.

Just as doula studies have varied with respect to the hospital environments, they have also varied with respect to the patient populations. Most randomized trials of doula intervention have only worked with extremely low risk pregnancies, typically women who are admitted to hospitals in early labor with no medical or obstetric complications. An exception is an HMO-based study that recruited prenatally and also showed limited obstetric outcomes (Gordon et al., 1999). Our study included a sample of women who were far more representative of a typical urban obstetric practice and who presented in labor. This created a methodologic challenge for measuring labor length, since unlike in prior studies, they were not all enrolled into the study in active early labor. It also may have limited the ability of doulas to have an impact on obstetric outcome when powerful risk factors were affecting the obstetric outcome. Yet, it is important to study the effects of doula intervention in such high-risk populations. Our clinical observation was that mothers who were at higher medical risk were often the ones who were in the greatest emotional distress and had the greatest need for emotional support.

It is also important to note that there is debate in the doula research literature about differential patterns of effects depending on the characteristics of the doula. It has been noted that studies employing nurses and other hospital staff have more limited effectiveness than when doulas are outsiders (Hodnett, 2005). The doulas in the present study fell into an intermediate category. They were employees of the university, but not members of the hospital medical staff. Thus over time they became familiar to many doctors, nurses, and residents, but were never perceived as close insiders. On the other hand, their relationship with hospital staff was rarely, if ever, adversarial, as has sometimes been reported (Hwang, 2004). Physicians and nurses were usually pleased when a doula was present, particularly for very young mothers. They were generally provided full access to the birth setting, although were not allowed in the labor triage room, and depending on who the attending physicians were, sometimes were denied access to surgery rooms. The doulas themselves, as is being documented in our qualitative research, although paraprofessionals, increasingly perceived themselves as professionals (Korfmacher, 2004). In fact it was important to them to seem professional, especially when attending births. In their work they walked a fine line between providing mothers encouragement to consider natural childbirth, supporting mothers in their personal preferences, respecting the opinions of family members, and recognizing the authority of the medical staff. The doulas in this study showed impressive social skills in negotiating these different interests.

Breastfeeding outcomes. As has been the case in previous studies, the doula intervention had clear effects on breastfeeding initiation, even in this population of young African-American mothers who would not typically elect to breastfeed their infants. Sixty-three percent of the mothers in the doula intervention group initiated breastfeeding, compared to less than half of those not receiving the intervention.

The intervention was also successful at increasing breastfeeding duration, compared to the control group. This success, however, must be tempered by the fact that most mothers in the intervention group did not continue to breast feed after leaving the hospital. Virtually none of them breastfed through their infants' first birthdays as is currently recommended by the American Academy of Pediatrics {, 1997 #351}.

As has been documented extensively in the research literature on breastfeeding, there are many challenges to breastfeeding promotion. The women in the present study were from a cultural group that has very low rates of breastfeeding, and most did not have a mother who had breastfed. As our qualitative research is documenting, the doulas struggled to promote breastfeeding with resistant clients in a way that was respectful of clients' wishes and that did not do damage to the relationship between the doula and client. From the clients' perspective, breastfeeding promotion was often a tension in the relationship.

We noted that the challenge in supporting breastfeeding is offering support after mothers are discharged from the hospital. Most mothers need considerable support with breastfeeding during the first couple of weeks postpartum if they are to be successful. Doulas made home visits to offer breastfeeding support in the first few days after births, even though the doulas and their families were still recuperating from the stress of labor and delivery. It was more typical, however, for doulas to have only telephone contact during the first week after the birth, unless the mothers requested that they visit. In fact, doulas often suggested it would be intrusive and culturally inappropriate to make such a visit without an invitation. Moreover, once home, young mothers were often with mothers and other family members who are discouraging of their efforts at breastfeeding. Mothers often report that returning to school and work, as is required by TANF regulations, is the reason for discontinuing breastfeeding. It is notable that the breastfeeding intervention was most successful in the more mature and more verbal mothers. These women may have been better able to understand the public health message about breastfeeding that the doulas were providing. They also may have been better able to overcome the many challenges in establishing breastfeeding and resisting pressure to not breastfeed.

