Determinants of Fathers' and Mothers' Involvement in a Parenting Intervention

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Parental involvement in interventions is key to their success. Drawing on data from an ongoing book-based parenting intervention aimed at increasing knowledge of child development among fathers and mothers of infants, we examined parents' participation and quality of their engagement in the first 2 waves of the intervention, when children were 9 to 12 months old. We also examined the factors that predicted parents' level of participation in the intervention. We report 2 sets of findings. First, parents participated an average of 2.6 times per week, and mothers participated more frequently than fathers. Almost all parents reported that they enjoyed reading the books regardless of their level of participation, though mothers reported slightly more enjoyment than fathers. Second, results of regression tree analyses showed that the most important predictor of mothers' and fathers' participation in the intervention was whether or not their partner was also participating. The other important set of predictors was the level of resources, hours worked, education, and household income for fathers and employment status and income for mothers. Our findings have important implications for improving fathers' and mothers' participation in interventions.

Public Significance Statement
Increasing parent involvement in interventions is a primary goal of programs and policymakers. In this study, we found that mothers participated in a book-based parenting intervention more often than fathers. We also found that for both fathers and mothers, the most important factor that predicted their intervention involvement was their partner's involvement.

Keywords: fathers, intervention, parenting, participation, infants

There is substantial public and private investment in designing and implementing parenting interventions to support parents (National Academies of Sciences, Engineering, and Medicine, 2016). The majority of parenting interventions focus on mothers and relatively few include both mothers and fathers (Panter-Brick et al., 2014). The data on the effectiveness of parenting interventions are not very rigorous (Spoth, 2008), and, consequently, the question of whether or not interventions work continues to be important to ask. One way to improve our understanding of whether or not

interventions work is by grounding evaluations of interventions in developmental research as well as in theories of program involvement (Olds, Sadler, & Kitzman, 2007). Program involvement is generally defined as the frequency of participating in an intervention as well as the quality of engagement with that particular intervention (Olds et al., 2007). A theory of program involvement can shed light on participants' beliefs and behaviors, including the question of why parents would want to be involved in an intervention in the first place (Knox, Cowan, Pape Cowan, & Bildner, 2011; Nelson, Cordray, Hulleman, Darrow, & Sommer, 2012; Olds et al., 2007). Program involvement is certainly a critical element of whether or not an intervention is effective.

To date, there is little information about the correlates of mothers' and fathers' involvement in parenting interventions (Mytton, Ingram, Manns, & Thomas, 2014; Sicouri et al., 2018; Spoth & Redmond, 2000). Two of the most robust reasons why interventions fail to produce results are high levels of participants' attrition and limited engagement in the intervention (Fletcher, Freeman, & Matthey, 2011; Gomby, Culross, & Behrman, 1999; Spoth & Redmond, 2000). We know that fathers' and mothers' contribution to children's development is unique, which suggests that the factors that predict levels of attrition and engagement might also be unique (Cabrera, Jeong Moon, Fagan, West, & Aldoney, 2020;

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Cabrera, Shannon, & Tamis-LeMonda, 2007; Lamb & Lewis, 2010; Martin, Ryan, & Brooks-Gunn, 2010). Understanding the factors that are associated with mothers' and fathers' participation in interventions can then provide researchers with information about feasible ways to increase mothers' *and* fathers' involvement, which can theoretically increase the effectiveness of interventions (Coatsworth, Duncan, Pantin, & Szapocznik, 2006a; Durlak & DuPre, 2008; Gansle & Noell, 2007). We address this significant problem by exploring parental involvement in a reading-based parenting intervention for two-parent families of infants, the Baby Books 2 Project (BB2). Specifically, we ask the following questions: (a) What are mothers' and fathers' levels of involvement in a parenting intervention? Does involvement in the intervention vary by parent gender? (b) What are the factors that predict mothers' and fathers' intervention involvement?

Baby Books 2

The BB2 project is an ongoing randomized control trial of a parenting intervention in the United States to improve child development knowledge among first-time, low-income, cohabiting heterosexual parents (Cabrera & Reich, 2017). The goal of the BB2 intervention is to test whether increases in child development knowledge would increase parenting practices that promote optimal child development and improve the quality of parent–child relationships, which in turn would improve child outcomes. The intervention consists of bilingual (Spanish–English) read-aloud "baby books" for each developmental stage (i.e., 9, 12, 18, and 24 months) embedded with anticipatory guidance (AG) messages. AG messages are based on the American Pediatric Association' Bright Futures Guidelines for Health Supervision (Hagan, Shaw, & Duncan, 2008), providing advice (i.e., anticipatory guidance) to parents about how to promote children's socioemotional, cognitive, language, math, and physical development; improve parenting practices, including using appropriate discipline and safety practices; and, improve coparenting support. The BB2 books include books for mothers and books for fathers. The books for each parent are equivalent in storyline and content, except that both the titles and main characters of the books for mothers are mothers (e.g., "Mommy's Growing Baby") and the title and main characters of books for fathers are fathers.

To be eligible for BB2, both parents were required to pass a literacy screener administered during recruitment which required at least a 1st grade reading level in either English or Spanish. Then parents had to meet the following criteria at the initial home visit: be co-residing (i.e., mother, father, and child must be living together), be first-time biological parents, and have an annual household income of up to $75,000 or 300% of the federal poverty line for a family of four. We included a wide range of household income up to $75,000 to capture families that fall within the "low income" category as defined by the Department of Housing and Urban Development Income Limits in the areas from which the families were recruited (United States Department of Housing and Urban Development, 2017). Mothers and fathers were recruited by English and English/Spanish bilingual researchers at community centers, physician offices, emergency room waiting rooms, farmers' markets, parks, and clinics administering the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) in two major metropolitan areas—one in the mid-Atlantic

and one in the Southwest. Families were recruited when their baby was less than 9 months of age and followed until their child was 30 months of age. Families were told that the project was aimed at understanding how reading to babies helps them learn and were offered children's books as well as financial compensation for their time. Overall, our sample consists of first time, heterosexual parents, the majority of whom reported English as a second language, at least a third of the families identifying Spanish as their primary language.

Data collection for BB2 took place over multiple home visits, phone calls, and online surveys when the children were 9, 12, 15, 18, 21, 24, and 30 months old. Participating families were consented at the baseline home visit when the child was 9 months old and were randomly assigned to one of the four conditions prior to completing their initial visit. The four conditions determined the type and number of books the parents received. The parents were given either: a "mommy" book *and* a "daddy" book, a "mommy" book only, a "daddy" book only, or a commercially produced book with no target parent. So, families in the first group (i.e., "mommy" book *and* a "daddy" book) received two books, whereas families in the other three groups received only one book. All of the books provided to families were bilingual and had text in both English and Spanish. All home visits (9-month, 18-month, 24-month, and 30-month) were scheduled at a time convenient for the family. Mothers and fathers were present for all baseline home visits and participated in data collection equally. Data collection was conducted in either English or Spanish as requested by the participants.

The home visits consisted of mother and father interviews, a child language assessment, a direct assessment of parents' executive functions, and video-taped mother-child and father-child semi-structured interactions. The parent–child interactions included four sections: shared reading, free-play without toys, free-play with toys, and a clean-up task. Following the completion of data collection, fathers and mothers were shown a brief video that described the benefits of reading to infants and demonstrated strategies for positive parent–child reading interactions. At the conclusion of the video, the parents were given either intervention books or commercial books, based on condition. Parents were instructed to read the book to their child every day or as often as possible using the tips they saw in the video.

Phone interviews were conducted when children were 12, 15, and 21 months of age. Phone calls were scheduled separately for mothers and fathers, at times that were convenient for each parent. During the phone calls, parents were interviewed about changes to their employment and living arrangements, their child's health and social development, and their participation in the intervention. To minimize the burden of phone call surveys on participants, additional questions were sent via a link to Qualtrics. The institutional review boards of two universities approved all project materials and procedures.

The data for this study were drawn from the first two waves of data collection: (a) a home visit when the child was within five days (plus or minus) of their 9-month birthday and (b) a phone call survey when the child was within five days (plus or minus) of their 12-month birthday. These data assess parents' quality of engagement in the initial wave of the intervention, during which books were provided only once (at the 9-month home visit).

