



# Parent engagement in a Head Start home visiting program predicts sustained growth in children's school readiness

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## ARTICLE INFO

### Article history:

Received 26 June 2017

Received in revised form 1 June 2018

Accepted 8 June 2018

### Keywords:

School readiness

Home visiting programs

Intervention implementation

Parent involvement

Parent engagement

## ABSTRACT

This study examined three components of parent engagement in an enriched Head Start home visiting program: intervention attendance, the working alliance between parents and home visitors, and parents' use of program materials between sessions. The study identified those family and child characteristics that predicted the different components of parent engagement, and the study tested whether those components predicted sustained growth in children's school readiness skills across four years, from preschool through second grade. Ninety-five low-income parents with four year-old children attending Head Start (56% white; 26% black; 20% Latino; 44% girls) were randomly assigned to receive the home visiting program. Assessments included home visitor, parent, and teacher ratings, as well as interviewer observations and direct testing of children; data analyses relied on correlations and hierarchical multiple regression equations. Results showed that baseline family characteristics, such as warm parent–child interactions, and child functioning predicted both working alliance and use of program materials, but only race/ethnicity predicted intervention attendance. The use of program materials was the strongest predictor of growth in children's literacy skills and social adjustment at home during the intervention period itself. In contrast, working alliance emerged as the strongest predictor of growth in children's language arts skills, attention skills, and social adjustment at school through second grade, two years after the end of the home visiting intervention. To maximize intervention effectiveness across school readiness domains over time, home visiting programs need to support multiple components of parent engagement, particularly working alliance and the use of program materials between sessions.

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## 1. Introduction

Children living in poverty often show low levels of the literacy, attention, and social adjustment skills that contribute to school readiness (Blair, 2002). In part, this reflects the adverse conditions and corresponding lower levels of parent support for learning that often accompany stressful economic circumstances (Ryan, Fauth, & Brooks-Gunn, 2006). Factors such as family instability, less formal education, elevated rates of maternal depression, and social isolation can undermine positive parenting practices and reduce parents' efforts to support children's developing competencies (Abenavoli, Greenberg, & Bierman, 2015). A number of group-based and individual home visiting programs have been developed to support low-income families, promote positive par-

enting practices, and encourage children's learning at home, with the ultimate goal of improving school readiness (see reviews by Brooks-Gunn & Markman, 2005; Welsh, Bierman, & Mathis, 2014). In theory, group-based programs should help foster a sense of community among parents and be more efficient in terms of service delivery, but individual home visiting programs should be more nimble in adapting to and meeting the needs of specific families. Although some parenting programs have produced benefits for children, there is concern that program effects are sometimes weak and often variable (Brooks-Gunn & Markman, 2005; Gomby, 2005). Key challenges include recruiting and retaining parents into parenting programs and promoting the level and type of parent engagement needed to alter children's development (Golas, Horm, & Caruso, 2006; Korfmacher et al., 2008).

The purpose of this study was to examine parent engagement in a home visiting program designed to promote school readiness among children living in poverty. A randomized controlled

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trial demonstrated that the Head Start REDI-P (Research-based Developmentally Informed-Parent) program, compared to the Head Start REDI-Classroom program alone, produced significant benefits for children in areas of literacy skills and social/behavioral adjustment at the end of the intervention period in kindergarten (Bierman, Welsh, Nix, Heinrichs, & Mathis, 2015) and two years later, in second grade (Bierman, Heinrichs, Welsh, Nix, & Gest, 2016). This study investigated natural variation in intervention response among the families randomly assigned to REDI-P. It sought to understand which parents engaged in the home visiting program and how that engagement affected children's school readiness.

### 1.1. Parenting programs that support school readiness in preschool children

Prior research documents the benefits that accrue to young children when their parents support early learning at home by talking and reading with children, playing games and engaging in educational activities, and interacting in a warm and responsive manner (Fantuzzo, McWayne, Perry, & Childs, 2004). For children in Head Start, this kind of home-based family involvement is linked to multiple dimensions of school readiness, including vocabulary, learning motivation, task persistence, attention, and positive behavior (Fantuzzo et al., 2004).

