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Regular Article

Young mother risk-taking moderates doula home visiting impacts on parenting and toddler social-emotional development

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Abstract

This longitudinal randomized controlled trial examined the impact of a doula home visiting intervention for young, low-income mothers on parenting and toddler social-emotional development and tested whether intervention effects were moderated by maternal emotional and behavioral health characteristics. 156 mothers were offered home visits from a home visitor starting in mid-pregnancy through several years postpartum, with a community doula also working with the mother during pregnancy and after the birth. 156 received case management. Interviews, video recordings of mother-child interactions, and toddler assessments were conducted at 3 weeks, 3 months, 13 months, and 30 months of age. Intent-to-treat analyses conducted with the full sample showed some intervention effects. Moderation analyses, however, showed that most effects were concentrated among mothers engaged in high levels of risk-taking (delinquent behaviors, school suspensions, smoking, alcohol use, sexual risk-taking). Among higher risk-taking mothers, the intervention was related to less intrusiveness during early infancy, less psychological and physical aggression during toddlerhood, more sensitive parenting attitudes, and greater toddler social relatedness. Maternal depressive symptoms were only a moderator for toddler behavior problems. These findings suggest that doula home visiting may be a particularly effective model for enhancing sensitive, non-aggressive parenting among young mothers with a history of risk-taking behavior.

Keywords: adolescent mothers; behavior problems; parenting intervention; pregnancy; maternal sensitivity

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Introduction

Early childhood home visiting programs are designed to promote positive parenting and the health and development of parents and young children who are living in poverty or are otherwise at high sociodemographic risk. There has been significant federal investment and spending for home visiting since the passage of the Maternal and Infant Early Childhood Home Visiting (MIECHV) program in 2010 (Patient Protection and Affordable Care Act 42 U.S.C. § 18001 et seq. (2010)), and home visiting programs currently operate in all U.S. states, five US territories and many tribal communities (Denmark et al., 2018). Hundreds of thousands of families in the United States are served annually by home visiting programs.

Home visiting programs utilize a variety of different program models, many of which have created infrastructure that supports training and implementation of their models nationally and internationally (National Home Visiting Resource Center, 2019; U.S. DHHS, 2020). Although there is variation across the most widely utilized home visiting models, there are many commonalities in conceptualization and practice. Across models, these service providers work with families in their homes to provide information, support, screening, and referrals. Most models emphasize the importance of trust and relationship building between families and home visitors and the importance of respecting family strengths and cultural values. In most models, services begin during pregnancy or shortly after a child's birth and continue in some form until children are ready to enter school. In some models, home visitors may be professionals (such as nurses or teachers), but in many they are well-trained paraprofessionals. Although early childhood home visiting models vary in their primary goals – for example, maternal and child health promotion, school readiness, prevention of child maltreatment – most of the most widely disseminated models are complex and target a wide variety of child, parent, and family outcomes.

The agencies partnering with the investigators in this study use two of the more widely disseminated early childhood home visiting models – Healthy Families America (HFA) ("Healthy Families America," 2019) and Parents as Teachers (PAT) ("Parents as Teachers," 2021). These models both rely on paraprofessional home visitors to provide multi-year services that begin during pregnancy or the first months after the birth. Both models emphasize helping parents understand children's development, supporting parent-child relationships, and promoting nurturing, child-centered parenting approaches. HFA was originally established with the primary goal of preventing child maltreatment among families at greatest risk, and the program's theoretical framework emphasizes the importance of building nurturing early parent-child relationships. Program activities include screening for family risk and assessment of parent-child interactions. PAT was originally established with a primary goal of promoting children's

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school readiness among families from a broad range of socioeconomic backgrounds, with a theoretical framework that emphasizes parent efficacy and parents' important roles in promoting their children's development. Program activities include screening for developmental delays and a curriculum for parents to encourage children's early learning.

A large literature exists on the efficacy and effectiveness of early childhood home visiting programs (Paulsell & Avellar, 2011). Although hundreds of studies have documented positive impacts on a host of different child, parent, and family outcomes, findings are inconsistent across studies, the average size of effects across studies is modest (Supplee & Duggan, 2019), and the size of effects in a recently completed national study is small (Michalopoulos et al., 2019). Of particular concern is that positive impacts observed in studies of smaller demonstration projects with close ties to university researchers, are often not observable when models are taken to scale such as in statewide policy initiatives (Supplee et al., 2021).

Outcome evaluations of home visiting programs have examined a large number of important outcomes during the early years of life including, but not limited to, birth outcomes, maternal substance use, maternal mental health, child accidents and injuries, parent reading to children, breastfeeding, maternal depression, family violence, parent education and employment, and child cognitive development. Of most interest to the field of developmental psychopathology are outcomes related to early socioemotional development, parent-infant relationships, and parent sensitivity and use of nurturing child rearing practices. Multiple studies suggest that home visiting services can enhance positive parenting behavior, including sensitive and responsive behaviors during mother-infant interactions, sensitive parenting attitudes, and less punitive discipline tactics (Barnet et al., 2007; Casillas et al., 2016). Filene et al., 2013; McDonald Culp et al., 2004; McKelvey et al., 2012; Olds et al., 1986; Sweet & Applebaum, 2005). Some reports on the HFA model, as taken to scale in statewide systems, have found positive impacts on the quality of the nurturing environment provided by the parent for the infant (LeCroy & Lopez, 2018; LeCroy & Kryznik, 2011) and reductions in parents perception of child as difficult (Jacobs et al., 2016), but most evaluations of HFA programs being implemented to scale have shown no impact on characteristics of the mother-infant relationship or home environment (e.g., Caldera et al., 2007; Duggan et al., 2004; Landsverk et al., 2002). Similarly, evaluations of PAT programs brought to scale for low-income families have shown scattered findings related to parent beliefs about child development and parenting efficacy, but no consistent positive effects on mother-infant interaction or aspects of the home environment supportive of socioemotional development (Wagner & Clayton, 1999; Wagner et al., 2002).

Although effects of home visiting on young children's social-emotional and behavioral development have been less often reported, a few studies have shown positive impacts on socioemotional outcomes or impacts only for subgroups (Lorber et al., 2019; Ordway et al., 2014). One evaluation of a statewide HFA program found program effects in reducing internalizing and externalizing problem behaviors (Caldera et al., 2007), and one study of a multisite evaluation of PAT reported effects in low-income children's adaptive social skills (Wagner et al., 2002). Other studies of the HFA and PAT programs taken to scale find no impact on measures of young children's socioemotional development (Landsverk et al., 2002).

Parenting among young mothers

Adolescent and young mothers often face significant social, economic, and personal challenges as they make the transition to parenthood. Many pregnant and parenting teens grow up in the context of poverty, systemic racism, stigma, low quality education and neighborhood violence (Mollborn, 2017; SmithBattle, 2013) which, in addition to their age, can compromise their parenting and their children's development. Compared to older mothers, young mothers tend to express less empathy for young children (Baranowski et al., 1990), show more intrusiveness and disengagement with their infants (Berlin et al., 2002), respond less sensitively to their infants' cues (Firk et al., 2018), endorse more punitive parenting practices (Reis, 1989) and are harsher with their children (Lee & Guterman, 2010). Children of adolescent mothers are at greater risk for poor cognitive, social-emotional and health outcomes when compared to children of older mothers (Mollborn & Dennis, 2012). Given these risks and the challenges associated with the transition to parenthood, young mothers are often a target population for intervention and support during pregnancy and in the early years of parenting.

Doula home visiting intervention for young mothers

In order to increase the effectiveness of home visiting programs, many program models allow for local organizations to create enhancements to core program models. The community doula model is a home visiting program enhancement that was created to provide greater focus on issues of health and parental bonding during pregnancy and the postpartum than is typical within home visiting models. Community doulas have been integrated into widely utilized home visiting programs throughout the state of Illinois, particularly in home visiting programs specializing in work with young mothers (Abramson et al., 2006; Glink, 1999). A community doula is a paraprofessional health educator who provides young pregnant women with information and support throughout pregnancy, during childbirth, and in the first postpartum weeks. Community doulas are women from the communities and many share similar life experiences and identities as the young mothers they serve. They receive doula training and ongoing reflective supervision. In the doula home visiting model, community doulas are paired with traditional home visitors to offer mothers an integrated, team approach to services.

Starting in mid-pregnancy, young women are offered weekly home visits from their doula, home visitor or both together. The doula brings specialized expertise to the home visiting team on pregnancy health, mother-fetal bonding, preparations for labor and delivery, and breastfeeding, in addition to newborn care and safety, newborn development, and helping the mother observe and respond effectively to their newborn infant's cues. The doula aims to develop an intimate, trusting, nurturing relationship with the young mother, is available to her 24 hours a day, and the relationship has been described as "mothering the mother" (Klaus et al., 1993). The doula provides education on pregnancy, stages of labor, and different medical interventions that may be offered during childbirth. She offers to attend prenatal appointments, and builds mother's self-efficacy and helps the mother advocate for herself with medical staff. The doula is with the young woman at the hospital throughout labor and delivery to provide physical and emotional comfort and encouragement, and to support the mother during her first interactions with her newborn. Home visits from the doula continue through six weeks postpartum.

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The home visitor is focused on the developing relationship between mother and infant, but also on the child's development and milestones and the mother's personal development, including mental health, plans for education and employment, and important relationships. She provides referrals for additional services (e.g., mental health, childcare, housing) as needed. Visits from the home visitor increase after the birth and are offered through the first several years of the child's life. The mother is also encouraged to attend prenatal and parenting classes at the program led by the doulas and home visitors.

Two primary goals of the doula home visiting intervention, and the focus of the current study, are to encourage sensitive parenting and promote child social-emotional development. The doulas use the Community Based Family Administered Neonatal Activities (Cardone et al., 2008), a structured set of activities intended to help the mothers observe and elicit their infant's behaviors and capabilities, both in utero and after the birth, and foster a nurturing relationship with their infant. The home visitors help mothers to recognize and respond to their infant's cues and engage them in mother-infant activities that are enjoyable and promote the infant's development. A core tenet of this intervention is the parallel process. The doula and home visitor work to develop close, supportive, trusting relationships with the young mother, which ideally serve as models as the mother begins to develop a relationship with her child (Ounce of Prevention, 2005). Previous research on a short-term community doula intervention showed positive effects on sensitive parenting among high-risk adolescent mothers (Hans et al., 2013).