Parental Involvement in Parenting Interventions

There is substantial variability in how parental involvement in interventions is defined and, consequently, measured (Korfmacher et al., 2008). Some intervention studies use retention as an indicator of involvement, categorizing parents as "drop-outs" or "completers." However, how dropouts and completers are defined (i.e., how many sessions participants need to attend) is often unclear and differs across studies. Thus, there is large variability among studies in how parent involvement in interventions is assessed, making comparison of findings across studies challenging, at best (see Coatsworth et al., 2006a for a discussion; Korfmacher et al., 2008).

Some studies view the number of sessions attended, typically by mothers, as an indicator of dose (Baggett et al., 2017). However, this categorization does not recognize the heterogeneity of participants (usually mothers) in the different dosage groups (Coatsworth et al., 2006a). Dosage (i.e., number of sessions) may not be an accurate way to measure intervention receipt because there is tremendous variability in the experiences of participants, even if they may share equal number of sessions (Korfmacher et al., 2008). Another way to assess dosage is by using a participation rate proportion score (i.e., sessions attended out of sessions offered). This approach also suffers from the previously mentioned limitations (Coatsworth et al., 2006a). Coatsworth and colleagues (2006a) argued that a person-oriented conceptual and analytic approach is a better way to examine patterns of attendance and its correlates. Importantly, this framing acknowledges that participants may stay in an intervention, but not be engaged in the actual program delivery. Similarly, Olds et al. (2007) argued that whether or not an intervention produces changes in mothers' and fathers' behaviors is not dependent solely on the number of sessions completed (i.e., participation) but also on the extent to which the intervention is able to engage and motivate (i.e., quality of engagement) its participants as well as convey the program as being beneficial to parents.

Other scholars measure parental involvement in interventions as fidelity or the extent to which an individual receives and implements the intervention's core components as proposed by the theory of change (Nelson et al., 2012). In their review of how mothers and fathers are involved in early childhood home visiting services, Korfmacher and colleagues (2008) define involvement as "the process of the parent connecting with and using the services of a program to the best of the parent's ability" (p. 173). In their view, involvement in an intervention includes two broad dimensions: participation and quality of engagement. *Participation* is defined as the quantity (how much) of the intervention a participant receives (e.g., frequency of home visits or the duration of staff-family contact). In contrast *quality of engagement* is defined as the emotional quality of participating in the intervention and considers how participants feel about the services they receive or the intervention in which they participate. Quality of engagement is often measured by the strength of the relationship between participants and program staff or the amount of conflict families have with the information presented in the intervention. In this article, we use Korfmacher and colleagues' (2008) definition of parental involvement that includes measures of both participation *and* quality of engagement with a parenting intervention. Importantly, we look at both mothers and fathers and measure involvement as the frequency with which mothers' and fathers' report reading the intervention books *and* the quality of their engagement as self-reported enjoyment of reading the books.

Correlates of Parental Involvement in Interventions

We draw from ecological systems theories that individuals' behaviors are influenced by multiple interdependent ecological systems where factors most proximal to individuals are likely to exert greater influence on specific behaviors than distal factors (Bronfenbrenner, 1995; Bronfenbrenner & Morris, 2007). Proximal factors include interactions with others in the family system. Accordingly, the degree to which parents are involved in interventions is likely determined by a host of individual and family characteristics, including parents' beliefs and values about child rearing, socioeconomic status (SES), and parenting practices such as shared book reading (Coatsworth, Duncan, Pantin, & Szapocznik, 2006b; Mendez, Carpenter, LaForett, & Cohen, 2009; Spoth & Redmond, 2000). These studies have mostly included mothers; thus, it is unclear whether or not the factors that predict maternal involvement also predict paternal involvement.

We also draw from family systems theory that individuals in families constitute a set of interdependent subsystems that affect each other (Cox & Paley, 1997). Because mothers and fathers, as part of the family system, tend to influence each other, a parent's involvement in an intervention may have a spillover effect onto the other parent. Spoth, Redmond, Hockaday and Shin (1996) examined the barriers that influenced mothers' and fathers' decision not to participate in a preventive intervention. They found that fathers were more likely than mothers to cite their partners' refusal as a reason for not participating, leading the authors to conclude that targeting mothers' involvement in interventions may be one way to promote fathers' involvement in parenting interventions.

Demographic Characteristics and Involvement in Interventions

Studies that have examined associations between indicators of SES, such as income, employment and education, and rates of mothers' and fathers' involvement in interventions report mixed findings. Some studies find that across a range of child ages, mothers who reported lower income and less education were less likely to participate or be retained in parenting interventions (Coatsworth et al., 2006a; Robinson, Adair, Coffey, Harris, & Burnside, 2016). A qualitative study of father participation in a behavioral parent-training program found that for fathers, work schedules were a barrier to involvement (Salinas, Smith, & Armstrong, 2011). It is possible that families experiencing financial strain may focus their efforts on meeting basic needs rather than participating in interventions (Staudt, 2007; Wong, Roubinov, Gonzales, Dumka, & Millsap, 2013).

But other studies have found weak or no significant associations between maternal and paternal education and parental involvement in interventions (Gross, Julion, & Fogg, 2001; Spoth & Redmond, 2000; Whittaker & Cowley, 2012; Wong et al., 2013). In a review of 28 studies that examined the predictors of recruitment and retention in interventions targeting mostly mothers, Robinson et al. (2016) found that sociodemographic predictors, such as education, income, and socioeconomic status, were predictive of retention in randomized controlled trials for only half of studies that included

these variables in their analyses. One study with mostly mothers (92%), however, found that compared to higher income parents, lower income parents tended to perceive greater benefits to involvement when interventions were aimed at preventing child maltreatment, which was significantly related to program attendance and participation (Corso, Fang, Begle, & Dumas, 2010). In another systematic review of the facilitators and barriers that were related to intervention engagement, perceived need for services was cited as an important facilitator by participants, especially among families with lower SES (Mytton et al., 2014). However, analyses were not conducted by parent gender, so it is unclear whether perceived need was an important predictor of both mothers' and fathers' participation. Based on this literature review, we examine the association between indicators of SES and mothers' and fathers' involvement in the BB2 intervention.

Values, Beliefs, and Participation

Parenting behaviors, in general, are also influenced by parents' own values and beliefs about parenting and child rearing (Bornstein, Cote, Haynes, Hahn, & Park, 2010). If parents believe that it is important to learn about how to rear a child, then they may be more likely to participate in interventions aimed at improving child rearing practices. Evidence for this perspective comes from studies that find parents routinely seek information about how to rear their children, although mothers access more resources compared to fathers (Bernhardt & Felter, 2004; Radey & Randolph, 2009). Indeed, studies have found that when mothers and fathers believe that an intervention is useful or beneficial to their child, they are more likely to enroll and participate (Spoth & Redmond, 1995; Wellington, White, & Liossis, 2006).

Other research has shown that the degree to which the intervention aligns with parents' norms and beliefs about child rearing and parenting is associated with high levels of parent involvement in interventions, especially among parents of young children (McLaughlin, Denney, Snyder, & Welsh, 2012). The alignment between the goals of the parenting intervention and parent's goals and beliefs about child rearing is referred to as treatment preference. Baydar, Reid, and Webster-Stratton (2003) found that in an intervention with Head Start (HS) families aimed at increasing positive discipline strategies and effective parenting skills, mothers who frequently used harsh and negative parenting practices were more likely to have higher levels of participation than mothers who had higher levels of supportive or positive parenting. The researchers speculated that mothers who used more harsh and negative parenting practices believed that the intervention program would increase their knowledge of how to discipline their children more positively or were more motivated to change their parenting behaviors. In a qualitative study on White and Latino fathers' engagement in Early Head Start (EHS) and HS, fathers reported participating in activities (e.g., field trips) that were in line with their parenting goals to support their children's learning and with their views of their role in their child's development (Anderson, Aller, Piercy, & Roggman, 2015). In another qualitative study with HS fathers, Latino fathers discussed how their goal of raising their child well motivated them to enroll their family in HS (Raikes, Summers, & Roggman, 2005). Latino fathers described the program's goals as aligning with their goals of serving as a role model for their children. The African American fathers who participated

in the same study similarly discussed how their goal of supporting their children's education motivated them to be involved in HS (Raikes et al., 2005).