Parent-focused interventions designed to promote the school readiness of low-income preschool children have focused on improving support for learning at home by: teaching parents to use interactive reading strategies that encourage conversation and highlight print concepts (see reviews by Mol, Bus, DeJong, & Smeets, 2008; Reese, Sparks, & Leyva, 2010); promoting play-based learning activities and strategies, with the goals of enriching parent-child conversation, improving parent-child interaction quality, and increasing cognitive stimulation (see review by Welsh et al., 2014); and teaching positive parent-child interaction and behavior management skills (Brotman et al., 2013; Webster-Stratton, Reid, & Hammond, 2001). Conceptually, all of these parent-focused interventions exert their effects on children primarily as a function of changes in parenting behaviors and attitudes, making parent engagement in intervention a critical lever for change (Korfmacher et al., 2008).

### 1.2. Components of parent engagement in interventions

Several different components of parent engagement in interventions have been identified, showing differential associations with family characteristics and intervention outcomes.

#### 1.2.1. Intervention attendance

The first challenge is to encourage parents to attend sessions so they receive sufficient exposure to intervention content to bolster positive change. Motivating attendance in parent-focused group programs can be difficult, with attendance rates hovering around 50% of sessions (Dumas, Nissley-Tsiopinis, & Moreland, 2007; Webster-Stratton et al., 2001). In most home visiting programs, attendance rates are also about 50% (Paulsell, 2012).

In general, when parents are younger, have less education, or are depressed, they are less likely to attend parent groups (Baydar, Reid, & Webster-Stratton, 2003; Raikes et al., 2006; Wagner, Spiker, Linn, Gerlach-Downie, & Hernandez, 2003). In one study that offered parent groups and individual home visits, black parents were less likely than white parents to attend groups but more likely to receive home visits (Nix, Pinderhughes, Bierman, Maples, & the Conduct Problems Prevention Research Group (CPPRG), 2005). The presence of child behavior problems may motivate parents to attend sessions in preventive interventions for parents (Nix, Bierman, McMahon, &

CPPRG, 2009). Likewise, difficult parent-child interactions and children's academic problems may motivate parents to participate in home visits (Nix et al., 2005).

Several studies have found that higher rates of attendance in parenting programs are associated with more positive child outcomes. For example, when Brotman et al. (2013) offered parent group sessions in kindergarten, they found a strong linear association between intervention attendance and improvement in children's reading skills. Similarly, when Gross et al. (2009) offered a behavior management group program to parents of preschool children, they found that parents who attended at least 50% of sessions experienced the greatest improvements in parenting skills and child behavior. When Raikes et al. (2006) examined dose-response relations in home visiting, they also found that attendance was related to improvements in parenting, albeit to a smaller extent.

#### 1.2.2. Quality of the working alliance

Although less often studied than intervention attendance, the formation of a trusting working alliance between the parent and the group facilitator or home visitor also may make important contributions to intervention outcomes (Brookes, Summers, Thornburg, Ispa, & Lane, 2006; Korfmacher, Green, Spellmann, & Thornburg, 2007; Sierau, Brand, & Jungmann, 2012). The working alliance refers to parents' emotional orientation to the intervention and group facilitator/home visitor, reflecting the degree to which parents believe the intervention objectives and methods align with their own goals and the degree to which they trust and feel respected by the group facilitator/home visitor (see summary in Horvath & Greenberg, 1989). Conceptually, the working alliance is associated with parent interest, motivation to change, and enthusiasm about implementing program strategies (Wagner et al., 2003).

Prior studies suggest that the quality of the working alliance and quality of participation in an intervention is predicted by many of the same family factors that predict intervention attendance. For example, socioeconomic disadvantage, parent education, being a parent of color, and maternal depression have predicted lower levels of working alliance and quality of participation in parent groups, as has the severity of child behavior problems (Baydar et al., 2003; Nix et al., 2009).

