Journal of Applied Developmental Psychology 35 (2014) 337–346

Contents lists available at ScienceDirect

Journal of Applied Developmental Psychology

The effect of baby books on mothers' reading beliefs and reading practices☆

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ARTICLE INFO

Article history:
Received 1 April 2013
Received in revised form 23 May 2014
Accepted 29 May 2014
Available online 9 July 2014

Keywords:
Maternal reading beliefs
Reading practices
Baby book interventions

ABSTRACT

The impact of a baby book intervention on promoting positive reading beliefs and increasing reading frequency for low-income, new mothers ($n = 167$) was examined. The Baby Books Project randomly assigned low-income, first-time mothers to one of three study conditions, receiving educational books, non-educational books, or no books, during pregnancy and over the first year of parenthood. Home-based data collection occurred through pregnancy until 18 months post-partum. Mothers who received free baby books had higher beliefs about the importance of reading, the value of having resources to support reading, and the importance of verbal participation during reading. The results showed that providing any type of baby books to mothers positively influenced maternal reading beliefs, but did not increase infant-mother reading practices. Maternal reading beliefs across all three groups were significantly associated with self-reported reading frequency when children were at least 12 months of age.

Reading story and picture books to young children has repeatedly been linked to positive developmental outcomes (e.g., Bus, van IJzendoorn, & Pellegrini, 1995; Fletcher & Reese, 2005). Children who are read to frequently and beginning early in life show greater language ability than children who are read to less frequently or beginning at later ages (DeBaryshe, 1993; Dunst, Simkus, & Hamby, 2012; Whitehurst et al., 1994). Although the benefits of reading to children and actively engaging with them while reading are numerous and well documented (e.g., Beck & McKeown, 2001; Justice, Kaderavek, Fan, Sofka, & Hunt, 2009; Mol & Bus, 2011; Mol, Bus, & de Jong, 2009; Phillips, Norris, & Anderson, 2008), less is known about what contributes to early parental beliefs about the importance of reading practices, especially for new mothers.

Research has noted three important contributions to early reading practices. These are mothers' knowledge of child development (Benasich & Brooks-Gunn, 1996); their beliefs about the benefits, importance, and feasibility of reading (DeBaryshe, 1995); and cultural factors, such as traditional story-telling and family reading practices or rituals (Hammer, 2001; Heath, 1983). Of these, our study focused particularly on how maternal reading beliefs are informed by knowledge of child development, and how that contributes to reading practices. We operationalized reading beliefs as maternal expectations about reading to their child, including their ability to act as a teacher to their child, their self-efficacy related to reading to their child, and the resources they have available to them (e.g., DeBaryshe, 1995). This definition of reading beliefs is frequently employed when examining the association between reading beliefs and child outcomes (e.g., Bingham, 2007; DeBaryshe, 1995; Skibbe, Justice, Zucker, & McGinty, 2008).

Studies with preschool children have found that beliefs about the importance and feasibility of reading are significant predictors of home literacy practices, children's later reading achievement, and motivation for reading (Baker & Scher, 2002; Baker, Scher, & Mackler, 1997; Bingham, 2007; Weigel, Martin, & Bennett, 2006). The interplay of maternal reading beliefs, reading practices, and children's emergent literacy skills are part of a dynamic system, where these and many other situational and cultural elements contribute to children's development and the establishment of maternal beliefs and practices (Smith & Thelen, 2003).

Given the links between more global maternal beliefs and parenting practices, it is surprising that, to date, little has been done to understand maternal beliefs about reading and their connection to reading practices in the early years of a child's life, as existing research has focused almost exclusively on parents of preschoolers. To address this gap, the present study employed a three-group randomized design to test whether a maternal education book intervention (i.e., baby books written in simple rhyming stanzas that included child development content) improved new mothers' beliefs about the importance and feasibility of reading to their child and their initiation and maintenance of reading behaviors in the first 18 months of motherhood.

☆ Funding/Support: Funding for this study was provided by the National Institute for Child Health and Human Development (RO1HD047749-01A1).

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http://dx.doi.org/10.1016/j.appdev.2014.05.007
0193-3973/

Reading beliefs of parents of preschool-aged children

Beliefs about reading include parents' own reasons for reading (i.e., personal enjoyment or entertainment) and their role in teaching children to read (Baker et al., 1997; Bingham, 2007; DeBaryshe, 1995). However, the vast majority of evidence pointing to the importance of parental reading beliefs and early reading practices comes from research conducted during the preschool years. For example, maternal beliefs about the importance and benefits of reading are associated with mothers' reading practices with their preschool-aged children (Bingham, 2007; Celano, Hazzard, McFadden-Garden, & Swaby-Ellis, 1998; DeBaryshe, 1995; Weigel et al., 2006), and children's language skills and later interest in reading (Skibbe et al., 2008; Weigel et al., 2006). Bingham (2007) examined the association between the quality of mother-child interactions around reading practices, such as visiting the library and frequency of joint reading, and mothers' affect during joint reading practices. Bingham found that mothers' beliefs about the importance of reading significantly predicted the quality of literacy activities in the home, even after taking into account maternal education level. Similarly, Weigel et al. (2006), using structural path analysis, documented a positive association between reading beliefs and the activities that parents and children engaged in together, which then predicted children's interest in reading and print knowledge. Additionally, the path analysis indicated that parental reading beliefs directly predicted children's emergent writing and receptive language. However, it is unknown if these findings would generalize to all populations, including low-income, first-time mothers, or mothers of infants or toddlers.

In previous research, beliefs about the importance of reading were related to reading practices in the home and child outcomes such as children's motivation to read, interest in reading, and literacy skills such as print concept knowledge and receptive language skills (e.g., Baker & Scher, 2002; DeBaryshe, 1995; DeBaryshe & Binder, 1994; Weigel et al., 2006). Children's motivation to read was also positively associated with maternal beliefs about reading (Baker & Scher, 2002; Baker et al., 1997). For instance, children whose parents believed that reading was enjoyable and was a source of entertainment, and not solely used for skill development, were more motivated to read and enjoyed reading more, irrespective of income or ethnicity (Baker & Scher, 2002; Baker et al., 1997). Curenton and Justice (2008) found a positive, significant association between low-income mothers' reading beliefs and their children's pre-literacy skills, particularly their conventions of print. However, little work has been done with low-income mothers of infants and toddlers to investigate how reading beliefs can be formed or expanded through interventions, or the role these beliefs have in reading practices. Previous research from families with preschool-aged children found that maternal beliefs about the importance of reading led to increased reading activities in the home and children's emergent literacy. Understanding how these beliefs can be informed or positively altered during the infant and toddler years may help promote reading activities with young children, which in turn could lead to improved literacy outcomes for children.