Moderators of home visiting effectiveness

After decades of research, there is motivation to advance the science of home visiting more efficiently through research in precision home visiting (Supplee & Duggan, 2019). Precision home visiting aims to develop more effective interventions, in part, by identifying meaningful subgroups of families (with attention to their social contexts) who benefit in specific ways from an intervention (Supplee & Duggan, 2019). Prior research suggests that maternal psychological and behavioral characteristics may be important moderators of home visiting effectiveness across a variety of program models (e.g., Cluxton-Keller et al., 2014; Easterbrooks et al., 2013; Olds et al., 2004). Therefore, the current study aims to identify whether the doula home visiting model is differentially effective for mothers with varying levels of depressive symptoms and risk-taking – two behavioral health characteristics that are prevalent among young mothers (Cassidy et al., 1996) and are known to compromise sensitive parenting and child social-emotional development.

Maternal depression

Maternal depression is common during pregnancy and in the early postpartum (O'Hara & Wisner, 2014), and pregnant and parenting adolescents may be at especially high risk of experiencing depressive symptoms (Easterbrooks et al., 2016; Edwards et al., 2012). Additionally, because most home visiting programs target marginalized families experiencing sociodemographic adversities, levels of maternal depression are typically high among participants. A review of the home visiting literature showed that rates of clinical levels of depressive symptoms ranged from a quarter to over half of mothers at the start of services (Ammerman et al., 2010).

Maternal depression is known to interfere with the formation of a healthy mother-infant relationship. Mothers experiencing depression are more likely to withdraw while interacting with their infant, struggle to respond appropriately to their infant's attempts at communication, and in some cases, become intrusive and overly directive (Field, 2010). Infants of mothers with perinatal depression display more negative affect and have difficulty regulating their emotions compared to infants of non-depressed mothers (Field, 2011), and are at risk of developing both internalizing and externalizing behavior problems during early childhood (Stein et al., 2014).

Findings on the effects of home visiting services on parenting and child development for mothers experiencing depression have been mixed (Ammerman et al., 2010). Some studies have shown that home visiting programs are effective in reducing rates of child maltreatment (Easterbrooks et al., 2013) and attitudes supporting corporal punishment only among mothers with low depressive symptoms, while others have shown that home visiting reduces child maltreatment and hostile parenting (DuMont et al., 2008; Robinson & Emde, 2004) and improves child developmental outcomes (Administration on Children, Youth and Families, 2002; Cluxton-Keller et al., 2014) for mothers with high levels of depressive symptoms.

Maternal risk-taking

Adolescent risk-taking behaviors, such as delinquent activity, early and unsafe sexual activity, and substance use, frequently co-occur (Biglan et al., 2004; Mustanski et al., 2013) and are more prevalent among socially marginalized populations (Brindis et al., 2003). Early conduct problems and adolescent risk-taking are associated with an increased likelihood of teenage pregnancy, and young mothers often have a history of involvement in multiple risky activities (Scaramella et al., 1998; Woodward & Fergusson, 1999; Zoccolillo et al., 2005). Some risk behaviors, including alcohol use and smoking, are known to be elevated among home visiting participants (Azzi-Lessing, 2013; Duggan et al., 2018; Michalopoulos et al., 2015). Less is known about rates of delinquency, externalizing behaviors, school suspensions or sexual risk-taking among participants, perhaps in part because few home visiting studies focus exclusively on young mothers.

As with depression, mother risk-taking is associated with problematic parenting and child behavior problems. Substantial links have been found between mother behavior problems during childhood and adolescence and their children's behavior problems from infancy through middle childhood (Raudino et al., 2013, Schentag Trella et al., 2013; van der Molen et al., 2011) with several studies demonstrating that these connections are at least partly mediated by parenting behaviors such as low maternal warmth, negative and over-reactive discipline, and low levels of responsiveness (Cassidy et al., 1996; Raudino et al., 2013; van der Molen et al., 2011). Substance use is also associated with lower maternal sensitivity and an increased risk for child maltreatment (Hatzis et al., 2017; Smith et al, 2007).

To our knowledge, with the exception of substance use, home visiting research has not examined mother risk-taking as a moderator of intervention effectiveness. In a study of American Indian adolescent mothers, there were greater home visiting effects on child behavioral outcomes for mothers with a history of alcohol or marijuana use (Haroz et al., 2019), and a study of South African mothers showed that a home visiting intervention reduced the negative effect of problem drinking on later child aggression (Rotheram-Borus et al., 2019).

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Table 1. Descriptive statistics for doula home visiting (HV) intervention group and case management control group at study enrollment (pregnancy)

	Case Management ($n = 156$)	Doula HV ($n = 156$)
Maternal age (years)	$M = 18.3$ (SD = 1.6)	$M = 18.5$ (SD = 2.0)
Race/ethnicity		
Black/African American	$n = 72$ (46.2%)	$n = 68$ (43.6%)
Latina (Mexican origin)	$n = 56$ (35.9%)	$n = 61$ (39.1%)
White/European American	$n = 13$ (8.3%)	$n = 13$ (8.3%)
Multi-ethnic/other	$n = 15$ (9.6%)	$n = 14$ (9.0%)
Educational attainment		
Less than high school	$n = 95$ (60.9%)	$n = 96$ (61.5%)
High school diploma or GED	$n = 50$ (32.1%)	$n = 47$ (40.1%)
Some college	$n = 11$ (7.1%)	$n = 13$ (8.3%)
Public insurance (n = 305)	$n = 138$ (90.8%)	$n = 140$ (91.5%)
Partner relationship with father of baby (married, engaged, couple)	$n = 107$ (68.6%)	$n = 131$ (72.4%)
Lives with parent figure[a]	$n = 100$ (64.1%)	$n = 120$ (76.9%)
Gestational age (weeks)	$M = 25.7$ (SD = 5.9)	$M = 25.5$ (SD = 6.0)
Expecting first child	$n = 154$ (98.7%)	$n = 152$ (97.4%)

[a]More participants in the intervention group lived with their own mother or another parent figure compared to the control group ($\chi 2(1) = 6.17$, $p < .05$).

Broader measures of behavioral and emotional health have been used to define subgroups of mothers, but these measures have included indicators of depression, anxiety, domestic violence, stress, and post-traumatic stress disorder, with risk-taking and externalizing behaviors largely ignored.

Current study

The purpose of this randomized controlled study is to evaluate the impact of evidence-based home visitation enhanced with community doula services for young, low-income, urban mothers on sensitive parenting attitudes, behaviors and practices, and toddler social-emotional development from the early postpartum weeks through child age 2 ½ years. This paper also examines whether maternal depressive symptoms and maternal risk-taking moderate intervention effectiveness on parenting and toddler outcomes.

Methods

All study procedures were approved by the IRB at The University of Chicago and the trial is registered with clinicaltrials.gov (ID NCT01947244).

Participants

Four community organizations with well-established doula home visiting programs participated in this randomized controlled trial. These programs were part of a statewide network of publicly funded doula home visiting programs where training and implementation were managed by Start Early (formerly the Ounce of Prevention Fund). Each program used either HFA or PAT models, two of the home visiting models considered evidence-based by the State of Illinois. The research team had no involvement with the implementation or oversight of programs outside of engaging them in the RCT, so programs were studied as taken to scale in the community. Two programs were located in a large city, and two were located in smaller cities. Programs met fidelity standards set by the core home visiting model and were monitored by Start Early, which included quarterly review of participant retention, intensity of services, and family outcomes, and annual site visits, interviews with program staff and group observations. On average, the cost per family was approximately 12% higher for doula-enhanced home visiting compared to home visiting only programs.

A total of 436 young pregnant women were referred to these programs through typical referral sources, including public health clinics, WIC clinics, schools, and informal sources, and were informed about the study. In order to be eligible for the RCT, women needed to be less than 34 weeks gestation, young (three sites required that women were under age 20; one site allowed women up to age 25), live in the geographic catchment area of the program, plan to stay in the area, and meet the socio-demographic risk criteria of the home visiting program. Women who were wards of the state or currently involved in the juvenile justice system, under 14 years old, or had significant cognitive impairments were not included in the study and were referred to home visiting services. Of the 436 referred to the programs, 312 women met eligibility criteria, were interested in the study and home visiting services, provided written informed consent, and completed a baseline interview. An a priori power analysis showed that with 150 mothers in the intervention group and 150 mothers in the control group, there would be 90% power to detect moderate differences in parenting behaviors.

Study participants completed a baseline interview, on average at six months of pregnancy (Table 1). The average age of the mothers was 18.4 years (89% were adolescents) and almost all were having their first child. The mothers came from diverse racial/ethnic backgrounds: 49% identified as Black/African American (AA), 38% identified at Latina (all of Mexican origin), 8% identified as White/European American (EA), and 9% identified as multiracial/ethnic or other. Over half of the mothers (61%) had not completed high school, 31% had a high school diploma or GED only, and 8% had completed at least a year of postsecondary education or vocational training program. Over two-thirds (71%) were in a partner relationship (couple, engaged, married) with the father of the baby. Less than a third (28%) were living with the father and 71%

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were living with their primary parent figure at baseline. Just over half (53%) of the mothers were enrolled in school or a job training program, and 19% were employed part-time or full-time. The majority of mothers were receiving public insurance (91%) and WIC benefits (86%) at baseline.

Randomization procedures

At the end of the prenatal baseline interview, the interviewer opened an opaque sealed envelope that contained the participant's randomized assignment to either the doula home visiting group or the case management control group. The principal investigator prepared the envelopes prior to study recruitment and neither the interviewer nor anyone who had contact with the family had advanced knowledge of the assignments. Depending on the group assignment, the interviewer's supervisor contacted the doula home visiting program or case management program in the mother's community to share her contact information.

Mothers assigned to the intervention group were offered home visits from both a doula and home visitor (Family Support Worker or Parent Educator) as described above. Mothers assigned to the control group were offered basic case management services by workers at local health and social service agencies (standard of care), which typically involved one prenatal and one postpartum office visit. Case managers conducted assessments of family basic needs and mental health concerns, and made referrals as needed. Case managers did not provide intensive intervention around parenting.

Mothers assigned to the intervention group and control group did not differ on any characteristics at baseline, except that more intervention mothers lived with their own mother or parent figure ($p < 0.05$; Table 1), and therefore, co-residence was included as a control variable in all analyses.