In their systematic review of qualitative studies that included mothers and fathers, Mytton et al. (2014) found that parents preferred programs that helped them develop new skills to promote closer relationships with their children and that supported their own personal development. Typically, parenting programs use curricula that increase parents' knowledge of child development; that is, parents learn positive discipline strategies, how to develop better relationships with children, and how to engage frequently in parenting practices (such as reading) to promote children's learning and development (Chacko, Fabiano, Doctoroff, & Fortson, 2018; Sanders, 2008).

Overall, the evidence suggests that when programs offer parenting activities or curriculum that align with mothers' and fathers' parenting goals and beliefs, parents may be more motivated to participate than when there is misalignment. We expect that parents whose treatment preferences (i.e., read to children and have low levels of child development knowledge) align with the goals of the BB2 intervention (i.e., read books to children to understand how it helps them learn) will be more involved in the intervention than parents who do not.

Partner Influences on Parent Involvement in Interventions

Within a family system perspective, various mechanisms have been proposed to explain the link between one subsystem (parent–parent) and another (parent–child) in the family context (Cox, Paley, & Harter, 2001). Consistent with family systems theory, one proposed pathway is through disruptions to the parent–child relationship; that is, negative feelings and behaviors between partners *spillover* to predict negative interactions with their children, known as the spillover hypothesis (Cox & Paley, 1997; Cox et al., 2001). Spillover is hypothesized to occur when conflict in the marital dyad, for example, is transferred to conflict in the parent–child dyad (Cox et al., 2001). That is, the hostility felt in the marriage causes parents to be irritable and less patient with their child. Studies that have tested for spillover effects have typically tested it to explain why marital discord has negative effects on children (Cummings & Davies, 2010).

The studies that have examined how the behavior of one parent might have spillover effect on the behavior of the other parent are quite limited. A study of family literacy practices with 9-month-old infants found that mothers who reported a high number of depressive symptoms had partners who were less engaged in literacy activities with their infants (Cabrera, Shannon, & La Taillade, 2009). In another study, fathers who had high levels of risk when children were 9 months of age had partners who were less supportive when children were 24 months old, suggesting a spillover effect (Cabrera, Fagan, Wight, & Schadler, 2011). To date, the research on spillover effects tends to focus on the spillover of negative practices or conflicts. Little research has explored positive spillover effects, but some studies suggest that partners affect each other in both negative and positive ways. Although not formally tested as spillover effects, a study of the impacts of a relationship intervention program for parents found that couples who showed changes in positive couple interactions also showed

changes in their levels of involvement with their children (Adler-Baeder et al., 2013). Similarly, in another study, fathers who reported feeling higher levels of acceptance from their partners reported engaging in higher levels of positive reinforcement with their children (Morrill, Hawrilenko, & Córdova, 2016).

In the context of a parenting intervention, we expect that spillover effect may occur when mothers and fathers reinforce each other's participation in the intervention. For instance, mothers (or fathers) participating in the intervention (i.e., in BB2 are seen reading to their children) may serve as good role models for fathers (or mothers) who observing their partner read to their children might be motivated to also read to their children. That is, parents will reinforce each other in learning and implementing new parenting strategies, which can lead to more consistent child rearing practices across parents and less disagreements regarding parenting their child. The spillover effect can also occur when mothers and fathers who receive the same parenting information discuss what they have read, further reinforcing the practices learned in the intervention. The present study tested the spillover hypothesis and expected that parents who are highly involved in the intervention will have partners who are also more involved in the intervention.

Fathers' and Mothers' Involvement in Interventions

Understanding whether or not involvement in interventions differs for mothers and fathers and, if so, why, is central to developing and adapting interventions that yield positive outcomes for both parents. Empirical evidence shows that the goals of interventions (e.g., to improve parents' child rearing practices) are more likely to be maintained in the long-term when both parents participate (Panter-Brick et al., 2014). Yet, there is a limited understanding of whether parents differ in their levels of involvement in parenting interventions partly because there are so few interventions that target both parents (Cabrera & Reich, 2017; Cowan, Cowan, Pruett, Pruett, & Gillette, 2014; Feinberg & Kan, 2008). But even in interventions where both parents are targeted, the findings are often not analyzed by gender or are mixed (Panter-Brick et al., 2014). Some find no differences in mothers' and fathers' levels of involvement (Frank, Keown, & Sanders, 2015) and others find greater impacts of interventions for mothers.

A meta-analysis of 11 parent-training studies that included data on mothers and fathers found that parenting behaviors among mothers improved more than parenting behaviors among fathers immediately following parent training (Lundahl, Tollefson, Risser, & Lovejoy, 2008). Moreover, mothers were more likely to perceive the parenting intervention more positively than fathers (Lundahl et al., 2008). One reason for the differences in benefits between parents might reflect the different ways in which mothers and fathers behave during interventions. For example, mothers might view joint parenting sessions as more for them than for fathers and consequently participate more whereas fathers might view them as less for them and participate less often. Unfortunately, none of the studies included in the meta-analysis analyzed the levels of parents' participation by parent gender. But in a study of a Group Triple P parenting program that was modified to include father-oriented content (e.g., discussing father-specific challenges in raising children), researchers found that attendance and parent-reported satisfaction with the program were high among both mothers and fathers (Frank et al., 2015).

Other studies suggest that differential levels of participation between parents might reflect individual preferences. For instance, research suggests that fathers may prefer interventions that are activity-based because they enable them to spend quality time with their children (Maxwell, Scourfield, Featherstone, Holland, & Tolman, 2012). Fathers also have reported wanting parenting information to be conveyed in small doses (Sicouri et al., 2018), whereas mothers tend to prefer interventions that improve children's behaviors or social skills (Fabiano, Schatz, & Jerome, 2016). Given these potential differences in preferences between mothers and fathers, we examine the factors that predict maternal and paternal involvement in the BB2 intervention.

The Current Study

The overarching goal of the current study is to increase our limited understanding of the factors that predict maternal and paternal involvement in the BB2 intervention, which is a parenting intervention designed for both mothers and fathers and aims to increase their knowledge of child development. Guided by bioecological and family systems theories as well as theory of program involvement (Bronfenbrenner & Morris, 2007; Cox et al., 2001; Olds et al., 2007), we first examine levels of mothers' and fathers' involvement (i.e., frequency of participation *and* quality of engagement) in the BB2 intervention. We then explore whether indicators of SES (e.g., employment, household income, education, and financial strain), partner involvement in the intervention, and indicators of treatment preference (i.e., knowledge of child development and shared book reading practices) predict levels of parent involvement (quantity and quality) in BB2 and whether these vary by parent gender.

We use data from BB2 and ask the following research questions:

RQ1: What are mothers' and fathers' level of involvement (i.e., how often parents report reading the books *and* do they report liking the books) in the BB2 intervention? Does involvement in BB2 vary by parent gender?

RQ2: What are the factors that predict mothers' and fathers' involvement in BB2?

We hypothesize that parents who have lower levels of education and household income and higher levels of employment and financial strain will be less likely to be involved (i.e., read the books less often and report not enjoying the books) in the intervention than their counterparts. We also hypothesize that parents who have less knowledge of child development, read often to their children, and have a partner who regularly participates in the intervention (i.e., frequency of reading the books) will be more involved in the intervention than parents who do not.

Method

Participants

Participants for this study were drawn from the larger BB2 study (*N* = 210 families) and included a racially and ethnically diverse sample of mothers and fathers and their infants. The analytic sample for this study includes families in which intervention participation data at the 12-month wave were available for both

Table 1
Missingness Breakdown

Intervention wave	Individual parents N (% missing)	Fathers n (% missing)	Mothers n (% missing)	Full families n (% missing)
Enrolled at baseline	420	210	210	210
Enrolled at Wave 2	411 (2%)	205 (2%)	206 (2%)	205 (2%)
Completed Wave 2 data collection	371 (12%)	178 (15%)	193 (8%)	177 (16%)
No missing participation data	364 (13%)	176 (16%)	188 (10%)	170 (19%)

Note. Only data from families with participation data for both parents ($N = 170$) were included in the analytic sample.

parents ($n = 170$ families; Table 1). Bias analyses comparing families who were missing participation data ($n = 40$) with families included in the analytic sample ($n = 170$) revealed that the two groups did not differ significantly on household income, work status, or hours worked. The only significant difference between the two groups was in parental education, with parents in the analytic sample reporting higher education levels ($M = 2.72$, $SD = 0.989$) than parents not in the analytic sample ($M = 2.26$, $SD = 0.924$; $t(417) = 3.74$, $p < .001$.). Thus, our results likely generalize to families who signed up for BB2 and have high levels of education.