Reading beliefs of parents of infants and toddlers

In contrast to the growing body of knowledge about parental reading beliefs during the preschool years, little is known regarding the connection between reading beliefs and literacy practices for parents of infants and toddlers. One exception is a study that examined the link between joint reading frequency, caretaker demographics, caretaker literacy level, and beliefs about reading of low-income mothers (a large majority of whom were African-American) of young children one to five years of age (Celano et al., 1998). The researchers found a significant association between parent–child reading practices and listing reading as an enjoyable activity and part of a daily routine, and parental reading beliefs, as measured by DeBaryshe and Binder (1994) Parent Reading Belief Inventory (PRBI). Interventions aimed at increasing reading practices, such as Reach Out and Read have been shown to be effective at improving beliefs about the importance of reading among parents of older infants (12 months) and toddlers (High, Hopmann, LaGasse, & Linn, 1998). However, much less is known about ways in which the reading beliefs of new mothers or mothers of young infants are developed or can be informed.

Joint reading practices with infants and toddlers

The majority of the prior research about reading in the infant-toddler years focused on the importance of parental reading practices, rather than parental beliefs about reading. From this body of work, several studies have investigated the contribution of shared book reading during these early years with children's early literacy skills. Joint reading between parents and children has long been shown to have a positive, significant impact on a child's language and literacy development (e.g., Fletcher & Reese, 2005; Payne, Whitehurst, & Angell, 1994). A recent meta-analysis of studies that investigated infant and toddler outcomes associated with early reading found that the age at which parents begin to read to their children was related to children's literacy outcomes (Dunst et al., 2012). Specifically, Dunst et al. found that infants who were read to before they were 12 months of age had better literacy and language outcomes compared with children who were not read to until a later age. Although pediatric organizations such as the American Academy of Pediatrics (AAP) have recommended that reading and early literacy be discussed at all well-child visits, starting in infancy (AAP, 2002), few empirical studies have explored how to promote early reading. The limited work on infants and toddlers suggests that the provision of free books can increase reading practices for low-income families in particular (High, LaGasse, Becker, Ahlgren, & Gardner, 2000; Mendelsohn et al., 2001).

Culture, reading practices, and beliefs

Although pediatric professionals recommend that all families read to their children starting in infancy, regardless of income, race/ethnicity, education, culture, and other demographic characteristics (AAP, 2002), it is important to note that literacy practices and beliefs vary across economic, cultural, and racial/ethnic groups (e.g., Fletcher & Reese, 2005; Hammer, 2001). There is substantial evidence that families from different economic, cultural, and racial/ethnic backgrounds engage in a variety of behaviors that promote literacy skills in their children, such as singing and using print materials other than books, such as newspapers (Anderson-Yockel & Haynes, 1994; Heath, 1983; Heath & Branscombe, 1986).

Many studies have found evidence that mother-child reading interactions differed substantially across demographic groups, in which mothers of different communities and cultural backgrounds emphasized distinct practices and drew from different funds of knowledge to promote reading with their children (e.g., Anderson-Yockel & Haynes, 1994; Bus, Leseman, & Keultjes, 2000). In contrast, Hammer (2001) found few differences in *reading behaviors* among mothers of different social economic status (SES) levels, but instead found evidence that higher-SES parents may *read more frequently* to their children than lower-SES parents. This finding has been supported by recent studies of mothers with infants and toddlers that demonstrated that lower-SES parents read less frequently to their children, and that perceived barriers, such as book cost, may have led to less frequent reading (Fletcher & Reese, 2005; Harris, Loyo, Holahan, Suzuki, & Gottlieb, 2007). However, Harris and colleagues (2007) found that parents who had more positive beliefs about the importance of reading for the child's developmental outcomes engaged in more frequent reading practices, indicating that increasing maternal beliefs about reading may be one potential avenue to increase reading frequency among low-income mothers.

Examining racial differences in reading practices, Brooks-Gunn and Markman (2005) in a review of literature on parenting found that ethnic and racial differences exist in reading practices, as African-American and Hispanic mothers were less likely to report reading to their toddler everyday compared with white mothers. However, it is not yet known how maternal beliefs about the importance of reading may influence reading practices in a low-income, African-American sample. Despite the importance of culture in shaping mothers' reading practices and beliefs, the aim of the present study was not to focus on cultural variation in reading behaviors and beliefs, but to test whether embedding educational information, put forth by the American Academy of Pediatrics (Hagan, Shaw, & Duncan, 2008), into baby books could improve low-income, first-time mothers' beliefs about the importance of reading and increase the frequency of joint reading practices.

Knowledge of child development and reading practices and beliefs

Although there is a strong link between parental knowledge, positive child development, and parenting practices (e.g., Benasich & Brooks-Gunn, 1996; Huang, Caughy, Genevro, & Miller, 2005), few studies have examined how parental knowledge of child development contributes to maternal reading beliefs and practices when children are in infancy or their early toddler years, particularly among low-income families. In a review of research on parental knowledge, Bornstein, Cote, Haynes, Hahn, and Park (2010) concluded that parents' knowledge of child development was related to infants' scores on a cognitive assessment and the quality of interactions between mothers and their children, though none of the reviewed studies connected this parental knowledge to maternal literacy behaviors. In addition, research has shown parental education and income to be associated with knowledge of child development, as low-income, less-educated families tended to lack knowledge about typical development and the importance of reading (Reich, 2005).