Mental health outcomes. Our data suggest limited impact of the doula intervention on maternal mental health. At least one prior doula study has shown effects of the doula intervention on reducing postpartum depression (Wolman et al., 1993), although the methods for assessing depression in that study were less rigorous than those used in the present investigation. Also the timing of the assessments were different. In the other study depression was measured at one-month postpartum; in our study, at 4 and 12 months postpartum. We also found in the present study that mothers who had the doula intervention experienced less stress than other mothers in their interactions with their infants.

The effects we found on maternal mental health and parenting stress, surprisingly, were at the 12-month assessment – long after the end of the supportive intervention. Such “sleeper” effects must always be viewed with skepticism. We are still considering explanations for this finding, and will be conducting more data analysis in an attempt to understand the finding. Notably, twelve months is a challenging time for many young mothers, a time when infants become increasingly active and demanding. It may be that the doula-supported mothers have been prepared by their doulas to understand and accept the normal developmental challenges of this period.

Notably, the data on maternal depressive symptoms show very high rates for both groups prenatally, that actually drop somewhat in the initial postpartum months and even more by twelve months. Also notably, maternal depression at four months is correlated with prenatal depression ($r=.43$).

Parenting attitudes and behavior. The doula intervention had positive impact on parenting attitudes and behavior at four months, shortly after the intervention ended. Mothers in the doula intervention had more realistic developmental expectations for their children and were less likely to endorse statements suggestive of role reversal. These data suggest that the doulas were successful at educating young mothers about the developmental needs of young infants, especially that babies are in need of nurturing and that the maternal role is to nurture infants (and not the reverse). Doulas spent the greatest proportion of their time postnatally dealing with issues of parenting and childcare, educating mothers about what their babies can do, but also emphasizing that it is normal for infants to cry and to need to be held. Doulas, in working with the young mothers in the study, also spent much effort helping mothers understand their roles as nurturers of their babies, emphasizing that being a mother requires accepting responsibility.

The doula intervention also had a positive impact on parenting behavior at four months, shortly after the intervention ended. We measured two dimensions of parenting behavior: 1) sensitive responsiveness, and 2) encouragement and guidance. Sensitive responsiveness involves parenting behavior such as gentle handling, noticing the child's cues, responding to the child's cues, and following the child's lead. Encouragement and guidance, involves parenting behavior such as smiling and talking to the baby, and actively encouraging the baby's play. One can think of these dimensions as mapping onto two different maternal roles: the mother as nurturer and the mother as teacher. The impact of the doula intervention was on maternal encouragement and guidance. In thinking about why the effects were concentrated on that dimensions we are hypothesizing that it is because the encouragement and guidance variable assesses dimensions of behavior that can be most actively taught and modeling. Our doulas did much of that kind of teaching, encouraging mothers to talk with, read to, and play with their infants. Our doulas often spoke openly about the high value they placed on education. This was reflected in their seeking educational opportunities for themselves, their encouragement of mothers to return to school, and we think, in their encouragement of mothers in childrearing practices that might be promotive of cognitive development.

This is the first study to document the effects of a doula intervention on long-term parenting behavior. One previous abstract reported such an effect, but was never published in full form (Landry, McGrath, Kennell, Martin, & Steelman, 1998).

B. Limitations of the study and suggestions for further research

As is the case with all scientific research, the present study raises new questions and calls for alternative research designs and measures that were not included.

A limitation of the present study was that it investigated the effectiveness of the intervention at only one site, a major teaching hospital. The effects of the intervention, especially with respect to obstetric practice, may not generalize to other practice settings with different practice philosophies.