Longitudinal follow-up and sample retention

Interviews were conducted with mothers at baseline (study enrollment) and when the child was 3 weeks, 3 months, 13 months, and 30 months old. These interviews focused on mother physical, mental and behavioral health, child health, parenting, relationships with family and the father of the baby, and education and employment. The baseline and each follow-up interview lasted approximately 2 hours and most took place in the mother's home unless she preferred a different location. The interviews were available in English and Spanish and were read aloud to the participants. All interviewers were women who were either from or very familiar with the mothers' communities, and several were fully bilingual. Training and ongoing supervision were provided for the interviewers by study directors.

At all follow-up sessions, mothers were video-recorded while interacting with their child. At 3 weeks, 3 months, and 13 months, mothers were asked to play with their infant with a new age-appropriate toy, and undress, weigh, and re-dress their infant. At 3 months and 13 months, the mothers were also given a new book to read or look through with their infant. At 30 months, mothers read or looked through a new book and then were given pretend food to play with their child. Video-recorded sessions lasted approximately 15 minutes. Additionally, at 13 and 30 months, child development specialists, masked to information about family group assignment, conducted social-emotional and developmental assessments of the children.

Figure 1 provides a CONSORT flow chart for participants in the study. Sample retention was 91% at 3 weeks, 89% at 3 months, 79% at 13 months, and 71% at 30 months. Retention was equivalent between the intervention group and control group. Baseline maternal risk-taking and depressive symptoms were not associated with study retention at any follow-up wave. Several baseline variables were associated with retention at the 30-month wave only, including older maternal age, higher levels of education, and one program site ($p < 0.05$). However, there was no differential attrition at any time point between the intervention and control groups based on any baseline variables.

Reasons for attrition at each wave are presented in Figure 1. The primary reasons for non-participation included inability to contact or schedule mothers, mothers declining participation, mothers moving out of the state or country, infant or mother death, and change in primary caregiver. Additional reasons for non-participation in the mother-infant video sessions and/or child assessments were mother declining to be video-recorded, infant illness or serious medical condition, mother and/or child moving out of state or country (phone interviews were conducted in these cases), and equipment failure.

Measures

Prenatal depressive symptoms

At baseline, mothers completed the Center for Epidemiological Studies – Depression Scale (CES-D; Radloff, 1977). The CES-D is a 20-item questionnaire that assesses symptoms of depression experienced in the past week. Participants respond to each item on a 0 to 3 scale, with higher total scores indicating higher levels of depressive symptoms. A score of 16 or greater is indicative of clinical levels of symptoms. The inter-item reliability for the current sample was $\alpha = 0.84$.

Maternal risk-taking behaviors

During the baseline interview, mothers were asked several questions about their engagement in risk-taking, including number of suspensions and expulsions from school, whether they had ever been questioned by the police about their own misbehavior and/or had ever been incarcerated, consumption of alcohol, smoking, and the number of lifetime sexual partners (see Table 1). These behaviors align with the dimensions of overt risk-taking and problem behaviors that have been identified in studies of adolescent risk behaviors (Benthin et al., 1993; Kwong et al., 2018). These variables were measured on 3- to 5-point scales, and were used to create a composite measure of risk-taking. Each indicator (school suspensions, smoking, delinquency, drinking, and sex partners) was first standardized to reduce the influence of any one variable, and then the standardized indicators were summed. In order to improve interpretability, these composite scores were transformed into T values with a mean of 50 and standard deviation of 10. Cronbach's α for the five indicators was 0.63.

Service participation

Mothers assigned to the intervention group reported on their participation in services at each follow-up interview. Additionally, administrative records from the programs regarding participation in doula services and home visits for mothers were obtained. Mother report and administrative data were used to determine the following: any contact with program, any home visits during pregnancy, doula attendance at birth, any doula postpartum visits, and any home visitor postpartum visits.

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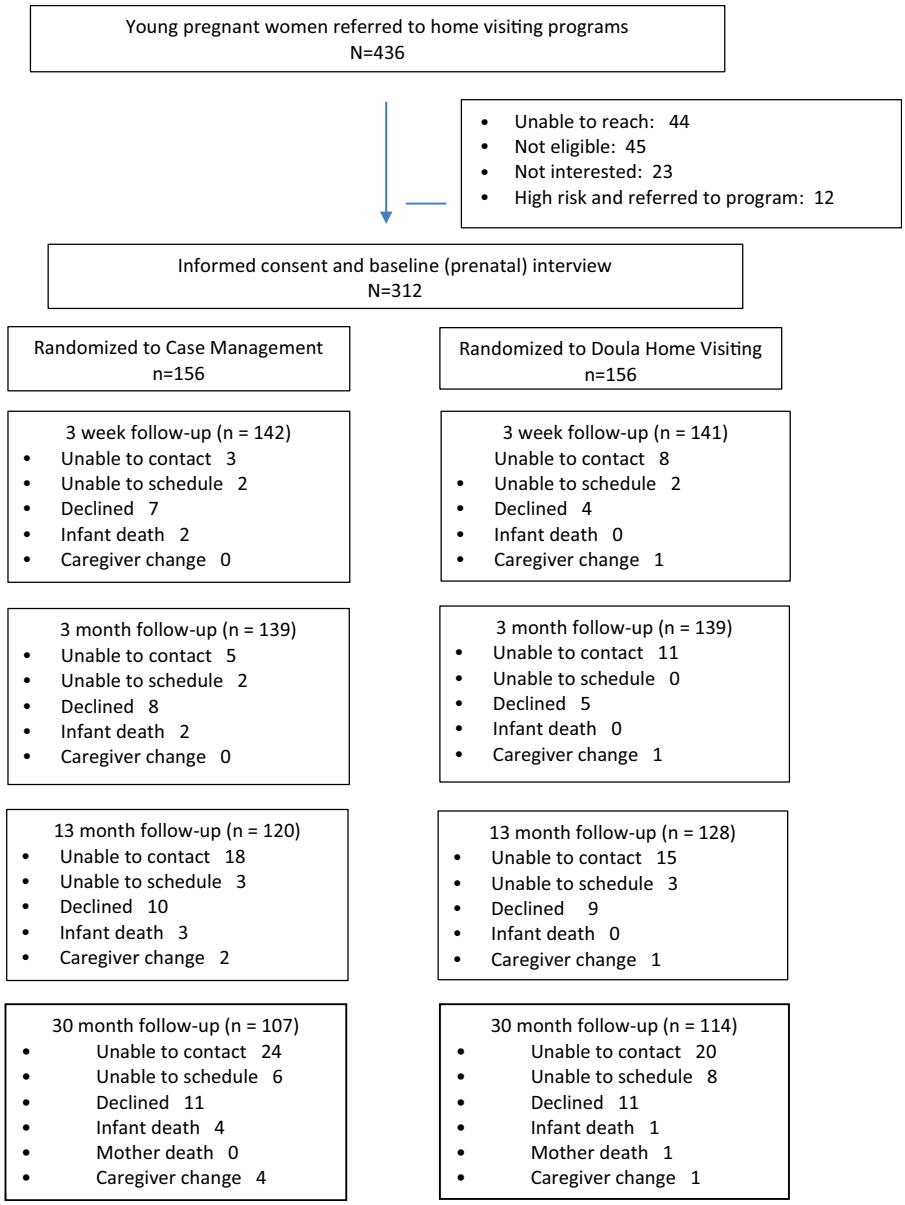

Figure 1. Consort diagram for doula home visiting randomized controlled trial.

Sensitive parenting behaviors

Mother-child interactions. The National Institute of Child Health and Human Development rating scales (NICHD Early Childhood Research Network, 1999) of sensitivity to non-distress and intrusiveness, in addition to a newly created rating of "careful handling" were used to code sensitive parenting behaviors during mother-infant interactions at 3 weeks, 3 months, and 13 months of age. At 30 months of age, mothers were coded for sensitivity and intrusiveness. Each item was rated on a four-point scale from "not at all characteristic" to "highly characteristic." Sensitivity to non-distress indicates how well the mother observes, interprets, and responds to her infant's cues, expressions, and gestures. Intrusiveness is shown when the interactions are adult-centered, overstimulating, not well-paced, and invasive. Careful handling is a rating of how well the mother supports the young infant's head, moves the infant slowly and safely, shows no physical roughness when holding or undressing, and adjusts positions when the infant is uncomfortable. At 30 months, the sensitivity rating includes mother responses to child distress and non-distress.

Two-coder teams (one team for each follow-up wave) who were blind to family information and intervention status rated the recorded interactions. The coders represented the racial/ethnic backgrounds of the mothers, each team included one bilingual coder, and coders were involved in modifying the rating scales to be culturally sensitive. After initial training from the authors, the coders rated between 20 and 30 videos independently and met to agree upon codes. In cases of uncertainty, they resolved disagreement in consultation with one of the authors. Once reliability was established (interclass correlation > 0.80 for each rating), the coders both rated every 5th video recording and met to discuss

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codes in order to maintain high reliability. The mean interclass correlation for the parenting ratings was 0.81 and the median was 0.83.

Maternal warmth and lack of hostility. During the 30-month mother-child interaction and child assessment sessions, the interviewer completed select items from the Infant-Toddler and Early Childhood Home Observation for the Measurement of the Environment Scales (IT- and EC-HOME; Bradley et al., 2001; Caldwell & Bradley, 1984), and the Supplement to the HOME for Impoverished Families (Ertem et al., 1997). The HOME and Supplement to the HOME for Impoverished Families include observation and a parent interview to assess multiple dimensions of parenting and the physical environment. Each item is rated as "yes" or "no" and two subscales were used in the current study. The parental warmth and responsivity subscale included 11 items such as "parent's voice conveyed positive feelings toward the child" and "parent spontaneously praised child at least twice." The lack of hostility and rejection subscale included six items (reverse coded) such as "mother slapped or spanked child at least once" and "parent scolded or criticized child during visit." The HOME has been used extensively, has strong reliability and validity, and is appropriate for use with families across income levels and race/ethnicities (Bradley et al., 2001; Bradley, 1994; Ertem et al., 1997).