Although previous research has demonstrated successful attempts to increase maternal reading practices (High et al., 2000; Mendelsohn et al., 2001), few studies have explored how the content of books may contribute to maternal beliefs about the importance and feasibility of reading to young children or reading practices. Providing parents with information about literacy along with standard trade books was effective at increasing parental enthusiasm for reading (e.g., High et al., 2000). Several national programs, such as Reach Out and Read and Dolly Parton's Imagination Library, aim to increase parental knowledge about the importance of reading and provide low-income families with free books and literacy information. These programs have been shown to be effective at increasing reading practices and maternal attitudes about the importance of reading (High et al., 2000; Mendelsohn et al., 2001; Sharif, Reiber, & Ozuah, 2002; Zuckerman, 2009). For example, in an evaluation of a pediatric clinic literacy intervention, High et al. (2000) found that providing literacy information and books to parents when their children were infants had a lasting effect on parental enthusiasm towards reading when their children were young toddlers.

Prior research also suggested that embedding developmentally appropriate parenting information could change parenting knowledge and behaviors among low-income mothers, particularly in the areas of health and safety (Reich, Bickman, Saville, & Alvarez, 2010; Reich, Penner, & Duncan, 2011; Reich, Penner, Duncan, & Auger, 2012), yet little is known about whether children's book text that provide knowledge about child development and developmentally appropriate practices for mothers could influence maternal beliefs about reading and reading habits. Our study thus sought to understand if increases in knowledge of child development and the importance of reading could promote positive maternal beliefs about reading and subsequently increase the frequency of reading among low-income mothers of infants and toddlers.

Present study

The present study used data from a random assignment study that provided low-income mothers with baby books embedded with educational content regarding typical child development and effective parenting practices, including joint reading. The books were written with the intention that, as the mothers read the books to their infants, they would encounter appropriate child development information. The content of the books was derived from the AAP's Bright Futures Guidelines for Health Supervision (Hagan et al., 2008). See Reich et al., 2010 for more details.

Educational baby books were effective at increasing new mothers' knowledge of child development (Reich et al., 2010), improving mothers' self efficacy and children's emergent language skills (Albarran & Reich, 2013), improving home safety practices (Reich et al., 2011) and changing maternal beliefs regarding corporal punishment (Reich et al., 2012). This study tested whether providing free, educational baby books to low-income mothers strengthened their beliefs about the importance of reading to their children and increased their reading practices. We also examined if there was a direct link between maternal beliefs about reading and self-reported reading frequency. The results of the study will help researchers gain a better understanding of whether maternal beliefs about the importance of reading can be expanded through an intervention targeted at first-time, low-income mothers with very young children. As demonstrated in other studies (e.g., Mendelsohn et al., 2001), we expected that the provision of free books would promote reading frequency in low-income families who typically have less access to baby books in the home. Finally, given that providing additional literacy knowledge has lasting effects on parental enthusiasm for reading, we also hypothesized that educational content focused on typical child development, including literacy and cognitive development, would have additional effects on parental beliefs about the importance of reading beyond the effect of just providing a free, non-educational book.

Method

Baby book study

Data for the present study came from the NICHD-funded Baby Books Project – a study that examined the effectiveness of embedding educational information into baby books as a mechanism for promoting maternal and child health. The embedded educational content was taken from the Bright Futures Guidelines for Health supervision (Hagan et al., 2008), covering topics such as infant physical, cognitive, and emotional development, safety practices, maternal self-care, benefits of breast feeding, discipline strategies, and nutrition recommendations. Pediatricians typically provide this information during well-child check-ups over the child's first year (birth, 2, 4, 6, 9, and 12 months). The books were relatively inexpensive to print, costing approximately $1–2 dollars per book.

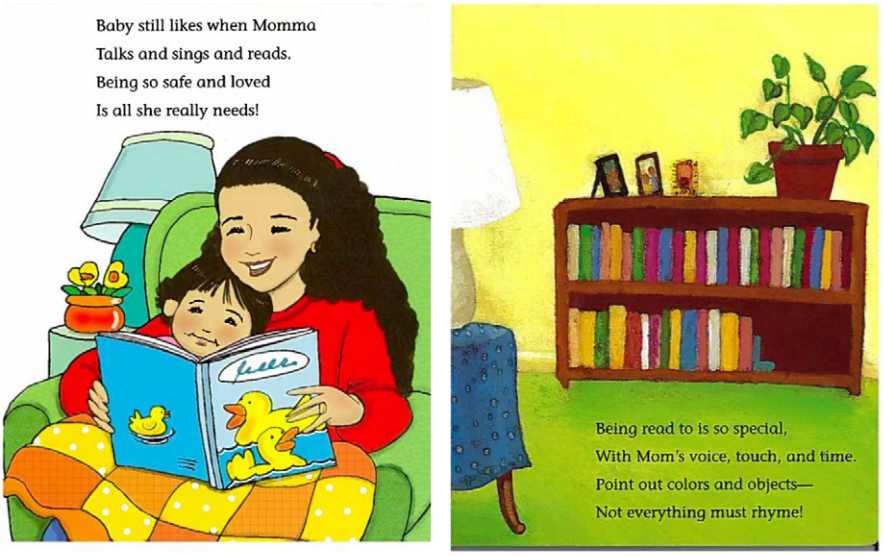
For this study, women were recruited during their third trimester of pregnancy and followed until their child was 18 months of age. All women were told that they would be part of a study about the importance of reading and would be selected to receive free books or not. Participants were then randomly assigned to one of three groups. Women in the educational book group received baby books embedded with educational information about typical child development and parenting. A new book was given during pregnancy and when children were 2, 4, 6, 9, and 12 months of age. The second group of participants, the non-educational book group, received visually similar baby books on the same schedule. Although the illustrations were identical to the educational books, the text was non-educational. Women in the two book conditions received books written at a first grade level. Participants in the third condition, the no-book group, received no baby books. See Fig. 1 for examples of the two book conditions.