Measures

Outcome variable. *Parent involvement* was measured following Korfmacher and colleagues (2008) definition of involvement and included both quantity or frequency of participation (i.e., how often parents read the intervention book/s) *and* quality of engagement (i.e., did the parents like the intervention book/s).

Parents' frequency of participation was assessed by asking parents during the 12-month phone call how often they read the intervention baby books in a typical week. The distribution of parents' responses is shown in Figure 1. Parents who reported reading the book more than seven times per week ($n = 7$) were recoded as reading seven times per week to reflect daily readers. Parents' quality of engagement in the intervention was also assessed at 12 months asking parents how much they enjoyed reading the intervention books using a Likert scale of response options,
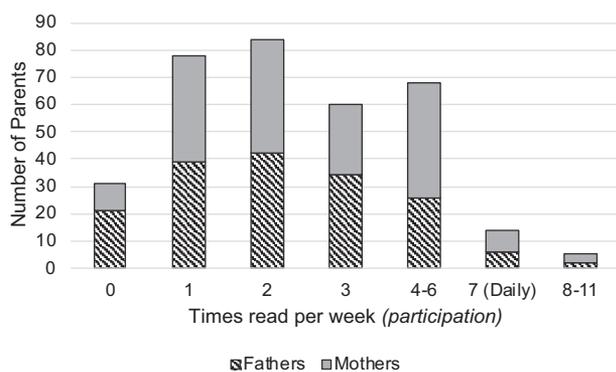
including $1 = not\ at\ all$, $2 = a\ little$, $3 = somewhat$ and $4 = a\ lot$. Parents' responses to the quality of engagement question were highly positively skewed and significantly correlated with parent's levels of participation, $r = .234$, $p < .001$. Because the quality of engagement variable had little variability, we tested our predictors only with parents' participation in the intervention. Therefore, our measure of involvement in the intervention included only frequency of participation.

Predictors. All predictor variables come from the 9-month wave of data collection, with the exception of partner's participation in the intervention (i.e., how often they read the book in a typical week), which was measured during the 12-month phone call survey.

Parents' education level. Mothers and fathers were asked to report their education level using the following response options: less than high school, completed high school, some college, or 4-year degree or higher. To preserve the ordinal nature of the measure, parents' education level was entered into the model as a continuous variable. However, the results should be interpreted using the ordinal nature of the data (James, Witten, Hastie, & Tibshirani, 2013). For more information, see the analytic plan.

Parents' employment status and hours worked. Parents were asked whether they were currently working or in school and if so, the number of hours worked in the past week for each job and/or school. Parents' responses for all jobs and school were summed to create a total number of hours worked. Because there was substantial variability in the number of hours parents worked or were in school, both parents' work status (a dichotomous variable for working or not working) and the number of hours worked (a continuous variable) were included in the analyses.

Household income. Parents were asked to report on their annual household income either by reporting a continuous value or selecting from a list of provided categories. Data for parents who responded with a continuous value were converted to the associated category. The household income categories were as follows: $10,000 or less, $10,001 to $20,000, $20,001 to $30,000, $30,001 to $40,000, $40,001 to $50,000, and more than $50,000. To preserve the ordinal nature of the measure, household income was entered into the model as a continuous variable. However, the results should be interpreted using the true categorical nature of the data. For more information, see the analytic plan.

Financial strain. Parents were asked a set of six questions regarding how much they had experienced financial strain (e.g., "How much difficulty did you have paying your bills each month?") using a 5-point Likert scale response (e.g., "no difficulty

Figure 1. Frequency of parents' participation (i.e., times reading per week) in the Baby Books 2 parenting intervention ($N = 170$).

at all," "a little difficulty," "some difficulty," "quite a bit of difficulty", and "a great deal of difficulty"). The six items were averaged to create a composite financial strain score, with higher scores representing higher levels of financial strain. To preserve the ordinal nature of the measure, financial strain was entered into the model as a continuous variable. However, the results should be interpreted using the true nonparametric nature of the data. For more information, see the analytic plan.

Parents' treatment preference refers to the view that parents are more likely to participate in a parenting intervention such as BB2 when it aligns with their beliefs about parenting. For example, parents who read often to their children are more likely to believe that reading is beneficial than parents who do not and parents who have a greater knowledge of child development are less likely seek out information than do parents who have less. In this study, treatment preference was assessed with two baseline variables: knowledge of child development and frequency of shared book reading to children. *Knowledge of child development* was assessed at the 9-month home visit using the Opinions About Young Children Questionnaire, a criterion-referenced 41-item measure adapted from the Opinions About Babies Questionnaire (Reich, 2005) that assesses parents' knowledge of children's health and development, safety practices, discipline strategies, and coparenting (Cabrera & Reich, 2017; Reich, 2005). Parents were presented with several statements; possible responses were "agree," "disagree," or "no opinion." For the purposes of the current study, only the nine items related to cognitive, emotional, and language development were included in the analyses. Each item was scored as correct or incorrect. Items in which the parent indicated having no opinion were scored as incorrect. The percent correct was calculated by dividing the number of correct responses by the total number of items answered and was entered as a continuous variable. Shared *book reading frequency* was measured using a 7-point scale item ($1 = never$; $7 = daily$) from the Home Literacy Environment Questionnaire (Farver, Xu, Eppe, & Lonigan, 2006). To preserve the ordinal nature of the measure, reading frequency was entered into the model as a continuous variable. However, the results should be interpreted using the true categorical nature of the data. For more information, see the analytic plan.

Control Variables. We included two sets of control variables in our analyses: family characteristics and intervention characteristics. Family characteristics, such as family participation in additional support programs, was controlled for because it is related to participation in interventions (Durlak & Dupre, 2008). Family participation in programs was assessed by asking parents whether they participated in any parenting programs (e.g., Healthy Start, Nurses for Newborns) at the 9-month home visit and was coded as a dichotomous variable for the analysis.

Intervention characteristics included the intervention condition (i.e., "both" condition in which families received two intervention books one for mothers and one for fathers, the "dad" condition in which families received one "dad" book, the "mom" condition in which families received one "mom" book, and the control condition in which families received one commercially available book for both parents) and ethnic congruence. At the first wave of BB2, when children were 9 months, the BB2 book featured a Black family and the commercial book featured a family of animals. Ethnic congruence was coded as a dichotomous variable and represents whether the participant's ethnicity was reflected in the illustrations of the book they were given, which included African, Afro-Caribbean, and African American parents who received the intervention BB2 book.

Analytic Plan

To address our first research question about the frequency of mothers' and fathers' involvement in the intervention and whether parent involvement in the intervention varied by parent gender, we calculated descriptive statistics and paired *t* tests.

To address our second research question about the factors that determine parents' participation in the intervention, we conducted regression tree analyses with parents' frequency participation in the intervention as the outcome (James et al., 2013; Venables & Ripley, 1999). We did not include parents' quality of engagement in the intervention into our regression models because of the lack of variability in this variable. Regression trees are a statistical learning method that allows for the identification of predictive variables and their relative importance to the outcome variable. Tree-based methods are used to represent a simple expression of complex systems and variable structures (James et al., 2013; Venables & Ripley, 1999). In this case, regression trees allow us to identify which variables predict intervention participation, at what level, and for whom (e.g., what level of education predicts intervention involvement).

The goal of regression tree analyses is to predict the level of the outcome variable based on a set of predictor variables. From the set of predictor variables (including predictors and control variables), the statistical learning program identifies the predictor that provides the most accurate split between cases (i.e., what predictor variable would split the cases into two groups that most accurately predict the outcomes). For binary predictor variables, the split aligns directly with the two variable levels (e.g., those who received the book in their native language split from those who did not). For continuous variables, the program determines the level at which the split would be most accurate (e.g., you can approximate the split between less involved and more involved parents by splitting cases based on income at an annual household income of $30,000). This process is then repeated for each subset of cases until further splits cease to increase the accuracy. The result is a regression tree, with "leaves" that represent groups of cases described by the recursive splits and their predicted outcome (e.g., parents who make more than $30,000 per year, have a partner who participates in the intervention more than twice a week, and are in the "both" condition are predicted to participate in the intervention 3.5 times per week).