A limitation of the present study is that it focused exclusively on young, urban, African-American women. While arguably a population at unusually high risk for poor obstetric outcomes and for low rates of breastfeeding, the data only speak to the effectiveness of the intervention for that particular age and cultural group. The expanded doula model used in the present study is being used in Chicago currently for working with Latina women and we know from our communications with those programs, that there are different challenges in working with that group of young mothers (e.g., less challenge around issues of

breastfeeding, but different family structures and different levels of acceptance of health care systems, especially for recent immigrants).

The present study presents very promising data with respect to the potential this model has for impacting parenting. Future studies would want to augment considerably the measures of parenting. Although a strength of the study is that it adopted multiple methods for assessing parenting: structured questionnaires, maternal narratives, and direct observations of videotaped interaction between mother and baby, an important omission was observation of parenting behavior in the home setting.

Although the data with respect to breastfeeding are also encouraging, clearly they fall short of current public health goals. The present model needs to be re-evaluated with respect to how to best encourage breastfeeding during the weeks immediately postpartum. Ideas that would follow from the present research might include, more intensive home visiting might be a solution, better advance education of other family mothers, and better support for nursing mothers who are attending school or at work.

An important limitation of our data is that there is relatively infrequent followup of mothers. We intentionally only gathered data at one point during the intervention (immediately postpartum), so as not to burden families with assessment or bias the intervention. Yet, four months postpartum, may not be the optimal time for assessing maternal postpartum depression.

Finally, although data are encouraging with respect to the intervention, they leave many questions open about why and for whom the intervention works. Our ongoing analyses of implementation data may shed light on some of these issues. However, future studies employing randomized designs might want to consider randomizing to intervention groups that offer service packages that offer different levels of intensity or different types of doula services.

C. Policy and practice implications

The data from this paper suggest continued focus on doula programs as intervention strategy for high-risk mothers.

Obstetric outcomes. If the yardstick for evaluating these programs, is limited to obstetric outcomes, the evidence remains somewhat unclear as to the benefits of doula intervention. Existing data suggest that for obstetrically low risk mothers delivering in hospital settings that do not routinely employ high levels of medical intervention, doulas have positive impacts on labor and delivery outcomes. Our data, suggest a relatively limited impact of such services for populations that include women who are not all at medical low risk and who deliver in hospital settings engaging in active medical management of labor, there may be limited obstetric benefits.

Breastfeeding. Our data suggest that paraprofessionals are effective promoters of breastfeeding, supporting other studies suggesting that paraprofessionals may be even more effective than professional lactation consultants at promoting breastfeeding. These studies suggest that paraprofessional lactation support staff should be more widely hired within prenatal care and hospital birth settings to provide services to mothers. Although our data did not address cost effectiveness issues, paraprofessional lactation support has obvious cost saving advantages. On the other hand, our data also suggest that it remains a challenge to promote long-term breastfeeding in this population, and that paraprofessionals may need specific training in how to sensitively address how breastfeeding fits within family and cultural traditions.

Depressive symptoms. Our data suggest that young mothers are at very high risk for depression, but that depressive symptoms typically emerge during pregnancy, rather than the postpartum period. The data strongly suggest that women should be routinely screened for depressive symptoms, and that such screening may be most effectively done in prenatal care settings.

Parenting. This study provides encouraging data with respect to the role that paraprofessional, community doulas can play in promoting more positive parenting beliefs and behavior. Such effects have obviously public health implications with respect to prevention of child maltreatment. Although more study of this issue is clearly warranted, it is notable that the effects on parenting seemed to wane after the end of the intervention. Sustaining effects on parenting behavior likely requires ongoing intervention to help mothers deal with challenges in their lives as well as the changing developmental needs of their children.