Participants

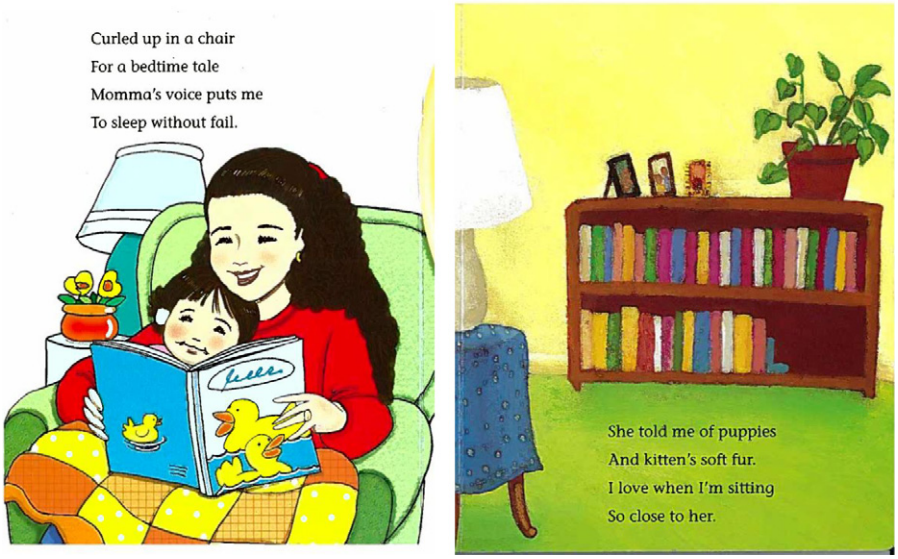
For this study, 198 women were recruited during their third trimester of pregnancy and followed until their child was 18 months of age. Women were recruited in obstetric resident continuity clinics in a Southern state. Of these, 167 women completed post-random assignment data collection. Reasons for attrition from baseline to post-random assignment data collection included fetal demise ($n = 4$), not interested in participating in the study ($n = 14$), moved ($n = 2$), and inability to contact participants to schedule subsequent interviews ($n = 11$). All women were told that they would be part of a study about the importance of reading and would be selected to receive free books or not. Participants were then randomly assigned to one of three groups. Women who participated in data collection after the birth of their child were predominately African-American (63%) or Caucasian (31%), with 9% of the sample identifying as Hispanic origin. Participants were almost all low-income and most of the sample was unmarried/living without a partner (81%). Participants had a wide range of education levels (11–18 years), with the majority (56%) having only a high school education or less. All women were first-time mothers and capable of reading at a first grade level or higher, as determined by having women read two rhyming stanzas and answering four comprehension questions. Only women who were able to answer all questions correctly were eligible to participate in the study. Table 1 shows background characteristics of eligible participants at the first post-random assignment data collection wave.

Procedure

Women in all three conditions were interviewed in their homes and completed surveys during their third trimester of pregnancy and when their children were 2, 4, 6, 9, 12, and 18 months of age. During these home visits, women in all groups were shown a brief video about reading to infants. Thus, the only difference between the groups was the provision of free books (educational and non-educational book groups versus no-book group) and the provision of educational content (educational book group versus non-educational book and no-book groups). Interview duration and procedures were equivalent across all three



Educational Content



Non-Educational Content

Fig. 1. Sample pages from the educational and non-educational baby books provided to the study families.

Table 1
Descriptive statistics of the whole sample and each study group.

	Whole sample ($N = 167$)	Educational book ($n = 53$)	Non-educational book ($n = 56$)	No-book ($n = 58$)
	% of Sample	% of Group	% of Group	% of Group
Race – black	63%	68%	63%	53%
Child gender – male	53%	62%	51%	47%
Married/living as married	17%	17%	11%	23%
Live alone	16%	21%	11%	18%
Employed	49%	44%	52%	52%
WIC services	59%	62%	59%	55%
Food stamps	43%	49%	43%	36%
Planned pregnancy	20%	11%	18%	29%
Maternal:	M(SD)	M(SD)	M(SD)	*M(SD)*
Age	23.05(4.57)	23.12(4.94)	22.54(4.42)	23.49(4.39)
Educ. level (In Years)	12.62(1.69)	12.53(1.40)	12.29(1.32)	13.02(2.15)
Health	3.83(0.92)	3.83(0.99)	3.88(0.83)	3.78(0.94)
Annual income	$18,662(14,847)	$15,885(13,474)	$16,694(12,491)	$23,500(17,240)

groups. During the interviews, information regarding the importance of reading was presented to all mothers in each of the three study groups, so any differences regarding beliefs about the importance of reading or reading practices should be attributed solely to the intervention and not to the information provided during the interviews. Measurements on such domains as home safety, nutrition, and appropriate developmental practices, like reading, were collected through the interviews and surveys, as were other background measures (for more information on the study, see Albarran & Reich, 2013; Reich et al., 2010, 2011, 2012).

Measures

Reading beliefs

Reading beliefs in this study focused on parental assumptions about reading, mothers' capacity to teach their child, and environmental influences related to their ability to read to their child. The PRBI – Short Form was used to measure maternal beliefs about reading to children and was administered when women were pregnant and when their child was 6, 12, and 18 months of age (University of Hawaii Center on the Family, n.d.). The PRBI was designed for and has been used with African-American, low-income families, and parents with very young children (e.g., Celano et al., 1998; Curenton & Justice, 2008; DeBaryshe & Binder, 1994). The 30-item short form version of the PRBI is based on the full version of the measure developed by DeBaryshe and Binder (1994), and is composed of five subscales: (1) teaching efficacy (e.g., "I am my child's most important teacher"; "My child learns many important things from me"; 8 items; $\alpha = .67$), (2) positive affect (e.g., "I feel warm and close to my child when we read"; "I enjoy reading with my child"; 11 items, prenatal version – 5 items; $\alpha = .83$), (3) verbal participation (e.g., "I ask my child a lot of questions when we read"; "Reading helps children be better talkers and better listeners"; 6 items; $\alpha = .80$), (4) reading instruction (e.g., "I don't read to my child because s/he is too young"; "Parents should teach their children how to read before they start school"; 2 items), and (5) resources (e.g., "I don't read to my child because we have nothing to read"; "I don't read to my child because I have other, more important things to do as a parent"; 4 items; $\alpha = .87$). A correlation coefficient was used to estimate reliability for the reading instruction subscale because of the subscale having two items. The items were correlated at $r = .28$, which was significant at the .001 level. Statements focused on parents' beliefs about their responsibility to read or teach their child to read, the materials or space they have available to help them read to their child, and their feelings toward reading to their child. Each question was scored on a 4-point Likert scale (1 *strongly disagree* to 4 *strongly agree*). The subscale scores were the sum of the items, with negatively phrased items reverse coded.