Parenting attitudes

The Adult Adolescent Parenting Inventory (AAPI-2; Bavolek & Keene, 2001) is a self-report instrument used to assess parenting attitudes and practices associated with risk for child abuse and neglect. In this study, 20 items on five-point scales ranging from "strongly disagree" to "strongly agree" were used at each follow-up interview. Four items were administered from each of the five subscales: expectations of children, parental empathy, corporal punishment, parent-child roles, and children's power and independence. Higher scores on the AAPI indicate less sensitive parenting attitudes. Cronbach's alpha for the current sample was 0.77, 0.76, and 0.76 at 3 months, 13 months, and 30 months, respectively.

Discipline strategies

The Parent-Child Conflict Tactics Scale (CTS-PC; Straus et al., 1998) is a measure of conflict management and discipline strategies that parents use with their children, and can indicate risk for child maltreatment. The CTS-PC assesses how often a parent has used nonviolent discipline, psychological aggression, and corporal punishment/physical assault with their child in the past year. In the current study, four items from the nonviolent discipline subscale (e.g., explained why something was wrong), four items from the psychological aggression subscale (e.g., shouted, yelled or screamed), and three items representing corporal punishment/minor physical assault (e.g., spanked on the bottom with bare hand) were administered. A prevalence score was calculated for each subscale at 13 and 30 months.

At 13 and 30 months, mothers were also asked the open-ended question, "When your baby/child tantrums, how do you usually handle that? Why?" A coding scheme was developed by one of the authors and two graduate-level research assistants based on conceptualizations of inductive/positive, punitive and lax discipline (for overview see Holden et al., 2011) and after reviewing all mother responses. The following categories are included in the current investigation: inductive (reasoning, explanation, negotiation), verbal harsh (threatening, teasing, yelling, criticizing), physical harsh (spanking, slapping, popping, grabbing), and lax (bribing, giving in, lets someone else handle). After initial training, the two coders, who were blind to family information and intervention assignment, individually coded groups of 30 responses and met after each set to discuss and come to agreement on all ratings. Any uncertainty was resolved in consultation with the first author. For analyses, verbal harsh, physical harsh, and lax were combined to form a harsh/lax discipline category.

Child behavior problems and social-emotional competence

Observed emotional regulation. During the child assessment sessions, the child developmental specialist rated child emotional regulation using modified versions of the Behavior Rating Scale of the Bayley Scales of Infant Development-II (Bayley, 1993; Thompson et al., 1996). The emotional regulation scale included 8 items rated on a 1–5 scale that assessed the child's negative affect, frustration, sensitivity to materials, and adaptation to change. Inter-item reliability was $\alpha = 0.81$ at 13 months and $\alpha = 0.89$ at 30 months.

Mother-reported child behavior. At 13 months and 30 months of age, mothers completed all problem items from the Brief Infant-Toddler Social and Emotional Assessment (BITSEA; Briggs-Gowan et al., 2013), and two competence subscales from the Infant-Toddler Social and Emotional Assessment (ITSEA: Carter et al., 2003) that were chosen a priori as most appropriate for young toddlers and relevant to the goals of the intervention. Mothers respond to each item on a scale of 0 (not true/rarely true) to 2 (very true/often). The BITSEA items were summed to calculate the 31-item problems total score, including a 14-item internalizing subscale (e.g., sadness, fear, worry) and 6-item externalizing subscale (e.g., hits, bites, destructive). The ITSEA subscales used were the 6-item mastery motivation subscale (e.g., curious about new things) and a 10-item social relatedness scale (e.g., looks for parent when upset). The ITSEA and BITSEA are appropriate for children ages 1 to 3 years old, have been validated across various ethnic groups (Briggs-Gowan et al., 2013), and show good inter-item and tests-retest reliabilities (Briggs-Gowan et al., 2004; Carter et al., 2003). Cronbach's alphas at 13 and 30 months were 0.80 and 0.84 for total behavior problems.

Analytic plan

First, intent-to-treat analyses were conducted to examine the overall impact of the doula home visiting intervention on parenting and child social-emotional outcomes. Several outcomes were only measured at 30 months of age (i.e., warmth, lack of hostility, and sensitivity), so in these cases, ordinary least squares regression analyses controlling for co-residence with parent figure at baseline and program site were conducted.

Because most outcomes were measured at 2–3 time points, random intercept models were used (Hedeker & Gibbons, 2006) in order to account for repeated observations nested within individuals. Random intercept linear regression was used for continuous outcomes and random intercept logistic regression was used for binary outcomes. Intervention group, time, and the interaction of group by time were modeled as fixed effects. Intervention group (*Doula)* was coded 1 for doula HV and 0 for case management, and time was coded as set of dummy variables representing the four data collection waves (T_{3w}, T_{3m}, T_{13m}, T_{30m}). Co-residence with parent figure at baseline (*Cores*) and program site (set of dummy

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variables representing the four sites) were also included as fixed effects. In the following equation, Y_{it} equals the outcome for individual i at time point t, β_0 represents the intercept, $\beta_{1\text{-}9}$ are the regressions coefficients for the variables described above, ν_{0i} is the random intercept for individual i, and ϵ_{it} is the error term for individual i at time point t. For example, for a continuous outcome measured at three time points (3 weeks, 3 months, and 13 months), its model is as follows (3 weeks is the reference for time and Site 1 is the reference for program site):

$$Y_{it} = \beta_0 + \beta_1 Doula_i + \beta_2 commaT_{3mi} + \beta_3 commaT_{13mi} + \beta_4 (Doula_i commaxcommaT_{3mi}) + \beta_5 (Doula_i xT_{13mi}) + \beta_6 Cores_i + \beta_7 Site2_i + \beta_8 Site3_i + \beta_9 Site4_i + \nu_{0i} + \varepsilon_{it} \quad (1)$$

β_1, the coefficient of $Doula_i$ represents the intervention impact at 3 weeks, holding co-residence and site constant. For the intervention impact at 3 months and 13 months, *lincom* in Stata was used to subsequently test for significant intervention by time interactions in order to examine whether there was an impact of doula home visiting on the outcome. For example, in the above equation, the doula HV impact on the outcome measured at 13 months is the sum of $\beta_1 + \beta_5$.

Second, moderation of intervention impacts by baseline (prenatal) depressive symptoms and baseline risk-taking was tested. Three additional variables were entered into the equation above: an intervention group by depressive symptoms (mean-centered) interaction, a time by depressive symptoms interaction, and a three-way interaction between intervention group, depressive symptoms, and time. A separate, similar procedure was followed by entering an intervention group by risk-taking (T-score) interaction, time by risk-taking interaction, and a three-way interaction term – intervention group by risk-taking by time.

A significant intervention group by moderator interaction term indicates that the associations between prenatal depressive symptoms (or risk-taking) and the parenting or child outcome differed between the intervention group and control group. Follow-up analyses for significant intervention by moderator and three-way interactions (intervention × moderator × time) were conducted in two ways. First, moderation was explored by graphing the relationship between prenatal depressive symptoms (or risk-taking; *x*-axis) and the outcome (*y*-axis) for the intervention and control groups at the time point(s) where moderation was found, and testing whether the slopes were significantly different from 0. Second, significant interactions were also explored by testing whether there was an intervention impact at higher (+1 SD above the mean) and lower levels (−1 SD below the mean) of prenatal depressive symptoms (or risk-taking).

Results

Maternal risk behaviors and depressive symptoms at baseline

The mean prenatal depressive symptoms score was 14.0 (SD = 8.9), with 33% of the mothers ($n = 102$) scoring at or above the clinical threshold. Table 2 displays the frequencies of the five indicators used to create the risk-taking composite score. Overall, the prevalence of risk on each of the indicators is high in the current sample compared to national samples of AA, Latina and EA female adolescents and young adults (National Center for Education Statistics, 2019; Centers for Disease Control and Prevention (CDC), 2020a; CDC, 2020b; CDC, n.d.). About 60% ($n = 188$) of the mothers had been suspended or expelled from school at least once, 42% ($n = 131$) reported past involvement with police concerning their own misbehavior, and 17% ($n = 53$) had spent time in juvenile detention or jail. Substance use in this sample included 11% ($n = 35$) who reported smoking daily before pregnancy or were currently smoking, and 22% ($n = 70$) who reported two or more drinks a week before pregnancy or were currently drinking. The average number of sex partners was 3.2 (SD = 3.8). The risk-taking composite, but not depressive symptoms, was associated with mother race/ethnicity. White/EA mothers had higher risk-taking composite scores than Black/AA ($p < 0.01$) and Latina ($p < 0.01$) mothers, and Black/AA mothers had higher risk-taking than Latina mothers ($p < 0.05$). Risk-taking and depressive symptoms were not significantly correlated with each other ($r = 0.08$, $p > 0.05$), and there were no differences between the intervention and control groups on these measures.

Table 2. Mother history of risk-taking at study enrollment (pregnancy)

	n (%)
School suspensions and expulsions	
Never	124 (39.7%)
1–2 times	97 (31.1%)
3–5 times	54 (17.3%)
6 or more times	37 (11.9%)
Law enforcement / criminal justice system involvement	
None	185 (59.3%)
Questioned by police about own misconduct[a]	74 (23.7%)
Served time in juvenile detention or jail	53 (17.0%)
Smoking	
Never smoked	190 (60.9%)
Smoked less than daily pre-pregnancy	87 (27.9%)
Smoked daily pre-pregnancy and/or currently smoking	35 (11.2%)
Drinking	
Never drank	63 (20.2%)
No drinking in year before pregnancy	45 (14.4%)
<2 drinks/week in year before pregnancy	134 (43.0%)
2–7 drinks/week in year before pregnancy	43 (13.8%)
>7 drinks/week in year before pregnancy	27 (8.7%)
Sex partners (lifetime)	
1 partner	88 (28.2%)
2–3 partners	131 (42.0%)
4 or more partners	93 (29.8%)

[a]Mothers who were only questioned by police about an acquaintance or an event they witnessed are not included

Intervention participation

Almost all mothers (98%; $n = 153$) assigned to the intervention group had contact with their home visiting program and received home visits. On average, mothers started services at just over 6 months of pregnancy. Most mothers had a doula present at the hospital during or following childbirth ($n = 128$, 83%), postpartum

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visits from the doula ($n = 135$, 87%), and postpartum visits from the home visitor ($n = 131$, 85%). At the 13-month interview, 53% ($n = 68$) of mothers reported they were still receiving home visiting services, and 20% ($n = 23$) reported continued services at the 30-month interview. Maternal depressive symptoms at baseline were not associated with any of these service participation outcomes. Mother risk-taking was not associated with the likelihood of having a doula present at the hospital, any doula postpartum home visits, or any home visitor postpartum visits, but mothers with higher risk-taking scores were less likely to receive home visiting at 13 months ($p < .05$). In the control group, 60% ($n = 87$) of mothers reported having had contact with a case manager by 3 weeks postpartum. The majority of referrals from case managers were for childcare resources, food assistance, and other types of financial assistance. Two mothers in the case management group reported participating in other home visiting programs, both ending services before the child's first birthday.