Use of paraprofessionals for early intervention. As was discussed in the literature review and in one of our publications (Hans & Korfmacher, 2002), there is considerable debate in the field of early intervention as to whether preventive, home-based services can be effectively provided by paraprofessionals. The present study suggests that they can. It should be noted, however, that in this program, the paraprofessionals had supports not typically offered by other programs. Salaries were not at minimum wage levels. Doulas were employees who had full medical benefits. Doulas received extensive initial training and regular ongoing training. Supervision was intensive and encouraged reflective practice {Bernstein, 2003 #1744}. Such supports are critical for individuals working with high-risk families, especially those who do not have the advantage of years of professional training with supervision. Doulas also increasingly viewed themselves in a professional role in relation to other staff members, even though their relationships with the mothers in their caseload bore many hallmarks of paraprofessional service provision.

Funding for doula programming. The clearest challenge for programming of this kind relates to funding. Currently doula services are not reimbursable under Medicaid in most states, and there are no incentives for hospitals operating under tight financial constraints, to pay for such services. We have been able to secure ongoing funding for our doula program through aggressive ongoing applications to private foundations and after the randomized trial was completed we received a contract through the Ounce of Prevention Fund to support two of our doulas through state block grant funds. That contract was only possible because of a current state government with progressive views on early intervention and active lobbying to make doula services eligible for such money. Such lobbying required resources, effort, and influence that would not have been possible for any single institution to have mounted.

VI. List of products to date

Papers

Hans, S.L., & Korfmacher, J. (2002). The professional development of paraprofessionals. *Zero to Three*, 23, 4-8.

Behnke, E.F., & Hans, S.L. (2002). Becoming a doula. *Zero to Three*, 23, 9-13.

Presentations

- Hans, S.L. (2002, January). The Chicago Doula Project. Workshop presented at the Children's Health Workshop, The Irving B. Harris Graduate School of Public Policy Studies and Department of Pediatrics, The University of Chicago.
- Hans, S.L. (2002, March). The Chicago Doula Project. Presentation made at the Child Psychiatry Colloquium. Department of Psychiatry, The University of Chicago.
- Bowie, A., Hans, S.L., & Henson, L.G. (2004, March). Relationship characteristics as correlates of depression during adolescents' transition to parenthood. Poster presented at the meetings of the Society for Research on Adolescence. Baltimore, MD.
- Bowie, A., Hans, S.L., & Henson, L.G. (2004, March). Impact of depression on adolescent mothers' parental values and beliefs. Poster presented at the meetings of the World Congress on Women's Mental Health. Washington, DC. Paper featured in June 2004, Psychiatric dispatches, *Primary Psychiatry*, 11, 22-26. Paper featured in May 2004, Clinical updates in neuropsychiatry, *CNS Spectrums: The International Journal of Neuropsychiatric Medicine*, 9, 329-332.
- Korfmacher, J., Humphries, M., & Hans, S. (2004, May). The helping relationship in a doula support program for young mothers and their infants. Poster presented at the meetings of the International Society on Infant Studies. Chicago, IL.
- Korfmacher, J. (2004, May). Evaluating doula support for young women. Plenary session presentation at the Seventeenth Annual Maternal and Child Health Leadership Conference. Chicago, IL.
- Korfmacher, J., Humphries, M., & Hans, S. (2005, April). Predicting parent involvement in a doula support program for young mothers and their infants. Poster presented at the meetings of the Society for Research in Child Development. Atlanta, GA.
- Hans, S. L., & Korfmacher, J. (2005, October). Early findings from the Chicago Doula Project. Papers presented at the conference honoring the opening of "A Doula Story." University of Illinois at Chicago.
- Korfmacher, J. (2005, November). Supporting parents during early childhood. Paper presented at the Johnson & Johnson Pediatric Roundtable: Eating Behaviors of the Young Child. Yountville, CA.
- Thullen, M., Hans, S. L., & Henson, L. G. (2006, January). Giving birth without the support of family and friends: Mothers at psychosocial risk. Poster accepted for presentation at the meetings of the Society for Social Work Research. San Antonio, TX.

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