A prenatal version of the instrument was used when women were in their third trimester of pregnancy. The prenatal version was similar to the traditional version of the instrument, except the wording of the statements was in the future tense. Several questions regarding positive affect while reading were omitted from the prenatal version because they did not apply, but otherwise all questions were the same. This version of the measure was used to adjust for any baseline differences in reading beliefs across groups that were present prior to the treatment being administered.

Self-reported reading frequency

Self-reported reading frequency was measured by a single question asking women how often they read to their child in the past seven days. The question did not make the distinction between the women reading the books provided to them through participation in the intervention or books the participants chose on their own. Women were asked about reading frequency when they were pregnant and at 2, 4, 6, 9, 12, and 18 months post-partum. To control for potential outliers, the responses to this question were truncated at the 95% level, since one mother reported reading 70 times per week, which was 30 more times per week than the next highest number of times mothers reported reading per week.

Fidelity of implementation

To assess whether the two types of books (educational and non-educational) were read, women in these two conditions were asked to report how often they read the books that were given to them in the days preceding the home data collection visit. Participants were also asked to read the book aloud while the researcher was present. For the no-book condition, women read a commercially available book that the researchers brought with them. See Table 2 for descriptive statistics.

Demographic characteristics

During the initial data collection episode, women were asked a variety of background and demographic questions. The present study used these questions in the analyses to adjust for imbalance across experimental groups at random assignment and improve the precision of the estimates. However, analysis for baseline equivalence found the three groups to be comparable. Maternal characteristics included in the analyses were: maternal age at the birth of the child, race (1 = African American, 0 = other), education, income, marital status, employment, receipt of public assistance, whether the pregnancy was planned, and health status as measured by maternal rating of their current health (1 = *excellent*, 5 = *poor*). All characteristics were self-reported by the mothers during the baseline (prenatal) home visit.

Table 2
Descriptive statistics for maternal reading beliefs and self-reported reading frequency prenatally and 6, 12, and 18 months.

	Educational book group			Non-educational book group			No-book group		
	N	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*
Prenatal									
PRBI summary score	53	85.79	7.08	56	87.82	5.63	58	87.55	5.91
Teaching efficacy	53	29.13	2.16	56	29.75	1.94	58	29.71	2.02
Positive affect	51	17.86	1.93	56	18.25	1.65	58	17.88	1.59
Verbal participation	51	21.76	2.22	56	22.14	2.01	58	22.07	1.90
Reading instruction	53	6.57	1.22	56	6.54	1.19	58	6.69	1.17
Resources	53	14.45	1.95	56	14.98	1.39	58	14.95	1.47
Reading frequency	53	5.15	5.02	55	5.67	5.61	58	5.78	5.53
6 Months									
PRBI summary score	48	105.63	10.25	48	106.23	7.96	52	106.88	8.46
Teaching efficacy	49	29.20	2.81	48	29.98	2.10	54	30.07	1.93
Positive affect	48	38.21	4.24	48	38.25	3.41	52	38.46	3.69
Verbal participation	48	20.21	2.48	48	19.58	2.47	52	20.21	2.39
Reading instruction	49	7.14	0.89	48	7.21	0.80	54	7.07	0.77
Resources	48	14.33	1.84	48	14.73	1.63	54	14.37	2.08
Reading frequency	46	11.11	4.54	46	9.43	4.65	48	10.85	4.60
Interv. book reading freq.	49	2.24	2.07	48	2.21	1.47			
12 Months									
PRBI summary score	47	105.70	9.79	50	105.22	9.55	54	103.31	10.18
Teaching efficacy	47	29.26	2.64	50	29.60	2.36	55	29.56	2.28
Positive affect	47	37.87	4.37	50	37.90	4.56	54	36.83	4.71
Verbal participation	45	20.58	2.58	49	20.49	2.47	54	19.56	3.00
Reading instruction	47	6.94	1.01	49	6.86	0.94	55	6.82	1.02
Resources	47	14.74	1.74	50	14.16	1.77	55	13.84	2.01
Reading frequency	43	10.65	4.81	47	10.47	4.60	49	11.22	4.65
Interv. book reading freq.	46	2.31	2.38	49	2.74	2.16			
18 Months									
PRBI summary score	44	105.70	10.36	47	105.43	9.90	54	105.85	10.24
Teaching efficacy	44	29.30	2.74	47	29.55	2.76	54	30.06	2.26
Positive affect	42	37.71	4.42	47	37.81	4.05	54	37.37	4.45
Verbal participation	44	21.16	2.74	46	20.46	2.66	53	20.72	2.66
Reading instruction	44	6.95	0.86	47	6.87	0.88	54	6.98	0.92
Resources	43	14.40	1.90	47	14.32	1.79	54	14.37	1.91
Reading frequency	39	11.23	5.35	42	9.98	4.59	46	11.24	4.62
Interv. book reading freq.	44	2.47	2.63	47	2.41	2.48			

Note. The PRBI summary and subscale scores are the sum of the item scores. Reading frequency is the number of times the mothers reported reading to their child in the last seven days. Intervention book reading frequency is the number of times the mothers reported reading the book provided to them during the past week.

Sex of the child, child's age in years, and child's age in years squared and cubed were also included in all analyses as covariates. Including additional control variables even when the study is experimental has been noted as an effective way to eliminate bias and increase the precision of regression-adjusted estimates (e.g., Angrist & Pischke, 2009).

Analytic strategy

The first research question examined whether reading beliefs, as measured by the PRBI, differed between the experimental (educational book), comparison (non-educational book), and control (no-book) groups. Several sets of analyses were conducted to answer this research question. First, maternal reading beliefs at 6, 12, and 18 months postpartum were pooled together and Ordinary Least Squares (OLS) multiple regression was used to determine the effect of receiving free educational baby books. The dependent variable was maternal reading beliefs globally and each subscale of the PRBI. The independent variable of interest was group assignment (i.e., educational book group (reference), non-educational book group, and no-book group).