Intent-to-treat intervention effects

Parenting outcomes

Random effects regression analyses showed that mothers in the doula HV intervention group showed less intrusiveness during observed mother-infant interactions than mothers in the case management control group when their infant was 3 weeks old (Table 3). Intervention mothers were also marginally less intrusive with their infants at 3 months of age. There were no group differences in observed sensitivity, intrusiveness or careful handling at later ages. At 30 months, mothers in the intervention showed marginally more warmth (HOME) compared to control mothers, but there were no differences on the lack of hostility subscale.

On mother report measures, there were positive effects of doula home visiting on conflict and discipline tactics. Specifically, mothers in the intervention group were more likely to use inductive strategies (e.g., explanations) when responding to their toddler's tantrums at 13 months and 30 months, and were less likely to use psychological aggression towards their child (CTS-PC) at 13 months. There were no significant intervention effects on insensitive parenting attitudes (AAPI) at any time or harsh/lax discipline at 13 or 30 months. Virtually all mothers in both groups reported using nonviolent discipline strategies on the CTS-PC at 13 months (99.2 and 100%) and 30 months (100 and 100%) so regression analyses were not conducted to examine group differences.

Child social-emotional development

At 13 months, children of mothers in the doula HV group had significantly higher mastery motivation scores (ITSEA) compared to control group children (Table 4). There were no group differences on any problem behaviors or on observed emotional regulation during the assessment. There were no intervention effects on mother-reported problem behaviors or positive social-emotional outcomes at 30 months.

Moderation analyses

Prenatal depressive symptoms

There were no significant intervention group by depressive symptoms interactions or 3-way (intervention group by depressive symptoms by time) interactions for any parenting outcome. Significant three-way interactions were found for several child outcomes, including internalizing ($p < 0.05$), externalizing ($p < 0.05$), and total behavior problems ($p < 0.01$), showing that depressive symptoms moderated the impact of the intervention on these outcomes at 30 months.

Follow-up analyses for the significant interaction effects are summarized in Table 5 and shown in Figure 2. Columns 2 and 3 in the table show associations (simple slopes) between prenatal depressive symptoms and each child outcome for the case management group and doula HV group respectively at 30 months. Associations between depressive symptoms and child behavior problems were found only for the intervention group and not the control group. Doula HV effects were examined at lower (−1 SD; CES-D = 5.14) and higher (+1 SD; CES-D = 22.92) levels of prenatal depressive symptoms. Intervention effects on child internalizing and total problem behaviors were only found for mothers with low levels of prenatal depressive symptoms (Table 5, column 4). Among mothers with high prenatal depressive symptoms, children in the intervention group had higher externalizing and total problem scores than children in the control group (Table 5, column 5).

Mother risk-taking

Significant risk-taking by intervention interactions and three-way interactions (intervention × risk-taking × time) were found for multiple parenting outcomes: intrusiveness at 3 weeks ($p < 0.05$) and 3 months ($p < 0.05$), 3-month careful handling ($p < 0.05$), 13-month psychological aggression ($p < 0.05$), 13-month minor physical assault ($p = 0.05$), 13-month inductive discipline ($p = 0.05$), and insensitive parenting attitudes at 3 months ($p < 0.05$) and 13 months ($p < 0.01$). Significant interaction effects also were found for the following child outcomes: 13-month observed emotional regulation ($p < 0.01$), and social relatedness at 13 months ($p < 0.05$) and 30 months ($p < 0.05$).

Table 6 provides a summary of follow-up analyses for all significant interactions. Columns 2 and 3 in the table show associations (simple slopes) between mother risk-taking and the parenting or child outcome for the case management group and doula HV group respectively. Columns 4 and 5 indicate whether there were doula HV effects (differences between the intervention group and control group) at lower (−1 SD; $T = 40$) and higher (+1 SD; $T = 60$) levels of risk-taking respectively.

As Table 6 and Figures 3-5 illustrate, in most cases there was an association between higher levels of maternal risk-taking and more problematic parenting and child outcomes for the case management group but not for the intervention group. Positive effects of the intervention were largely concentrated among the mothers with higher levels of risk-taking. Among high risk-taking mothers, the doula HV group showed less intrusiveness (3 weeks and 3 months) and there was a trend for more careful handling (3 months), they were less likely to use psychological aggression (13 months) and minor physical assault towards their child (13 months), they had more sensitive parenting attitudes (3 months), and they reported greater child social relatedness (13 and 30 months) compared to the control group. The only positive intervention effect found for low risk-taking mothers was a greater use of inductive discipline strategies (13 months), and low risk-taking intervention group mothers showed less sensitive parenting attitudes (30 months) and toddler emotional regulation (13 months) compared to low risk-taking control group mothers.

Discussion

This longitudinal, randomized controlled trial examined whether doula home visiting, a relationship-based intervention for young

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Table 3. Longitudinal doula home visiting intervention effects on sensitive parenting behaviors, attitudes and practices

		M (SD) / *n* (%)				Doula HV effect B [95% CI], *p*			
	Group	3 weeks	3 months	13 months	30 months	3 weeks	3 months	13 months	30 months
Sensitivity to non-distress	CM	3.16 (0.69)	3.19 (0.68)	3.22 (0.76)	–	0.04 [−0.13, 0.20], 0.659	0.10 [−0.07, 0.26], 0.259	−0.05 [−0.23, 0.13], 0.596	–
	HV	3.18 (0.76)	3.28 (0.67)	3.18 (0.68)	–				
Intrusiveness	CM	1.60 (0.66)	1.35 (0.57)	1.61 (0.72)	1.39 (0.62)	−0.16 [−0.31, −0.02], 0.025*	−0.13 [−0.27, 0.02], 0.083†	−0.02 [−0.17, 0.14], 0.828	−0.08 [−0.25, 0.08], 0.338
	HV	1.44 (0.61)	1.22 (0.50)	1.61 (0.70)	1.34 (0.58)				
Careful Handling	CM	3.32 (0.76)	3.36 (0.71)	3.69 (0.65)	–	−0.01 [−0.16, 0.15], 0.942	0.03 [−0.13, 0.19], 0.679	0.01 [−0.17, 0.18], 0.949	–
	HV	3.30 (0.78)	3.41 (0.69)	3.69 (0.61)	–				
Sensitivity	CM	–	–	–	3.36 (0.62)	–	–	–	0.01 [−0.17, 0.18], 0.949
	HV	–	–	–	3.34 (0.66)				
Insensitive parenting attitudes (AAPI)	CM	–	55.19 (9.09)	53.71 (9.02)	51.16 (8.43)	–	−0.81 [−2.88, 1.27], 0.446	−0.06 [−2.23, 2.10], 0.954	0.45 [−1.79, 2.70], 0.692
	HV	–	54.58 (8.84)	53.60 (9.05)	51.53 (9.79)				
Psychological Aggression (CTS-PC)	CM	–	–	105 (89.7%)	105 (99.1%)	–	–	OR = 0.32 [0.10, 1.00], 0.050*	OR = 0.22 [0.02, 2.62], 0.229
	HV	–	–	101 (79.5%)	108 (96.4%)				
Minor Physical Assault (CTS-PC)	CM	–	–	88 (75.2%)	89 (84.0%)	–	–	OR = 0.55 [0.24, 1.27], 0.159	OR = 0.88 [0.33, 2.38], 0.808
	HV	–	–	85 (66.9%)	92 (82.1%)				
Inductive response to tantrums	CM	–	–	14 (12.0%)	31 (31.3%)	–	–	OR = 2.36 [1.07, 5.24], .034*	OR = 1.98 [1.00, 3.94], 0.050*
	HV	–	–	29 (22.8%)	50 (45.1%)				
Harsh/lax response to tantrums	CM	–	–	22 (18.8%)	26 (26.3%)	–	–	OR = 0.57 [0.26, 1.27], 0.169	OR = 0.63 [0.30, 1.33], 0.226
	HV	–	–	17 (13.4%)	24 (21.6%)				
Warmth (HOME)	CM	–	–	–	8.81 (1.95)	–	–	–	0.42 [−0.05, 0.88], 0.079†
	HV	–	–	–	9.06 (1.62)				
Lack of hostility (HOME)	CM	–	–	–	4.99 (1.53)	–	–	–	−0.15 [−0.56, .26], 0.463
	HV	–	–	–	4.83 (1.46)				

Note. CM = case management control group; HV = doula home visiting group. Results are from random intercept regression analyses controlling for co-residence with parent figure at baseline and program site.
† $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 4. Longitudinal doula home visiting intervention effects on toddler social-emotional development and problem behaviors

	Group	*M* (SE)		Doula HV effect B [95% CI], *p*	
		13 months	30 months	13 months	30 months
Emotional Regulation (Bayley)	CM	32.53 (4.36)	31.93 (30.91)	−0.37 [−1.82, 1.09], 0.547	−1.11 [−2.61, 0.40], 0.151
	HV	32.25 (4.44)	30.91 (6.48)		
Internalizing (BITSEA)	CM	6.85 (3.30)	6.72 (3.45)	−0.61 [−1.50, 0.28], 0.180	−0.35 [−1.25, 0.55], 0.451
	HV	6.41 (3.36)	6.50 (3.54)		
Externalizing (BITSEA)	CM	3.69 (2.28)	2.98 (2.41)	−0.13 [−0.74, 0.47], 0.667	0.12 [−0.50, 0.73], 0.709
	HV	3.59 (2.39)	3.12 (2.17)		
Total Problems (BITSEA)	CM	16.48 (7.02)	15.46 (7.68)	−0.72 [−2.62, 1.18], 0.459	−0.33 [−2.25, 1.58], 0.735
	HV	16.04 (7.10)	15.23 (7.28)		
Mastery Motivation (ITSEA)	CM	9.80 (1.93)	10.45 (1.66)	0.55 [0.12, 0.98], 0.013*	0.31 [−0.14, 0.77], 0.177
	HV	10.31 (1.71)	10.68 (1.52)		
Social Relatedness (ITSEA)	CM	16.94 (2.35)	17.02 (2.39)	0.34 [−0.21, 0.90], 0.223	0.40 [−0.18, 0.97], 0.181
	HV	17.37 (2.07)	17.43 (1.98)		