Working alliance and the quality of participation also predicts therapeutic change. For example, the quality of participation in a parent group intervention has been linked with improvements in positive discipline and behavior management strategies (Nix et al., 2009). Likewise, the quality of participation in a home visiting program has been linked to parents' support for language and improvements in children's vocabulary (Raikes et al., 2006).

#### 1.2.3. Parent use of program materials at home

Most parent-focused school readiness interventions urge parents to practice targeted skills with their children between sessions. Sometimes parents are given explicit homework assignments or are provided with specific play and learning activities to complete with their children (Anthony, Williams, Zhang, Landry, & Dunkelberger, 2014; Wagner et al., 2003). In virtually all programs, the extent to which parents engage their children in the use of learning materials and the extent to which parents generalize the new strategies across contexts are considered fundamental to sustained change (Reese et al., 2010; Wagner et al., 2003; Whitehurst et al., 1994).

A number of studies have demonstrated positive effects on parent behaviors and child outcomes when parents are provided with home learning materials and taught how to use them (Ford, McDougall, & Evans, 2009; Justice & Ezell, 2000). However, few studies have examined the predictors of parent use of program

materials between sessions or the degree to which parents' use of program materials predicts child outcomes.

### 1.3. The present study

The present study was designed to better understand patterns of parent engagement and intervention response among families randomly assigned to REDI-P. This study examined both the quantity of parent engagement, as reflected in intervention attendance, as well as the quality of parent engagement, as reflected in the working alliance between parents and home visitors and use of program materials between sessions. This study examined whether baseline family characteristics and child functioning predicted the three components of parent engagement. In addition, this study tested whether the three components of parent engagement differentially predicted children's sustained growth in different aspects of school readiness, controlling for baseline family characteristics and child functioning.

## 2. Method

Because this study focused on parent engagement, it included only the families randomly assigned to the intervention condition of the REDI-P study (Bierman et al., 2015, 2016).

### 2.1. Participants

This study included 95 parents/primary caregivers (89% mothers, 4% fathers, 5% grandmothers, 2% other) and their children (56% white, 26% black, 20% Latino; 44% girls; mean age = 4.42 years at the start of the study). Median family income was \$18,000 per year, with 58% of the participating parents unemployed. About 33% of parents were single.

Families were recruited over two successive years from 24 Head Start centers in central Pennsylvania. In the early fall, a letter providing a short description of the REDI-P program was sent home to the parents of all 4-year-old children who would be transitioning to kindergarten the following year. Overall, 52% of eligible families participated in the study. They were randomly assigned to intervention or control conditions after completing baseline assessments. All children in this study were in the same Head Start classrooms, receiving the same REDI-Classroom curriculum (Bierman et al., 2008); the only difference was that parents in the intervention condition also received the REDI-P home visits.

For this study, families were followed across four years, from the beginning of the last year of Head Start, through the transition into kindergarten and until the end of second grade. In kindergarten and second grade, 5 and 15 of the original 95 families, respectively, had moved or were no longer participating in the study. There were no statistically significant differences between those families who were or were not retained in the study on any of the baseline family characteristics or measures of child functioning included in this study. Not surprisingly, though, families who were retained in the study tended to complete more home visits than families who were not retained ( $p < .001$ ).

### 2.2. Intervention procedures

In the REDI-P intervention, parents received 10 home visits during the spring of children's last year of Head Start and six home visits the following fall, after children transitioned into kindergarten. REDI-P home visitors coached parents in interaction strategies designed to strengthen parent-child relationships, increase parent-child conversations, and enhance parent support for the development of children's literacy and social-emotional skills.