Secondly, OLS multiple regression was conducted for each time point at which the PRBI was administered (6, 12, and 18 months postpartum). As with the pooled analysis, individual wave analyses examined impacts on maternal reading beliefs globally and on each subscale of the PRBI, and the independent variable of interest was also group assignment. OLS regressions for both sets of analyses were run comparing the non-educational book group and no-book group to the educational book group. Paired t-tests examined if significant differences existed between the non-educational book group and no-book group. Demographic characteristics listed above, as well as baseline reading beliefs, were included in the analyses to account for variation due to participant characteristics.[1]

The second research question examined whether participation in the intervention resulted in increased self-reported reading frequency over time. Similar to the first research question, OLS regressions were used to determine if mothers in the educational book group read significantly more to their child at 6, 12, and 18 months of age, and then pooled across waves, compared with mothers in the non-educational book and no-book groups. Baseline self-reported reading frequency, measured prenatally along with demographic variables, was controlled for in the analyses.

Lastly, we tested the relation between maternal beliefs about reading and self-reported reading frequency, irrespective of group assignment. OLS regressions were estimated to examine if reading beliefs – both the summary score and individual subscales – were related to self-reported reading frequency. We estimated regressions for the full sample at each time point, and pooled across time points. Baseline self-reported reading frequency and beliefs, as well as demographic and background characteristics were controlled for in the analyses. Group assignment was also included as a covariate to account for non-independence.

Hierarchical linear models were not estimated because it is difficult to conceptually predict the anticipated growth of mothers' reading beliefs or frequency of reading. The current approach was more flexible

[1] Although impact estimates separate by demographic subgroup might be of interest, many subgroups had small sample sizes within each experimental condition. Although we included these variables as covariates in our models, power issues made us hesitant to draw conclusions within or across demographic groups.

and allowed for detailed predictions to be made. Also, the data were pooled because the interest of this study was not in growth, but on the effect of the intervention on increasing maternal beliefs about the importance of reading and increasing reading practices. A pooled estimate was computed across the three time points to determine an overall effect of providing educational books to low-income families on reading beliefs and frequency of reading practices. Huber-White sandwich estimators were used to adjust standard errors for non-independence when pooling data across time points from the same family (Huber, 1967; White, 1982). Given the sample size and repeated measures, there was sufficient power (.80) to detect the observed effect sizes.

Missing data on any of the background variables at the time of random assignment were controlled for in the analyses with a dummy variable. Missing values on the demographic variables were set to zero and corresponding dummy variables entered for each variable were coded as one if the value for the variable was missing and zero if it was not. This technique has been noted as an appropriate way to handle missing data, particularly in randomized control trials (Puma, Olsen, Bell, & Price, 2009).

Results

Descriptive analyses

Table 2 shows the descriptive statistics of reading beliefs and self-reported reading frequency for each study group prenatally, and when the child was 6, 12, and 18 months of age. Examination of the summary reading belief scores and self-reported reading frequency means across intervention groups showed small differences between the three groups, with the groups that received books – regardless of the content – having the highest, but not significantly different means.

Substantive analyses

Global reading beliefs

Regression results examining the effect of receiving baby books on maternal beliefs about the importance and benefits of reading are presented in the first column of Table 3. No significant differences emerged in the pooled analysis. In contrast, wave-by-wave results indicated that the educational book group had significantly higher global reading beliefs (Cohen's $d = .52$) compared with the no-book group when children were 12 months of age. Also, at 12 months of age, a comparison of the non-educational book group and no-book group coefficients revealed that mothers in the non-educational book group had significantly ($p = .03$) higher global reading beliefs than mothers in the no-book group.

Subscales of the PRBI

To learn more about the specific aspects of reading beliefs that this intervention impacted, individual subscales of the PRBI were examined. Significant group differences were found for some, but not all of the specific reading belief subscales. In the pooled analysis (rows 1 and 2 of Table 3), mothers in the educational book group had significantly higher scores than the no-book group on the verbal participation ($d = .40$), and resources ($d = .35$) subscales. No significant differences between the educational book group and the non-educational book group were found on any of the subscales for the pooled estimates. Likewise, no significant differences were found between the non-educational book group and the no-book group for any of the subscales in the pooled analysis (not shown).

Examining the wave-by-wave results, the majority of the significant differences across groups were found in the 12 month wave. At 12 months of age, mothers in the educational book group had significantly higher beliefs overall on a global summary score of beliefs than mothers in the no-book group ($d = .52$). Also at 12 months, mothers in the educational book group had significantly higher beliefs regarding verbal participation than the no-book group ($d = .64$), and about resources than the non-educational book group ($d = .68$), and no-book group ($d = .44$).

Finally, a paired t-test of the coefficients revealed significant differences between mothers in the non-educational and no-book groups – when children were 12 months of age mothers in the non-educational book group had higher beliefs about verbal participation during reading ($p = .01$; not shown in table, results available upon request).

Self-reported reading frequency

In addition to examining the impact of the Baby Books intervention on maternal beliefs about reading, we were also interested in whether the intervention significantly changed maternal reading practices,

Table 3
Treatment and comparison groups predicting reading beliefs and self-reported reading frequency at 6, 12, 18 months, and pooled across time points.