Note. CM = case management control group; HV = doula home visiting group. Results are from random intercept regression analyses controlling for co-residence with parent figure at baseline and program site.
† $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 5. Summary of significant prenatal depressive symptoms × doula HV × time interaction effects

	Simple slope for CM group b [95% CI]	Simple slope for HV group b [95% CI]	Doula HV effect (marginal effect) at low depressive symptoms (−1 SD) b [95% CI]	Doula HV effect (marginal effect) at high depressive symptoms (+1 SD) b [95% CI]
Parenting outcome				
None	–	–	–	–
Toddler outcome				
Internalizing (30m)	0.02 [−0.05, 0.08]	0.14 [0.07, 0.21] **	−1.41 [−2.63, −0.19] *	0.73 [−0.48, 1.94]
Externalizing (30m)	−0.01 [−0.05, 0.04]	0.08 [0.03, 0.13] ***	−0.67 [−1.52, 0.17]	0.91 [0.08, 1.74] *
Total behavior problems (30m)	0.00 [−0.13, 0.14]	0.36 [0.21, 0.51] ***	−3.49 [−6.06, −0.91] **	2.84 [0.30, 5.38] *

Note. CM = case management (control), HV = doula home visiting (intervention). Results are from random intercept regression analyses controlling for co-residence with parent figure at baseline and program site.
† $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

mothers, has impacts on sensitive parenting behaviors, attitudes and practices, and toddler social-emotional development. There were limited intervention effects for the sample as a whole, but moderation analyses provide evidence that doula home visiting may be an effective program for reducing intrusive, aggressive parenting and promoting toddler social competencies among young mothers with a history of risk-taking. Prior home visiting studies have not included mother risk-taking or similar constructs when defining subgroups or exploring moderation, so this novel finding could have important implications for practice and research. Prenatal depressive symptoms, on the other hand, was not a moderator for any parenting outcomes, but did moderate the effect of the intervention on toddler behavior problems.

For the entire sample as randomized, intervention effects on parenting were found for observed intrusiveness during early infancy and discipline strategies in early toddlerhood. Intrusiveness can be common among young mothers, and may partially reflect the well-intentioned but high energy level that these mothers bring to their interactions. Parent behaviors that are intrusive and disregard the infant's behavior and mood can be dysregulating for young infants, and can contribute to child academic and behavioral problems (Egeland et al., 1993). In early infancy, doulas and home visitors help mothers observe their infant's reactions during "playtime" and everyday activities to differentiate between engaged and defensive infant behaviors, such as the infant turning their head away when a rattle is shaken too close to their face. They model appropriately paced and attuned interactions with the infant, and provide encourage and positive feedback when mother-infant interactions are child-centered.

The transition from the first to second year of life can be especially challenging as toddlers become more independent and begin to test limits. Research suggests that physical and psychologically

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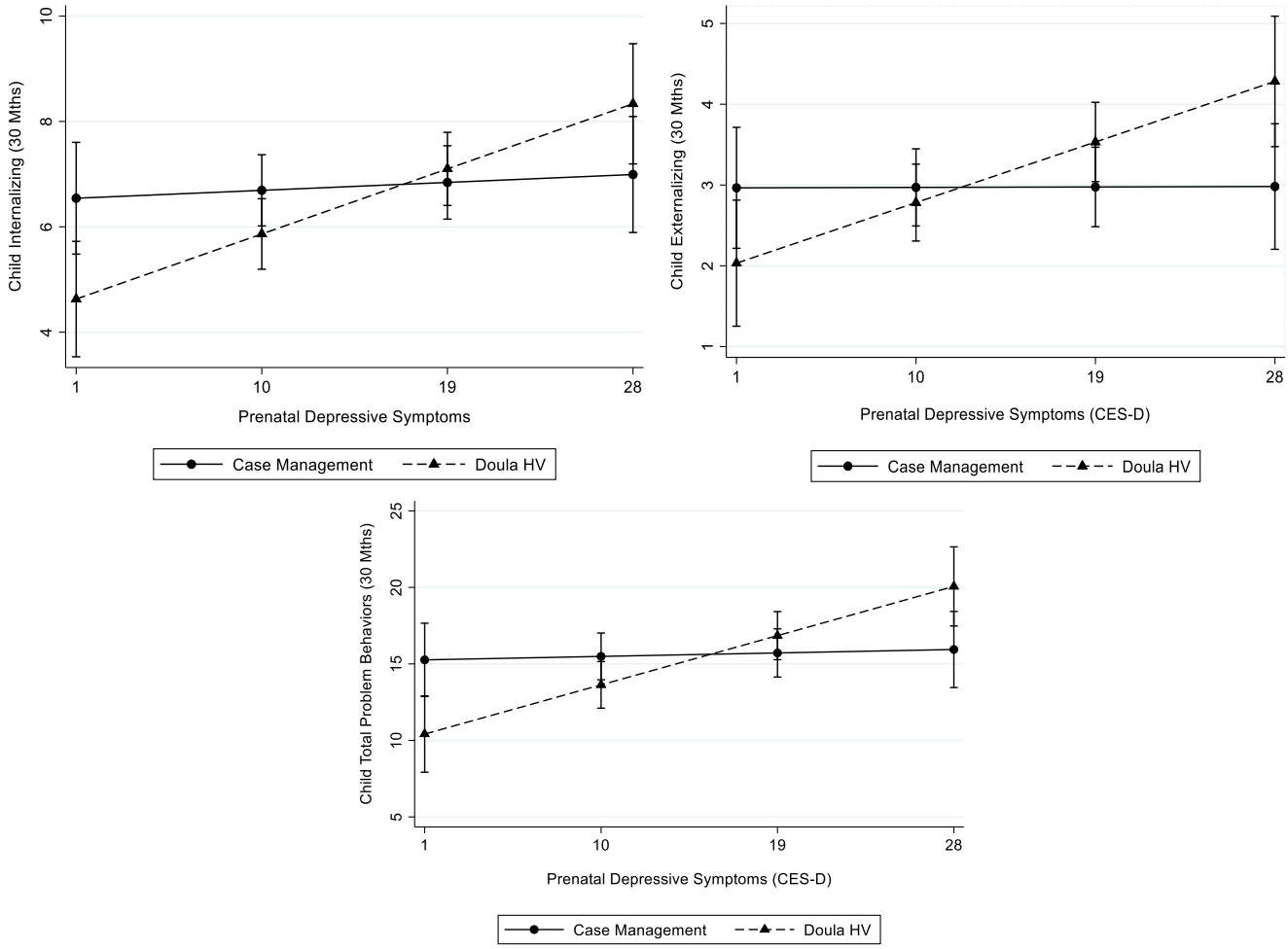

Figure 2. Mother prenatal depressive symptoms moderate doula home visiting intervention effects on toddler behavior problems.

aggressive discipline contributes to child behavior problems (Gershoff et al., 2018; O'Leary et al., 1999), whereas inductive, positive discipline strategies promote optimal growth of self-regulation and prosocial behaviors (Choe et al., 2013; Hart et al., 1992; Laible & Thompson, 2002). Home visitors help mothers to understand and be mindful of their toddler's growing need for independence, share strategies to promote good behavior, and also empathize when the mother shares feelings of frustration and stress. They provide education to families about toddler development and discipline, and help mothers reflect on how they were parented and ways in which these experiences might impact their own parenting. In this study, intervention mothers were more likely to report that they try to understand reasons for their toddler's tantrums and explain to them about appropriate behavior. They were also less likely to use psychological aggression, such as threatening or teasing, during conflicts with their toddlers.

For the entire sample as randomized, there were no intervention effects on toddler problem behavior, but mothers in the intervention group reported higher levels of mastery motivation in their young toddlers compared to mothers in the case management group. The kinds of statements that intervention mothers tended to endorse were descriptions of their children as curious, able to attend for long times, enjoying challenges and expressing positive feelings to other people. These findings, focused on desirable child behaviors, align with the philosophy of the doula home visiting model, which is to promote positive behaviors. Home visitors emphasize the importance of observation, asking mothers, "did you notice how your child . . . ?" and "did you see how excited they were when they accomplished . . . ?" and work with mothers to encourage their child's exploration and prosocial behaviors (Bernstein & Edwards, 2012). However, the intervention effects on toddler competencies faded by 30 months. Although home visits are offered to families for the first few years after birth, only half of the mothers remained in services past the child's first birthday, which could be one reason for the lack of findings by 30 months. Especially in the early years, the developmental needs and capabilities of children change so quickly that mothers may require continued support to adjust their expectations and parenting accordingly.