To create the regression tree, data are first split into two sets: a training set and a test set. The training set (i.e., a percentage of our overall sample) is used to develop the regression tree. The regression tree is then applied to the test set (i.e., the rest of our overall sample) to provide an unbiased test of the accuracy of the model.

We chose regression tree analyses for this paper to more accurately represent the complex web of predictors and allow for flexible interactions that may or may not vary for subgroups in our sample. For example, parents' shared book reading may be an important factor for participation, but only for those parents who are not working long hours. Regression tree analyses do not require any prior assumptions about moderators. For

this study, we fit regression trees separately for mothers and fathers to predict the pattern for each parent separately.

Twelve predictors, our theoretical predictors and controls, were included in the regression tree analyses for both mothers and fathers: education level, household income, financial strain, working or in school, weekly hours worked, knowledge of child development, parent reading at 9 months, partners' reading at 9 months, partners' participation in the intervention (i.e., frequency of reading intervention books), intervention condition, ethnic congruence, and parent enrolled in parenting support programs (Table 2). The data sets ($n = 170$ families) were split into training ($n = 119$) and test ($n = 51$) sets for mothers and fathers (i.e., 70 vs. 30 split; James et al., 2013). Regression trees were developed using 10-fold cross-validation with the training data set and then accuracy was evaluated cross-using the test dataset. To ensure the validity of the cross-validated trees, the bootstrapping method of random forests, was used with 2,000 bootstrapped samples and a maximum of four predictors (James et al., 2013). Random forests prevent model overfitting and provide information on the relative importance of each predictor variable, as it relates to overall accuracy and purity (James et al., 2013). In this case, the measure of accuracy indicates the increase in overall accuracy of the model when a variable is included (i.e., including that variable in the model improved the model's prediction for all cases).

Regression tree analyses can also use categorical predictors with more than two levels in determining splits; the program splits the categorical levels into two groups. For example, if race/ethnicity is used as a predictor with African American, White, Asian American, and Latinx as the categorical levels, the program will split the cases based on a grouping of the levels such as Latinx and African American compared to White and Asian American. All of the categorical variables in this study represent ordinal data (e.g., education level, household income). To preserve the ordinal nature of the data and obtain logical splits (e.g., low income compared to higher income rather than two groupings of income categories across the spectrum), all categorical data with more than two levels were entered into the model as continuous variables, though they should be interpreted as ordinal when reading the results.

Missing data at the item level were addressed by using gender-specific mean imputation. Missing values were imputed using the gender-specific mean (i.e., the average score for mothers was used for mothers with missing values and the average score for fathers was used for fathers) to preserve the interpretability of the results (Shrive, Stuart, Quan, & Ghali, 2006). In the analytic sample, only two variables had item level missing data: frequency of reading to children at 9 months (2% missing) and household income (6% missing). Book enjoyment data were missing for one or more parents in 10% of the families in the analytic sample. Pairwise deletion was used for the paired t test comparing book enjoyment for mothers and fathers.

Table 2
Variables Included in the Regression Tree Analyses Predicting Parents' Participation in the Baby Books 2 Parenting Intervention

Predictors of participation in BB2	Variable type	Variable levels	M(SD)/Percent	Range
Education level	Categorical	Less than high school	15%	
		Completed high school	21%	
		Some college	40%	
		4-year degree or higher	23%	
Household income	Categorical	$10,000 or less	9%	
		$10,001–$20,000	15%	
		$20,001–$30,000	19%	
		$30,001–$40,000	15%	
		$40,001–$50,000	13%	
		More than $50,000	29%	
Financial strain[a]	Continuous	—	3.54 (.74)	1–5
Working or in school	Dichotomous	Parent is working or in school	75%	
		Parent is not working or in school	25%	
Weekly hours worked	Continuous	—	28 (21)	0–105
Knowledge of child development[b]	Continuous	—	0.62 (0.19)	0–1
Parent reading at 9 Months	Continuous	—	5.1 (1.8)	1–7
Partner's reading at 9 months	Continuous	—	5.1 (1.8)	1–7
Partner's participation	Continuous	—	2.6 (1.9)	0–7[c]
Control variables				
Intervention condition	Categorical	"Both" condition	25%	
		Mom condition	25%	
		Dad condition	25%	
		Control condition	25%	
Ethnic congruence	Dichotomous	Parent's race was reflected in book illustrations	12%	
		Parent's race was not reflected in book illustrations	88%	
Parenting support	Dichotomous	Parent participates in parenting support programs	33%	
		Parent does not participate in parenting support programs	67%	

Note. Data reflect the analytic sample only and descriptive statistics were conducted prior to imputation.
[a] Higher scores represent higher levels of financial strain. [b] Score represents the percent of items answered correctly. [c] The full range was 0 to 11; however for the analyses responses were capped at 7 to reflect daily readers.

Table 3
Sample Characteristics N = 170

Sample characteristic	All parents (*n* = 340)		Fathers (*n* = 170)		Mothers (*n* = 170)	
	M(*SD*)/Percent	Range	*M*(*SD*)/Percent	Range	*M*(*SD*)/Percent	Range
Child is a girl	49%		—		—	
Parent age	28.8 (6.9)	18–53	30.2 (6.5)	18–53	28.0 (5.6)	18–42
Primary language						
English	15%		18%		13%	
Spanish	11%		9%		12%	
Bilingual: English/Spanish	61%		61%		61%	
Bilingual: English/Other	13%		12%		14%	
Race or ethnicity						
Hispanic/Latino	66%		67%		66%	
Black	13%		14%		13%	
Asian	6%		6%		5%	
Multiracial	5%		3%		7%	
White	8%		9%		7%	
Other	2%		1%		2%	
Education						
Less than high school	15%		21%		9%	
Completed high school	21%		23%		19%	
Some college	40%		38%		42%	
4-year degree or higher	23%		18%		29%	
Household income						
$10,000 or less	9%		6%		13%	
$10,001–$20,000	15%		14%		16%	
$20,001–$30,000	19%		17%		20%	
$30,001–$40,000	15%		14%		16%	
$40,001–$50,000	13%		16%		11%	
> $50,000	29%		33%		24%	

Results

Descriptive statistics for our sample are presented in Table 3. Most of our variables were generally normally distributed. Income was slightly positively skewed with over a quarter of the analytic sample reporting an annual household income higher than $50,000. Only 15% of the analytic sample had less than a high school diploma, and the majority of participants reported an annual income of less than $50,000. Parents reported moderate to high levels of financial strain (Table 2). On average, parents reported reading weekly to their children and answered over half of the questions on child development knowledge correctly (see Table 2).

Participation and Quality of Engagement: Variation by Parent Gender

Participation in the intervention. Parents' participation, that is, how often they read the intervention book to their child was quite varied: 9% (*n* = 31) of parents read zero times a week; 23% (*n* = 78) read one time per week; 25% (*n* = 84) read two times per week; 18% (*n* = 60) read three times per week; 20% (*n* = 68) read four to six times per week; 4% (*n* = 14) read daily; and, 1% (*n* = 5) read more than daily (Figure 1). On average, parents participated in the intervention 2.6 times per week (*SD* = 1.9; Table 4). A paired *t* test (Table 4) revealed that, on average, mothers participated in the intervention significantly more often (*M* = 2.9, *SD* = 2) than fathers (*M* = 2.4, *SD* = 1.8), though the magnitude of the difference was small.

Quality of engagement. Overall, almost all parents reported that they enjoyed the intervention books (Table 4). The majority

(67%, *n* = 212) of parents reported that they enjoyed reading the intervention book/s to their child a lot. After that, the next largest group reported liking the books somewhat (25%, *n* = 80). Less than 10% of parents reported only liking the books a little (8%, *n* = 24), and only two parents reported not liking the books at all. Both of the parents that reported not liking the book at all reported very low participation: one reported reading less than once per week and the other reported that they did not read the book at all.

There was a statistically significant difference between mothers and fathers in quality of engagement (Table 4), even though the mean difference was not large enough to be practically significant. The distribution of responses was slightly higher for mothers, with 75% of mothers (*n* = 118) reporting they liked the book a lot versus 60% of fathers (*n* = 94) who said the same.

Predictors of Parent Participation in BB2: Variation by Parent Gender

We ran regression trees separately for mothers and for fathers to allow the pattern of predictions to differ for the two groups. The dependent variable was the frequency of participating in the BB2 intervention (i.e., read the book two times per week).