	Parent Reading Beliefs Inventory						Self-reported reading frequency
	Summary score	Teaching efficacy	Positive affect	Verbal participation	Reading instruction	Resources	
	B (SE)	*B (SE)*	*B (SE)*	*B (SE)*	*B (SE)*	*B (SE)*	*B (SE)*
Pooled							
Non-ed book	−1.19 (1.29)	.15 (.37)	−.34 (.42)	−.68 (.41)	−.06 (.15)	−.35 (.27)	−.23 (.59)
No-book	−2.67 (1.39)†	.25 (.37)	−1.09 (.58)†	−1.04 (.45)*	−.08 (.15)	−.65 (.28)*	.29 (.67)
6 Months							
Non-ed book	−.19 (1.53)	.57 (.43)	−.28 (.72)	−.74 (.48)	.05 (.16)	.19 (.37)	−1.79 (.99)†
No-book	−.48 (1.53)	.63 (.43)	−.17 (.73)	−.30 (.48)	−.17 (.16)	−.24 (.37)	−1.16 (1.00)
12 Months							
Non-ed book	−1.62 (1.68)	−.09 (.49)	−.22 (.77)	−.32 (.57)	−.11 (.19)	−.82 (.36)*	.12 (.92)
No-book	−5.09 (1.70)**	−.07 (.50)	−1.90 (.78)	−1.74 (.57)**	−.12 (.20)	−1.27 (.36)**	.41 (.93)
18 Months							
Non-ed book	−1.59 (1.84)	.03 (.54)	−.49 (.84)	−1.08 (.58)†	−.10 (.19)	−.40 (.38)	−1.11 (1.07)
No-book	−2.22 (1.87)	.25 (.55)	−1.16 (.86)	−1.02 (.59)†	.10 (.19)	−.35 (.39)	−.04 (1.06)

Note. Standard errors are in parentheses. Educational book is the reference group. Control variables collected at random assignment included in the analysis were whether black, maternal age, years of schooling, health, income, whether married, whether living with partner, planned pregnancy, whether received WIC, and whether received food stamps. Child gender and age in years (squared and cubed as well) were included as control variables. Missing data were accounted for by setting missing to zero and including a dummy variable for each demographic variable that equaled 1 if missing and 0 if present. Prior reading beliefs and self-reported reading frequency were included in the analyses. The scale for the reading frequency is in number of times the mother reported reading to their child in the last seven days. Pooled indicates observations were combined across the 6, 12, and 18 month time points. Non-Ed = non-educational baby book group.
†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

specifically by increasing the frequency of reading. In testing whether group assignment predicted self-reported reading frequency, no significant differences between any of the book groups emerged in the pooled or wave-by-wave analyses.

Reading beliefs predicting self-reported reading practices

Although we found no evidence that the Baby Books intervention increased self-reported reading frequency, given the dearth of research about parental reading beliefs in very early childhood, we wanted to confirm that reading beliefs were positively associated with self-reported reading frequency, irrespective of group assignment. In Table 4 we present our findings across study groups. The results pooled across study groups showed a positive and significant association between reading beliefs – including the summary score and the teaching efficacy, positive affect, and verbal participation subscales – and self-reported reading frequency. The wave-by-wave results suggested that early in infancy there was not a strong relation between reading beliefs and self-reported reading frequency, but by 18 months of age, reading beliefs, both global and specific, became a significant predictor of reading frequency. In other words, reading beliefs appeared to exert a greater influence on the amount of time mothers' read to their child as children aged. Interestingly, in neither the pooled nor wave-by-wave analyses were beliefs about available resources a significant predictor of self-reported reading frequency, indicating that perceived resources, such as a having a quiet space for reading or enough reading materials, did not appear to be an aid or barrier to mothers' reading frequency.

Discussion

Reading beliefs

These findings support that both giving free books to mothers, as well as including educational content, could improve and have lasting effects on maternal beliefs about the importance of reading. Providing free books, regardless of the content, increased overall favorable beliefs about reading. The beliefs of the mothers in the educational book group about reading were not significantly different from mothers in the non-educational book group, with the exception of when children were 12 months of age. Then, mothers in the educational book group had significantly higher beliefs regarding resources. This finding suggests that just providing free baby books to low-income mothers may be beneficial for increasing reading beliefs and that providing an educational intervention when babies are one year old may be most effective.

Our study extended the work by High et al. (2000), the only other study we are aware of that connected educational information, free books, and reading practices, by exploring educational and non-educational content and different aspects of maternal reading beliefs as well as the impact of providing books to mothers of infants and toddlers. In looking at mothers' beliefs about verbal participation in reading, and beliefs regarding resources in the home, educational content about typical child development and parenting was beneficial. In the pooled analyses, our results indicated that providing books with educational content led to higher beliefs on these specific scales, but providing non-educational books did not lead to higher beliefs when compared with women who received no books. However, when comparing the mothers' beliefs in the educational book group with those in the non-educational book group, no significant differences for the global beliefs or belief subscales emerged.

Home literacy activities and positive maternal beliefs regarding reading have been shown to be beneficial to children's reading skills (e.g., Bingham, 2007; Skibbe et al., 2008); however, a recent review of home literacy practices found that reading was most beneficial to children when they were engaged (i.e., asked questions) by the reader (Phillips et al., 2008). Increasing mothers' reading beliefs regarding the importance of interacting with their child while reading may improve long-term reading ability and skills for children. Our finding that provision of free baby books to mothers of infants increased their beliefs about the importance of verbal participation in reading at 12 months is, thus, important.

Our study also highlighted the difficulties of changing reading beliefs among mothers of young infants. No significant differences emerged between any of the intervention groups on reading beliefs prior to when children were 12 months of age. One reason this could be is that reading to children who are very young may not be as enjoyable or as rewarding since the child is not yet a very active participant in the shared reading experience. Also, other studies have found that parents read less frequently to younger infants (e.g., Karrass & Braungart-Rieker, 2005). Therefore, changing beliefs about reading in early infancy may be more challenging than in late infancy given that reading practices are not as prevalent for the parents of children in this age group (e.g., Kuo, Franke, Regalado, & Halfon, 2004).

Time spent reading

Disappointingly, the Baby Books intervention did not have a significant impact on self-reported reading frequency for mothers in the educational book group relative to mothers in the other groups. This finding was surprising since previous studies have shown that providing free books to low-income mothers, such as through programs like Reach Out and Read, increased reading practices (High et al., 1998; Kreider, Morin, Miller, & Bush, 2011; Needlman, Toker, Dreyer, Klass, & Mendelsohn, 2005). One possible explanation for our contradictory finding is that infancy may be too early to see an effect of free books on self-reported reading practices. In an observational study of child caregiver reading practices with infants and toddlers, researchers found that 50% of infants under a year were read to as compared with over 85% of the infants at least 13 months of age (Honig & Shin, 2001). Another study that examined reading frequency with children from infancy to nearly 3 years, found that age was a significant predictor of reading practices, with older children being read to at a higher rate (Kuo et al., 2004).