Prenatal depressive symptoms

The literature is equivocal on whether depression limits a mother's capacity to benefit from home visiting services in terms of sensitive parenting (Ammerman et al., 2010), and in this study, prenatal depressive symptoms was not a moderator for any parenting outcomes. However, it was a moderator for toddler problem behaviors. Some studies have shown that home visiting produces stronger impacts on child social-emotional development among mothers with high levels of depression (e.g., Administration on

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Table 6. Summary of significant maternal risk-taking × doula HV × time interaction effects

	Simple slope for CM group b [95% CI]	Simple slope for HV group b [95% CI]	Doula HV effect at low risk-taking (−1 SD) b [95% CI]	Doula HV effect at high risk-taking (+1 SD) b [95% CI]
Parenting outcome				
Intrusiveness 3 weeks	0.01 [−0.00, 0.02] *	−0.01 [−0.02, 0.00] †	0.04 [−0.15, 0.24]	−0.37 [−0.56, −0.17] ***
3 months	0.01 [0.00, 0.02] *	−0.00 [−0.01, 0.01]	−0.01 [−0.21, 0.18]	−0.26 [−0.46, −0.06] *
Careful Handling (3m)	−0.02 [−0.03, −0.01] **	0.00 [−0.01, 0.01]	−0.12 [−0.34, 0.10]	0.21 [−0.01, 0.43] †
Psychological Aggression (13m)	0.01 [0.00, 0.02] **	−0.00 [−0.01, 0.01]	−0.00 [−0.14, 0.14]	−0.20 [−0.30, −0.10] ***
Minor Physical Assault (13m)	0.01 [0.00, 0.02] **	0.00 [−0.01, 0.01]	0.01 [−0.16, 0.17]	−0.18 [−0.32, −0.04] *
Inductive response to tantrums (13m)	0.00 [−0.00, 0.01]	−0.01 [−0.02, −0.00] **	0.21 [0.07, 0.35] **	0.01 [−0.13, 0.12]
Insensitive parenting attitudes 3 months	0.16 [0.02, 0.31] *	−0.04 [−0.18, 0.10]	1.18 [−1.66, 4.01]	−2.91 [−5.78, −0.04] *
30 months	0.20 [0.04, 0.36] *	−0.09 [−0.24, 0.07]	3.21 [0.14, 6.29] *	−2.54 [−5.70, 0.62]
Toddler outcome				
Emotional Regulation (13m)	−0.10 [−0.20, −0.00] *	0.09 [−0.01, 0.20] †	−2.22 [−4.19, −0.25] *	1.69 [−0.38, 3.76]
Social Relatedness 13 months	−0.04 [−0.07, 0.00]†	0.01 [−0.03, 0.05]	−0.09 [−0.84, 0.66]	0.82 [0.05, 1.59] *
30 months	−0.05 [−0.09, −0.01] *	0.02 [−0.02, 0.06]	−0.28 [−1.07, 0.52]	1.13 [0.31, 1.95] **

Note. CM = case management (control), HV = doula home visiting (intervention). Results are from random intercept regression analyses controlling for co-residence with parent figure at baseline and program site.
† $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Children, Youth and Families, 2002; Cluxton-Keller et al., 2014), but this study found the reverse. At 30 months, the intervention contributed to lower child internalizing and total problem behavior only among mothers who reported low prenatal depressive symptoms, and externalizing and total problems behaviors were actually higher in the intervention group among children of mothers with high depressive symptoms. Prenatal depression can contribute to later parenting and toddler behavior problems (Field, 2010, 2011), and home visiting may not be sufficient to buffer these effects. Mothers with depression can have difficulty emotionally engaging with the program, and may need clinical services to address their depression in order to fully benefit from home visiting, particularly if symptoms are ongoing. Doulas and home visitors are not typically trained or expected to provide mental health services, though home visiting programs are now being encouraged to provide more support to families with mental health issues (Dauber et al., 2017). Future research will be needed to understand how programs address maternal depression (e.g., training of home visitors, use of mental health consultants, clinical program enhancements) and whether this contributes to the ability of mothers with depression and their children to benefit from services (Zeanah & Korfmacher, 2019).

Mother risk-taking

Results from moderation analyses suggest that mother risk-taking, a measure that included delinquency, substance use, and sexual risk behavior, was an important factor in two regards. First, there were generally associations between higher levels of maternal risk-taking and more problematic parenting and toddler outcomes for the control group families. This finding was anticipated given prior research showing that mother conduct problems and substance use predict less sensitive parenting (Cassidy et al., 1996; Hatzis et al., 2017; van der Molen et al., 2011), and that intergenerational transmission of problem behaviors is high (Raudino et al., 2013). However, for many outcomes, similar associations between maternal risk-taking and problematic outcomes did not emerge for the intervention group. Second, with the exception of inductive discipline strategies, intervention impacts on parenting and toddler social-emotional development were found only for mothers who reported higher levels of risk-taking. Notably, this pattern of positive findings was observed across time, across a variety of parenting and child outcomes, and for both observational and mother report measures.

Given the literature demonstrating continuity of behavior problems across generations, experts have called for parent training and support services for mothers with conduct and substance use problems, and early prevention programs for their children (e.g., Trella et al., 2014; Zoccolillo et al., 2005). The intervention in this study appeared to reduce the impact of mother risk-taking on intrusiveness during early infancy, physical and psychological aggression in response to conflicts with their young toddlers, and parenting attitudes that favor corporal punishment and power assertion. These parenting attributes are particularly meaningful because they have been linked to risk for child maltreatment (Bavolek & Keene, 2001) and later child behavior problems (Holden et al., 2011). The intervention was also beneficial for the toddlers of high risk-taking mothers who scored higher than their control group counterparts on a mother report measure that captures curiosity, affection for caregivers, smiling, and enjoyment of challenges – aspects of motivation and development that contribute to school readiness, self-regulation and positive social relationships (Wang & Barrett, 2013).

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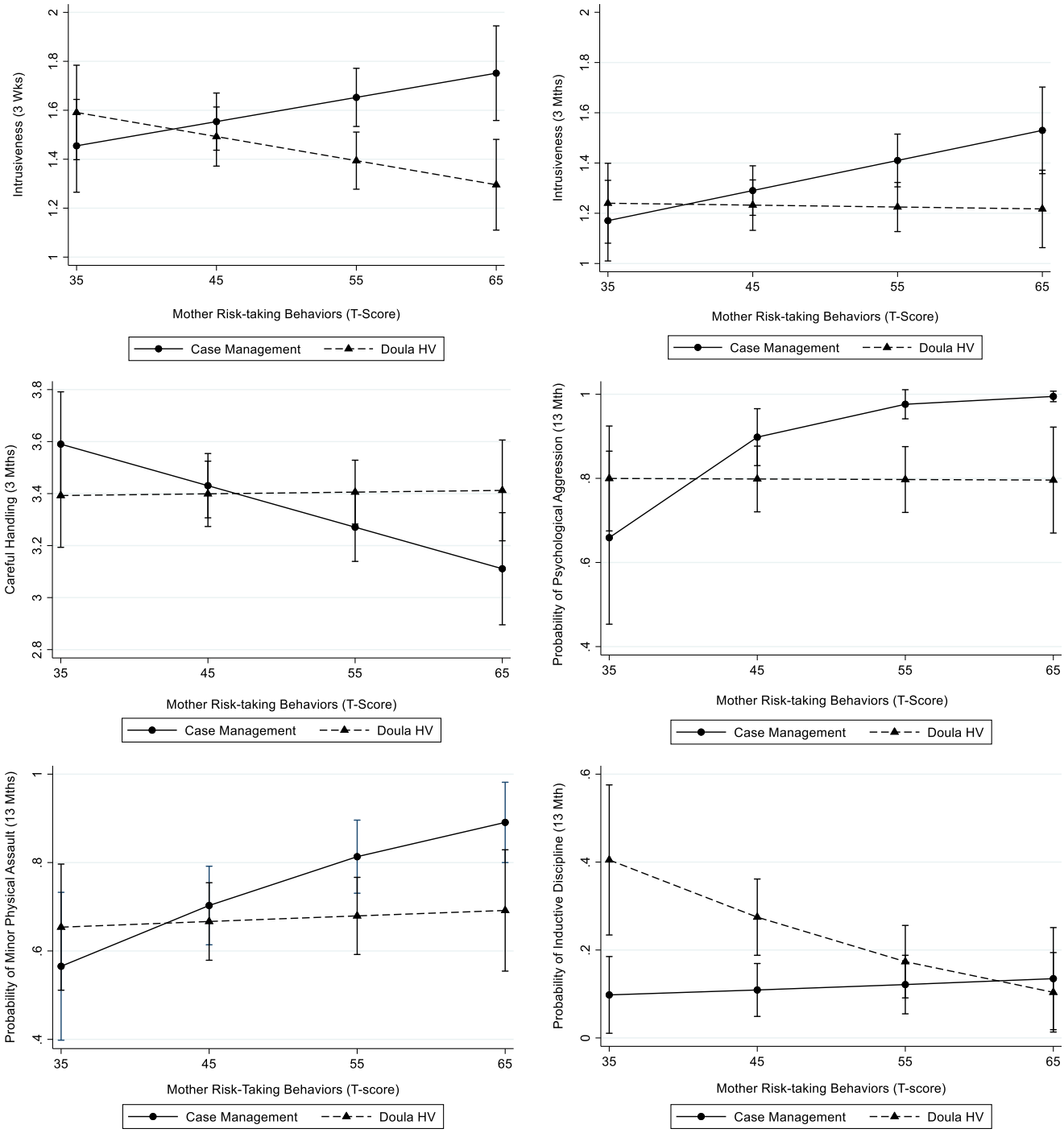

Figure 3. Mother risk-taking moderates doula home visiting effects on parenting behaviors.

Why might only high risk-taking mothers benefit from the intervention with respect to sensitive parenting and toddler social development? Since mothers involved in risk-taking activities are at greater risk for problematic parenting, they have more room for growth and perhaps more obvious behaviors and attitudes for home visitors to address, whereas the lower risk moms in this sample might be responsive to their infants' needs even absent home visiting services. As reported previously, the doula home visiting intervention had positive effects on infant safety practices (Hans et al., 2018) and early reading across young mothers (Edwards et al., 2020), which suggests that there may be a more universal need for support in these areas; guidance around sensitive, non-intrusiveness parenting may mostly be needed for higher risk moms. Adolescents involved in risk-taking are more likely to have experienced harsh parenting themselves (Bailey et al., 2009) and home visitors are able to offer education on alternative ways to understand and handle challenging infant and toddler behavior. They teach mothers about developmental expectations, help mothers normalize difficult behavior, explain that crying is a way for infants to communicate their needs, and that toddler assertiveness

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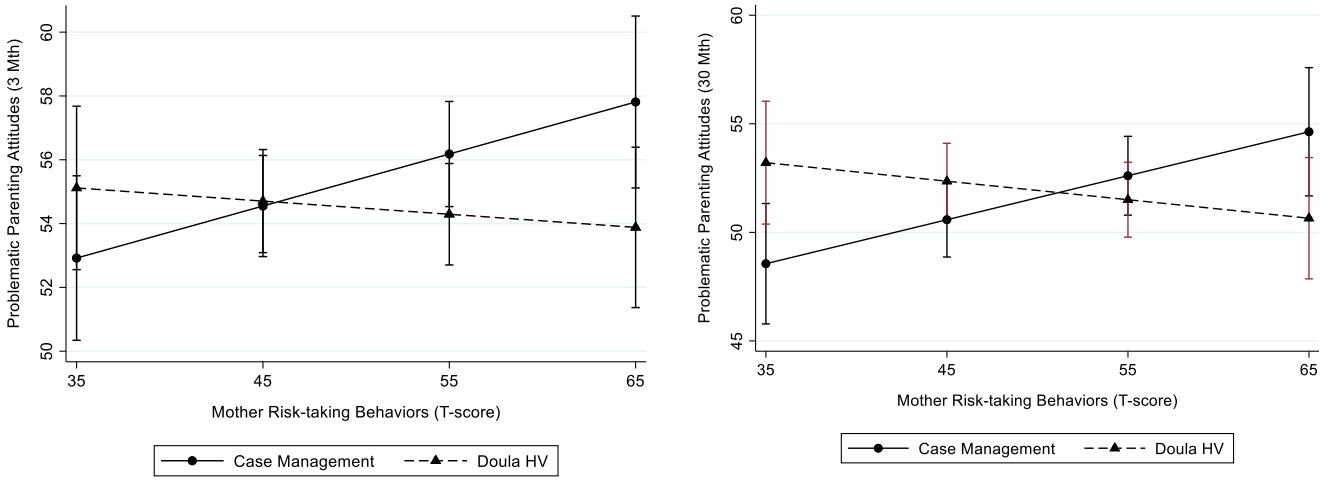

Figure 4. Mother risk-taking moderates doula home visiting effects on problematic parenting attitudes.