Fathers. The regression tree for fathers (Figure 2) showed that the most important variable in predicting participation in the intervention was the level of their partner's participation in the intervention. Fathers, on average reported reading the intervention book 2.4 times per week, but for fathers whose partners read 2.5 times or more per week their reading of the intervention had increased to 3.0 times per week. For this group, fathers whose partners read more than 2.5 times a week *and* worked 46 hr per

Table 4
Parents' Participation and Quality of Engagement in the Baby Books 2 Parenting Intervention

	Frequency of reading per week (participation)										
	All parents			Fathers			Mothers				
Sample	*M* (*SD*)	Range	*n*	*M* (*SD*)	Range	*n*	*M* (*SD*)	Range	*N*	*P*	*df*
Full analytic sample	2.6 (1.9)	0–11	340	2.4 (1.8)	0–10	170	2.8 (2.0)	0–11	170	*p* < .01	169

	Parents enjoyment of the book (quality of engagement)															
	All parents					Fathers					Mothers					
		Percentage of sample					Percentage of sample					Percentage of sample				
	M (*SD*)	1	2	3	4	*M* (*SD*)	1	2	3	4	*M* (*SD*)	1	2	3	4	*p*	*df*
Full analytic sample	3.6 (0.7)	<1%	8%	25%	67%	3.5 (0.7)	<1%	11%	29%	60%	3.7 (0.6)	<1%	4%	23%	73%	*p* < .01	152
Participating parents[a]	3.7 (0.5)	0	4%	18%	77%	3.6 (0.6)	0	8%	25%	67%	3.8 (.4)	0	1%	13%	86%
Nonparticipating parents[b]	3.5 (0.7)	1%	10%	31%	58%	3.4 (0.8)	1%	13%	31%	55%	3.5 (0.7)	1%	7%	30%	62%

Note. The sample size for engagement was *n* = 318 as 22 parents were missing data for the engagement question. Percentages reflect the percentage of sample with engagement data available. 1 = *not at all*, 2 = *a little bit*, 3 = *somewhat*, 4 = *a lot*.
[a] reads the provided books >2 times per week.   [b] reads the provided books ≤2 times per week.

week or more were predicted to read the books 2.4 times per week, while those working less than 46 hr per week were predicted to read 3.3 times per week. Of this group (i.e., partner participates often and working less than 46 hr), fathers with more education (i.e., more than some college) were predicted to read the most (i.e., 3.9 times per week), whereas those without at least a 4-year degree were predicted to participate 2.4 times per week. Thus, fathers who had a partner who read 2.5 times per week or more, worked less than 46 hr a week, and had a college degree were predicted to participate the most in the intervention.

In contrast, fathers whose partners participated less than 2.5 times per week (i.e., Figure 2, left side), read the intervention book

1.9 times per week. Of this group, fathers with an annual household income above $50,000 were predicted to participate 3.2 times per week. Fathers whose partners participated less than 2.5 times per week and had an annual household income of $50,000 or less read 1.8 times a week (Figure 2, left side). Of this group, fathers who reported having less knowledge of child development were predicted to read 2.3 times per week whereas fathers who reported having more child development knowledge were predicted to participate 1.5 times per week. Thus, fathers whose partners read less than 2.5 per week and reported more than $50,000 household income were predicted to read more often than fathers who reported a household income of $50,000 or less. Of the
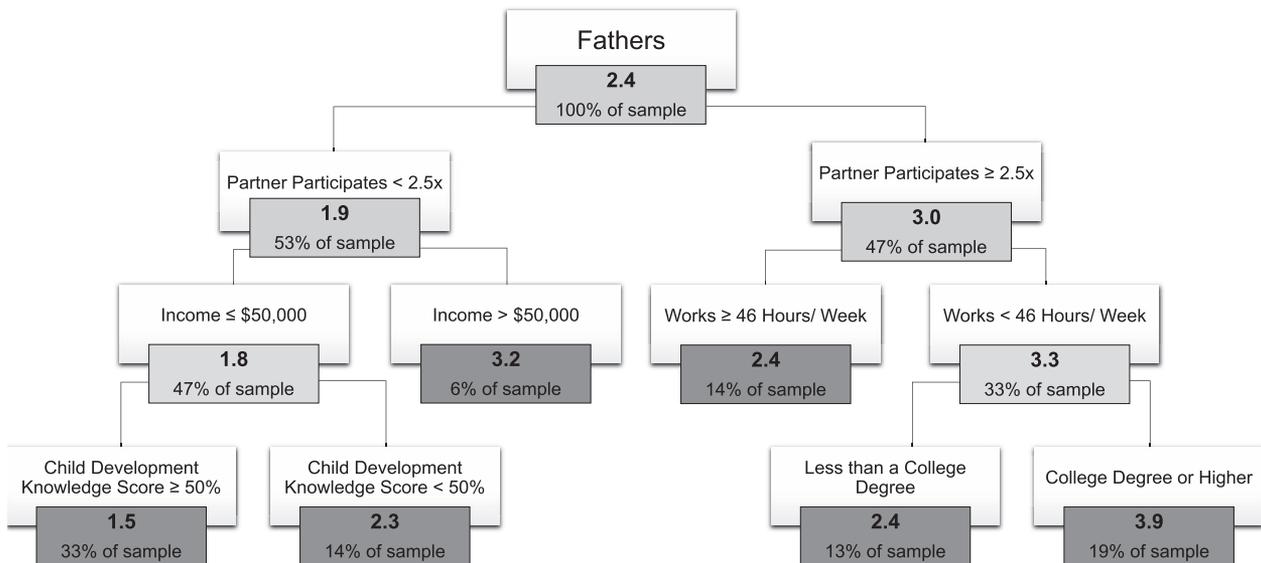

Figure 2. Cross-validated regression tree analysis of fathers' participation. The different paths of the tree end in terminal nodes which list the prediction for participants with those characteristics. The percent of the training sample that falls into each node is listed, as well as each node's predicted level of participation. For example, 19% of the father sample had a partner who participated more than 2.5 times per week, worked less than 46 hr per week, and had a 4-year degree or higher. Those fathers were predicted to participate in the intervention 3.9 times per the results displayed here are for the training data set.

group of fathers whose partners read less than 2.5 and reported a household income less than $50,000, fathers were predicted to read more often when they had lower scores on the measure of knowledge of child development.

The cross-validated tree for fathers accounted for 23% of the variance in father participation and had an average error (root standard mean error) of 1.5 when applied to cases in the test dataset. To further establish the validity of our regression tree, we conducted Random Forest analysis, as explained in the Data Analysis section (James et al., 2013). This method gives us information on the relative importance (i.e., accuracy) of each predictor. The results of the random forest provide information on which variables were most important across a bootstrap sample of 2,000 trees. The most important variables (i.e., with the largest percent increase in accuracy) for fathers were partner participation, knowledge of child development, education, and hours worked per week (Figure 3). These results from the random forests analysis suggest that the regression tree for fathers captured the most important variables.

Mothers. For mothers, the regression tree (Figure 4) also showed that partner participation was the most important variable in predicting participation in BB2. Mothers whose partners participated more than 4.5 times per week were predicted to read the intervention book to their child 4.6 times per week.

Mothers, who, on average read the intervention book 2.8 times per week, were predicted to have an increased participation in the intervention of 2.9 times per week when their partner read the intervention book between 1.5 and 4.5 times per week. Of this group, mothers whose partners reported reading between 1.5 and 2 times a week, read 2.9 times per week. Of this group, mothers read the intervention book 3.7 times per week when they were not working or in school and 2.5 per week when they were working or in school. But when their partners read less than 1.5 times per week, mothers participated 2.0 times per week (Figure 4, left side).
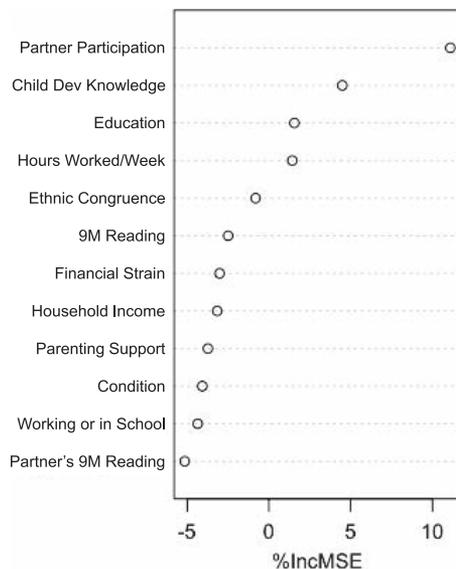
Of this group, mothers who reported a household income of $35,000 or more participated 1.3 times per week whereas mothers who reported less than $35,000 participated 2.6 times per week. Thus, mothers read the most when their partners read quite frequently. When partners did not read very often, mothers participated more often when they were not working or in school and had lower incomes.