Table 4
Reading beliefs predicting self-reported reading frequency with experimental conditions pooled.

	Parent Reading Beliefs Inventory					
	Summary score	Teaching efficacy	Positive affect	Verbal participation	Reading instruction	Resources
Self-reported reading frequency	*B(SE)*	*B(SE)*	*B(SE)*	*B(SE)*	*B(SE)*	*B(SE)*
Pooled	.10(.03)**	.37(.10)***	.21(.07)**	.26(.11)*	.54(.31)	.28(.15)
6 months	.07(.05)	.31(.18)	.19(.11)	.05(.19)	−.03(.52)	.18(.24)
12 months	.10(.04)*	.30(.16)	.19(.10)	.26(.15)	.53(.40)	.37(.22)
18 months	.12(.04)**	.48(.16)**	.22(.11)*	.38(.16)*	1.04(.49)*	.35(.22)

Note. Standard errors are in parentheses. Control variables collected at random assignment included in the analysis were child age, age squared, age cubed, child gender, whether black, maternal age, years of schooling, health, income, whether married/whether living with partner, planned pregnancy, whether received WIC, and whether received food stamps. Missing data were accounted for by setting missing to zero and including a dummy variable for each demographic variable that equaled 1 if missing and 0 if present. Prior reading beliefs and self-reported reading frequency were included in the analyses. The scale for self-reported reading frequency is in number of times the mother reported reading to their child in the last seven days. Pooled indicates observations were combined across the 6, 12, and 18 month time points. *$p < .05$, **$p < .01$, ***$p < .001$.

A practical implication of the findings may be to incorporate educational baby books for older infants into pre-existing programs, such as Early Head Start or Reach Out and Read, where parents are provided explicit instruction on and knowledge about the importance of reading practices (ACF, 2002; High et al., 1998). For Reach Out and Read programs, it is possible the educational baby books, given their low-cost to produce, could be given along with the books already provided to families in the program. Adding educational books to programs that already demonstrated promise in increasing reading practices may provide an additional way to reach parents of older infants and toddlers and potentially positively expand their beliefs about reading. Future research should examine the effect of receiving educational baby books through established book give-away programs on maternal reading practices and beliefs.

Reading beliefs and self-reported reading frequency

Our results showed a positive, significant relation between maternal reading beliefs and how often mothers report reading, which was consistent with other literature (e.g., Celano et al., 1998; DeBaryshe & Binder, 1994). However, this was the first study, to our knowledge, that focused exclusively on infants, and related maternal reading beliefs to self-reported reading frequency. Also, it was the first study to our knowledge that examined how the link between reading beliefs and reading frequency changed as young children aged. The results underscore the overall importance of fostering positive beliefs about reading, and showed that even in the early stages of a child's life, maternal beliefs were associated with self-reported reading frequency. As reading during the early years, particularly prior to when the child is 12 months of age, is important for children's language and literacy outcomes (Dunst et al., 2012), it is imperative for researchers to further investigate the link between beliefs and practices at this early age.

Our study showed that reading beliefs did not significantly predict reading practices until children were 12 months of age. Although it was possible that beliefs about reading were being informed and shaped during the child's infancy, mothers' beliefs were not related to their reading frequency at these early ages. Because of this, it is important for future research to investigate how early reading habits are formed and how beliefs may play a role in this, even if they do not have a direct association with reading frequency during the first year of a child's life.

Limitations and future research

Even with the strong research design of random assignment, limitations of the study remain. Sample size is a potential limitation of the study. In most instances, the analyses showed a positive, albeit non-significant, relation between the educational book group and self-reported reading frequency, relative to the other two groups. A larger sample would have provided more statistical power and smaller effects may have been detected. Since the study was not nationally representative, we urge the usual measure of caution when generalizing the findings to the population as a whole. The sample included only new mothers, most of whom were African-American and low-income. The lack of cultural and SES variation in the sample limits our ability to generalize to other cultures and SES groups. Therefore it is unknown how these findings would generalize to other types of parents such as fathers, mothers of other ethnicities, and those with more parenting experience.

Lastly, the measure of reading practices through self-report may have been influenced by problems with memory or a desire to report higher levels of reading with infants and toddlers. Future studies should work to include other measures of reading and literacy practices, not just the self-reported frequency of book reading. To that end, future work would be strengthened with the inclusion of an observational measure or daily log of reading practices as well as observations of non-book reading literacy practices such as storytelling and reading other sources, like newspaper comics.

Future research should also work to explore whether improving early reading beliefs is associated with increased and higher quality home literacy practices in children's later years, since previous research indicated a strong relation between reading beliefs and home literacy practices and activities when children were in their preschool years (Bingham, 2007). Also, future work should examine if beliefs that are not captured by the PRBI exist, such as beliefs regarding children being active participants in the reading time, and are present for parents of infants and toddlers. Similarly, future work should seek to understand if the quality of the parent–child joint reading is related to child outcomes, increased reading practices, or beliefs about the importance of reading. An additional limitation of the present study is the lack of information on the quality of the reading experiences, and it is plausible that higher-quality reading interactions may be associated with increased maternal knowledge of child development, something the intervention aimed to increase. Although the PRBI has been used frequently, one of the subscales on the short form, reading instruction, only contains two items. Future research should work to understand how reading instruction beliefs and practices can be impacted by a low-cost intervention.

Conclusion

A low-cost intervention providing low-income mothers with free baby books embedded with educational content and baby books without the educational content had a significant impact on maternal reading beliefs about the importance of reading, particularly those regarding verbal participation during reading, but not until children were 12 months of age, and the effects were not maintained after the intervention had ended 6 months later. Overall effects were found on global reading beliefs, and beliefs regarding verbal participation during reading, and resources in the home. In addition, beliefs about the importance of reading were related to mothers' self-reported reading frequency, but only after children were 12 months of age. These results are promising given previous findings of the importance of maternal beliefs about reading on children's future literacy and language skills (Weigel et al., 2006).

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