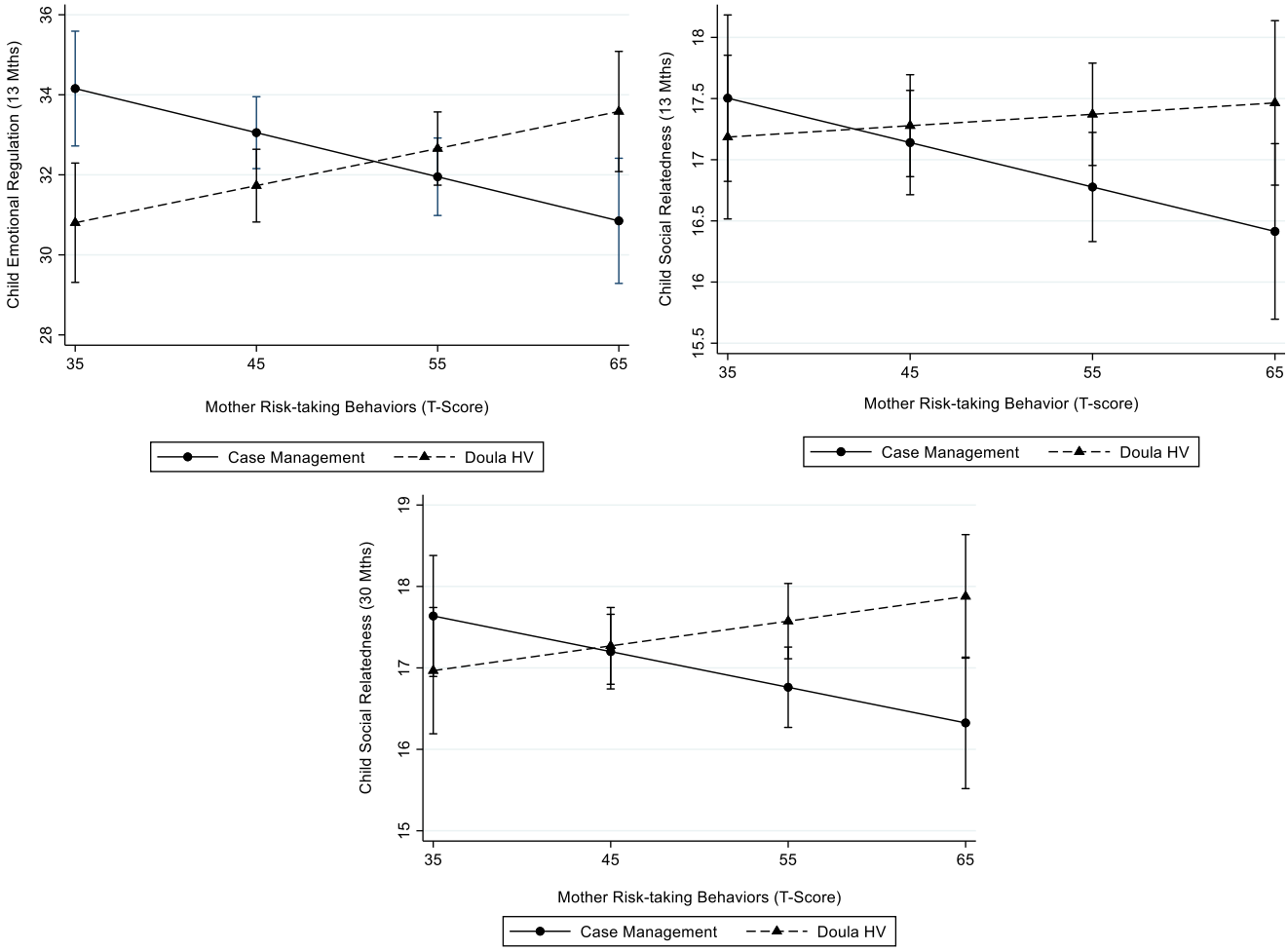

Figure 5. Mother risk-taking moderates doula home visiting effects on toddler social-emotional development.

and independence is developmentally appropriate. Additionally, the doula may serve as the mother's first example of how to carefully handle an infant and interact in non-intrusive ways.

Young mothers with a history of risk-taking may be responding well to the strengths-based, supportive relationships that the doulas and home visitors aim to develop. Mothers with multiple school suspensions and involvement with law enforcement may be accustomed to punitive and harsh interactions with authority figures. Because doulas are women from the community and often share similar life experiences, they deeply understand the unique challenges, stigma, and structural barriers that many of these young mothers encounter. They listen to and respect the mothers, and

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offer support in a non-judgmental way that can serve as an alternative to the mother's typical interactions with adults. Doulas and home visitors model trust and unconditional care, and in their relationship with the mother, the mother learns to be in a relationship with her infant.

Finally, the transition to parenthood can be an important turning point for adolescent and young mothers who engage in risk-taking (Cox et al., 2021). Qualitative studies indicate that many adolescents feel more responsible, mature, and experience a positive identity change when they become a mother (Clemmens, 2003). They express that having a baby helped them make better choices as they prioritized the needs of the baby and their role as a mother. As their priorities change, mothers report that they reduce their oppositional behavior such as "running" the streets and fighting (Cox et al., 2021). Developmental transitions can be an opportune time for intervention, and these mothers may have been open and motivated during pregnancy to accept the guidance of the doula and home visitor.

Service providers may find high-risk mothers challenging to work with and assume they are having little impact. Given the positive effects found in this study, however, practitioners should be encouraged to persist with these mothers and supervisors may need to offer additional opportunities for reflective supervision to process challenging cases. In many programs, it is not standard to assess for risk-taking behaviors, but there may be material and activities that home visitors can incorporate into their sessions, such as relaxation exercises for mothers who are emotionally volatile or information about substance use treatment, with greater awareness of the issues.

Strengths and limitations

Strengths of this study include the randomized controlled design, intent-to-treat analyses, longitudinal assessment with good retention, and the use of both mother report and observational measures. The research team had no involvement in the design or implementation of the intervention, or the training and supervision of staff, but rather studied the services as they are currently provided in community programs taken to scale. Four home visiting programs in different geographic areas were included in the study, so findings are unlikely to be the result of unique characteristics of a single program.

There are also limitations to the study that should be considered. The measure of maternal risk-taking did not include important related constructs such as anger regulation, aggression or involvement in specific delinquent activities, which may also be important elements of overall risk behavior, and internal consistency of the measure was acceptable but not high. Additionally, risk-taking was only assessed through self-report, and some young mothers may have felt reluctant to report underage substance use and delinquent activities to the research team. This study used mother-reported depressive symptoms but not clinically diagnosed depression, and, additionally, some research suggests that mother attachment style, which was not measured in this study, is important for how mothers with depression experience home visiting (Burrell et al., 2018). Only depressive symptoms measured at baseline were considered for moderation analyses, but depression can be chronic or episodic and symptoms can fluctuate – all of which can impact parenting and potentially the mother's ability to engage with the intervention over time. Results may not be generalizable to other populations of mothers in home visiting, particularly older mothers for whom risk-taking is less prevalent.

In this study, it was not possible to test whether the integration of doula and home visiting services, or either doula services or home visiting alone were central to program outcomes, particularly for high risk-taking mothers. The doula and home visitor differ in important ways, including their background and training, areas of expertise, focus and timing of services, and intensity of the relationship with the mother, but in traditional programs the home visitor assumes some of the responsibilities that were handled by the doulas in this study. Future research should explore the outcomes and experiences of young mothers with one home visitor compared to doula-enhanced home visiting to better understand the added value of doula services.

Implications and future research

This study adds to the large literature suggesting that early childhood home visiting has positive effects for parents and children and that such programs should continue to be offered to low-income parents. But the findings also suggest the need for targeted services. Few home visiting programs or other parenting interventions have specifically focused on mothers with conduct problems and other risk behaviors, and research on the impact of mental health on home visiting has been largely limited to maternal depression. The current study suggests that doula home visiting is a promising intervention and other home visiting models may have similar success for mothers engaged in risky behavior, but these findings need to be replicated. A sample specifically selected to include both high and low risk-taking mothers should be used in future studies. Samples of older mothers will also be needed to test whether the current findings are limited to adolescent and young mothers who are in a stage of life where risk-taking is more common. Given the changing nature of depression and the possibility for intervention effects on maternal mental health, bi-directional influences between home visiting participation and depressive symptoms over time should be examined in relation to parenting and child outcomes.

The current study used precision home visiting as a guiding framework in testing subgroup effects, but another important pillar is testing active ingredients and understanding mechanisms of change (Supplee & Duggan, 2019). Future studies need to ask questions such as, what specific components of the doula services are critical in fostering positive impacts, and what more immediate changes occur with the mother that lead to less intrusive parenting? Mechanisms of change for high risk-taking mothers in particular should be explored and could include trust in relationships, knowledge of infant development and parenting strategies, and social/life choices. These studies will require earlier and more frequent assessment of home visiting process and content, fidelity of home visits to program models, and mother and family mediating attributes.

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