The cross-validated tree accounted for 25% of the variance in mother participation in the test dataset and had an average error (root standard mean error) of 1.7. To further establish the validity of our regression tree, we conducted random forest analysis, as explained in the analytic section above (James et al., 2013). For mothers, the most important variables (i.e., with the largest percent increase in accuracy) that predicted mothers' participation in the intervention identified by the random forest (Figure 5) were partner participation, household income level, and whether or not mother worked or was in school.

In summary, the strongest predictors that predicted fathers' levels of participation in the intervention were partner participation, resources (i.e., education and hours worked), and knowledge of child development. For mothers, the strongest predictors were partner's participation and resources (i.e., household income and work/school).

Discussion

The overarching aim of this study was to examine levels of fathers' and mothers' involvement in the BB2 parenting intervention and gain insight into the factors that predict maternal and paternal involvement in this intervention. We assessed two aspects of parents' involvement in the BB2 intervention: participation (i.e., how often parents read the intervention books) and quality of engagement (i.e., how much they enjoyed reading the books).

The level of participation in BB2 by both parents was relatively low (average of 2.6 times per week), although there was quite a lot of variability. Fewer than 50% of parents in our study read the book between one and two times per week, more than 50% read between three times a week and daily, and fewer than 10% did not read at all. This variability is notable because it suggests that half of parents are reading the intervention book at levels that might be sufficient to effect a change in behavior. Also, just reading a book to children more than three times per week has been found to be related to children's language skills (Administration for Children and Families, 2003).

Our finding of relative low involvement is generally in alignment with past studies that have found parents' involvement in interventions to be low (Garvey, Julion, Fogg, Kratovil, & Gross, 2006; Perrino, Coatsworth, Briones, Pantin, & Szapocznik, 2001). For example, in their meta-analysis of fathers' participation in Triple P program (which targeted both mothers and fathers), Fletcher et al. (2011) found that only 20% of parents who participated across the studies were fathers. In their study with mostly mothers, Garvey et al. (2006) found that on average, mothers attended only 39% of the group sessions of a parent training program and Mendez (2010) found that mothers had very low average attendance at the monthly workshops, even though they reported feeling satisfied with the program.

In contrast to our finding of low levels of participation, we found that the quality of parent engagement with the BB2 inter-
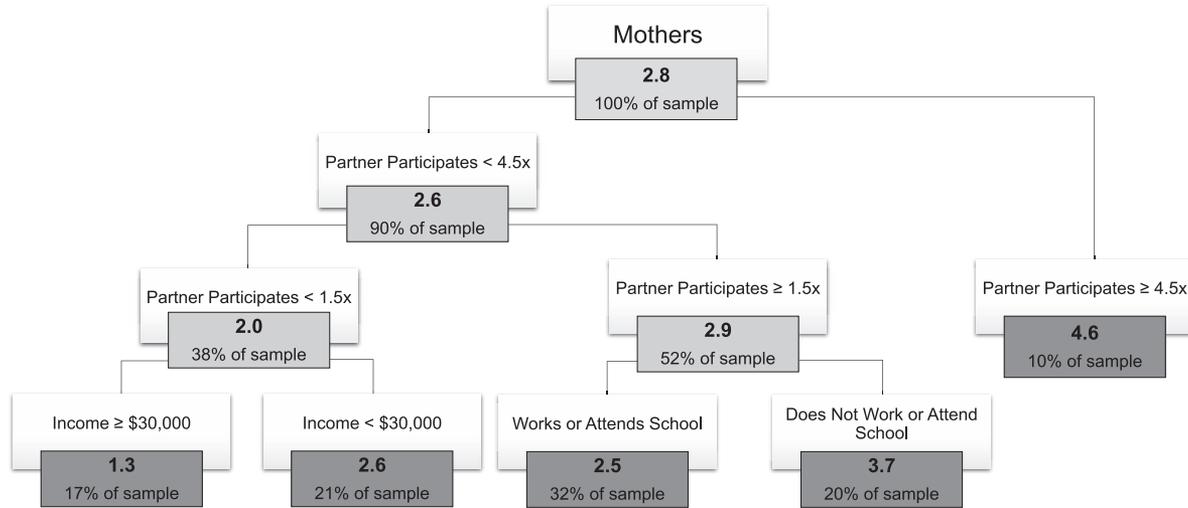

Figure 3. Random Forest results for regression tree analysis for fathers. The plot represents the average increase in overall model accuracy in trees that included each variable.

Figure 4. Cross-validated regression tree analysis of mothers' participation. The different paths of the tree end in terminal nodes which list the prediction for participants with those characteristics. The percent of the training sample that falls into each node is listed. For example, 20% of the mother sample had a partner who participated less than 4.5 times per week but more than 1.5 times per week and was not in school or working. Those mothers were predicted to in the intervention 3.7 times per week. The results displayed here are for the training dataset.

vention book (i.e., how much they enjoyed the book) was uniformly high, almost all parents, regardless of their level of participation, reported really liking the books. Only two parents reported not liking the books at all and those parents also did not participate. These findings suggest the degree to which parents enjoy the intervention plays an important role in their involvement. Enjoying the BB2 books may have reduced the risk of nonparticipation and might have been the reason why parents participated in the intervention even at low levels. This finding is in line with studies in

Figure 5. Random Forest results for regression tree analyses for mothers. The plot represents the average increase in overall model accuracy in trees that included each variable.

other areas such as mental health that find enjoyment of the intervention to be highly important for rates of participation and subsequent health outcomes (Heinrich, Patel, O'Neal, & Heinrich, 2014; Howells, Ivtzan, & Eiroa-Orosa, 2016; Manthey, Vehreschild, & Renner, 2016).

We also examined levels of involvement in BB2 by parent gender. We found that mothers reported reading the intervention book to their children (i.e., participation), on average 2.8 times per week and enjoying it a lot (i.e., quality of engagement) more often than did fathers (2.4 times per week), who also reported enjoying the book a lot. Although the difference in levels of participation between parents was statistically significant, it was so small as to be meaningless in a practical sense. In this way, our findings are in general alignment with findings by Cowan and colleagues (2014) who reported no differences between mothers and fathers in attendance of the weekly group sessions. It appears that in interventions targeted to coresident parents, fathers are as likely as mothers to participate. This is an important finding because it contributes to the emerging evidence that challenges the general belief that because fathers are less likely to participate in interventions, all efforts should be placed on mothers (Fletcher et al., 2011; Smith, Duggan, Bair-Merritt, & Cox, 2012). Our findings suggest that when interventions are intentionally targeted to both mothers and fathers, as is BB2, fathers are just as likely to participate as mothers.

Our second main goal was to examine why parents' involvement in the BB2 intervention is low or, alternatively, to answer the question of why parents are involved in interventions. The extant literature does not paint a clear picture. Some studies have found that indicators of SES are the strongest predictors of low parental participation (Coatsworth et al., 2006a; Heinrichs, Bertram, Kuschel, & Hahlweg, 2005; Robinson et al., 2016; Wong et al., 2013), others have found that parents' treatment preferences, that
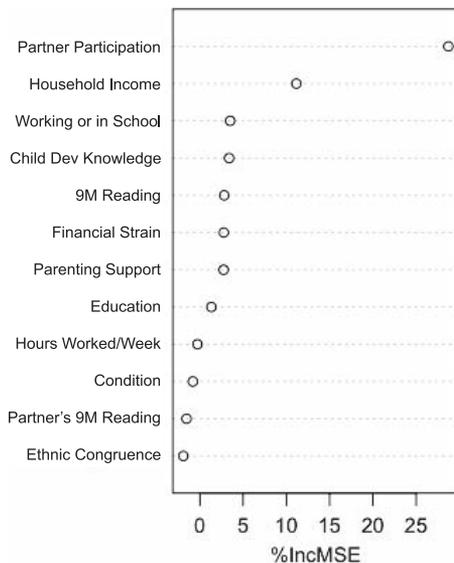
is whether the intervention aligns with their beliefs and practices about child rearing, are significant predictors (Corso et al., 2010; Wagner, Spiker, Gerlach-Downie, & Hernandez, 2000).

Using regression tree analyses, we explored how indicators of SES, treatment preferences, and participation by the other partner predicted paternal and maternal participation in BB2. We found that the most important predictor of mothers' and fathers' participation in the BB2 intervention was the participation of their partner. Mothers increased their reading from approximately three to five times per week when their partners read often (at least five times per week). Fathers also increased their reading from two to three times per week when their partner was an average reader, but decreased their reading to less than two times per week when their partner read less than average. These findings support the spillover effects hypothesis: mothers and fathers whose partners participated more often in the intervention also participated more often themselves (McGinnis et al., 2019; Raikes et al., 2005). It is also possible that the driver of the spillover effect was not just participation of the other parent but rather the parent's quality of engagement in the intervention or enjoyment of reading to their child, which may have resulted in an affective change that influenced parents' behavior with the other parent (i.e., encourage to read the book; Sears, Repetti, Reynolds, Robles, & Krull, 2016). Future work should further explore this hypothesis.

Our findings supporting a spillover effect are consistent with past studies that have shown that higher levels of quality of engagement (i.e., degree of engagement in the intervention) among mothers was associated with higher levels of involvement among fathers (i.e., participating in two or more types of activities; Raikes et al., 2005). In their study of a home-visiting program, McGinnis et al. (2019) found that families were more likely to be retained at the 6-month follow-up when fathers participated in at least one home visit compared to families in which the father never participated in the program. Collectively, these findings in conjunction with ours provide relatively robust evidence that including fathers in interventions might be a significant and perhaps cost-effective way to increase mothers' participation in intervention. Including fathers seems like a win–win situation for both parents and children and may go a long way in addressing the most concerning barrier to the impact of interventions on families, namely, low levels of participation. Our finding also suggests that interventions that target both parents may create an environment where a parent who is engaged in the intervention may "egg on the other parent," which has the potential to increase its effectiveness. Indeed, research on a variety of outcomes has found that couple and family interventions have bigger impacts on participants than individual interventions (Cowan & Cowan, 2019; Cowan, Cowan, Pruett, Pruett, & Wong, 2009).

The next best set of predictors of mothers' and fathers' participation in BB2 are parents' resources such as hours worked, education, and household income for fathers and employment status and household income for mothers. Our findings offer partial support for the general view that parents with higher levels of resources are more likely to participate in interventions than parents with lower levels (Coatsworth et al., 2006a; Heinrichs et al., 2005; Robinson et al., 2016; Staudt, 2007; Wong et al., 2013). But our findings are more nuanced than previously reported. In particular, we found that fathers whose partners were average readers reported an increase in levels of participation (i.e., 3.2 vs. 1.9) when they reported high levels of income (i.e., over $50,000) and slight decrease (i.e., 1.9 to 1.8) in levels of participation when their household incomes were lower than $50,000. But when their partners read more than average, fathers reported an increase in participation (i.e., 3.0 vs. 3.9) when they worked fewer than 46 hr per week and had a college degree or higher and a decrease (i.e., 3.0 vs. 2.4) when they reported working more than 46 hr per week. In other words, when fathers do not have a strong role model (i.e., partners read less than average) but are high earners they are more likely to invest time and resources on their children (Duncan, Magnuson, Murnane, & Votruba-Drzal, 2019). But when fathers have a strong role model (i.e., their partners read more than average), hours spent working are more important than being a high earner. These findings point to the need to consider the complexity and interdependence of contextual factors that are at play in determining the level of parents' participation in interventions.

For mothers, resources operate slightly different in predicting participation levels. Resources were predictive only for mothers whose partners read less than 4.5 times per week. These mothers whose partners were average readers increased their participation (i.e., 2.6 to 3.7) only when they were not working or in school. But if their partners read very little (less than 1.5 days per week), mothers increased their reading (i.e., 2.0 to 2.6) only when their income was less than $30,000. The group most at risk for not participating in the intervention (reading 1.3 times per week) are mothers whose partners read very little and report a household income of more than $30,000. Increases in household income can come from fathers' earnings or from longer work hours by mothers, thus perhaps this group of mothers read very little because they were working longer hours outside the home, though hours worked did not emerge as an important variable for mothers in our analyses. Future work should further disentangle how the availability of resources, work status, and time spent outside the home interact to influence maternal involvement in interventions.

In contrast to previous studies, we did not find evidence that financial strain was an important barrier to participation (Coatsworth et al., 2006a; Heinrichs et al., 2005; Robinson et al., 2016; Wong et al., 2013). The fact that some studies include measures of SES and others include perception of poverty (i.e., financial strain) may explain why there is mixed evidence on the effects of SES on interventions (Gross et al., 2001; Spoth & Redmond, 2000; Wong et al., 2013).

We also found partial support for the hypothesis that treatment preference would be related to higher levels of participation. Contrary to our hypothesis, shared book reading was not a predictor of participation in the intervention for mothers or fathers. However, fathers' knowledge of child development (the other indicator of treatment preference) was related to increased reading. Fathers whose partners read less than 2.5 times per week and reported an annual income below $50,000 increased their reading (from 1.8 to 2.3 times per week) when they had lower levels of child development knowledge. Future work should explore the nuances of treatment preference over time, controlling for other predictive factors.

Limitations

We caution the reader to interpret these findings in the context of several limitations. First, our main dependent variables, frequency of participation or how often parents read the book and how much they enjoyed reading the book, are self-reported. Self-report data are prone to be biased and often overestimate certain behaviors (Repetti, Reynolds, & Sears, 2015). Second, parents were asked about participation (i.e., frequency of reading) in a typical week, rather than the full 3 months. This frame offered greater ease than trying to calculate all readings, but could have under- or overestimated participation. The time-frame covered by our outcome variable (i.e., a typical week during a 3-month span) differed from the time-frame covered by other measures (e.g., annual household income, weekly work hours). The consequence of this lack of alignment in timing is that we assume some consistency in these variables over time, which may or may not be the case. Third, although we set out to include quality of engagement as another indicator of involvement, due to lack of variability we were not able to run prediction models for this variable (Korfmacher et al., 2008). However, we remind the reader that in our study all parents who participated in the intervention also reported really enjoying the book. That is, quality of engagement was highly correlated with participation, suggesting that if parents are participating in an intervention, then it is likely that they are also engaged with it (Brown, Goslin, & Feinberg, 2012; Reid, Webster-Stratton, & Baydar, 2004). Fourth, our analytic sample represents 81% of the original baseline sample due to missing data. Our bias analysis revealed that our participants were more likely to have higher levels of education, thus our findings do not generalize to all low-income families. Finally, the regression tree analyses are a useful way to model complex, nonlinear relationships. However, in this study they performed with less accuracy than expected, particularly for mothers. It may be that the recursive binary splits required by regression tree analyses are a poor fit for these processes with mothers.

Conclusion

This study provides important insight into the degree to which fathers and mothers participated in the BB2 intervention and the reasons why they did so. Our findings contribute to the literature on how to increase the involvement of mothers and fathers in a parenting intervention such as BB2 in several ways. First, our findings show that both mothers and fathers have similar levels of involvement in BB2, an intervention designed for both mothers and fathers. Second, one of the strongest predictors of participation in BB2 is the other parent's participation, this is especially true for mothers. This finding suggests that targeting one parent might not be as effective at increasing parental involvement in interventions as targeting both parents. One possible mechanism is that having a partner who is involved motivates the other partner to do so as well. There is strong evidence that in families, members influence each other for better or for worse (Cox & Paley, 1997; Raikes et al., 2005), thus utilizing this mechanism of influence seems significant for interventions. Our findings implicate that intervention targeted to two parents might be better than interventions targeted to one parent because each parent can influence each other. Third, it seems important for involvement in the intervention that parents

enjoy the intervention. We found that everyone who participated in the intervention really enjoyed the book. This is critical as parents might not be motivated to participate if they do not like what they were doing. Fourth, resources, such as household income and education, are important but not as important as partners' participation suggesting that low-income families can still participate in interventions at higher levels despite their limited resources. Overall, our findings underscore the mounting evidence that it makes no sense to leave fathers out of parenting interventions because including both parents is likely to increase maternal and paternal participation in interventions.

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