Home visits followed a well-specified manualized curriculum, focusing on developmentally sequenced skills initially introduced in the REDI-Classroom program (Bierman et al., 2008). For example, in the classroom teachers implemented the Preschool PATHS (Promoting Alternative Thinking Strategies) curriculum (Domitrovich, Cortes, & Greenberg, 2007) to teach children prosocial behaviors, emotional understanding, self-regulation, and social problem-solving. REDI-P was designed to provide parallel learning support at home and created PATHS materials for parent use. Using books that featured characters from PATHS and included embedded questions, parents were taught interactive reading (Justice & Ezzell, 2000; Whitehurst et al., 1994) to encourage parent-child conversations, strengthen children's oral language and emergent literacy skills, and reinforce target social-emotional skills. REDI-P also incorporated PATHS routines, such as compliment lists, a feelings face chart, and behavior control techniques, to help parents support the development of children's social adjustment.

Parents received monthly activity boxes containing play materials designed to encourage parent-child dramatic play, as well as letter identification, letter-sound recognition, and print concept practice (Senechal, 2006). For example, materials for "playing restaurant" at home included an alphabet soup letter identification game, menu sight words, and opportunities to practice writing when taking meal orders. Parents were shown videotapes illustrating how to use the home learning activities. They also received feedback and support for program implementation from their home visitors.

REDI-P home visitors had undergraduate degrees in early education or human services and experience working with families with young children. To maintain program fidelity, home visitors had a weekly meeting with the intervention supervisor to report progress and address family challenges. In addition, the supervisor attended about 20% of home visits to assure high-quality implementation.

### 2.3. Assessment procedures and study measures

Assessments occurred in the fall of Head Start, prior to beginning the intervention; during the intervention; in the spring of kindergarten, after the intervention had ended; and in the spring of second grade, two years after families had stopped receiving services. Parent interviews were conducted in families' homes; child assessments were conducted at Head Start or in school during individual pull-out sessions; teachers completed ratings on their own. Research assistants and teachers were naïve concerning the intervention status of all children.

#### 2.3.1. Home visitor ratings of parent engagement

After each session, home visitors completed ratings of three components of parent engagement – intervention attendance, working alliance, and use of program materials – widely acknowledged as critical to intervention success (Cunningham & Henggeler, 1999; Dumas et al., 2007; Karver, Handelsman, Fields, & Bickman, 2006; Raikes et al., 2006). In previous studies these particular ratings of engagement have been shown to be reliable and valid predictors of parents' involvement in their children's education (Nix et al., 2009) and improvements in children's behavior at school (CPPRG, 1999). During training, home visitors received a ratings manual and discussed ratings as a group. During intervention, home visitors discussed their ratings of parent engagement with their supervisor who also observed sessions.

In REDI-P, home visitors recorded whether each session was completed. A sum of the number of home visits received out of 16 was used as the indicator of intervention attendance ( $\alpha = .96$ ). After each session, home visitors rated their working alliance with the parent on a 4-point Likert scale. Lower scores reflected parental discomfort, active or passive resistance, defensiveness,

and/or disinterest whereas higher scores indicated parental comfort, openness, a collaborative orientation, and interest. The mean of this rating across the home visits that were received represented working alliance ( $\alpha = .93$ ). After each session, home visitors also rated the degree to which the parent used the program-based learning support strategies and materials as intended on a 4-point Likert scale, with lower ratings reflecting little or no effort to use the strategies or materials and higher ratings reflecting the use of a majority of the strategies and materials in a consistent and effective manner. The mean of this rating across the home visits that were received represented use of program materials ( $\alpha = .95$ ).

### 2.3.2. Baseline family characteristics

Five baseline family characteristics were used as predictors of parent engagement. Family race/ethnicity was coded as 0 = white and 1 = black and/or Latino. Parent education was coded as 0 = high school degree or less and 1 = specialized training beyond high school. Employment status represented the number of hours the parent worked outside the home each week.

Parent depression was assessed with the *Center for Epidemiological Studies-Depression Scale* (Radloff, 1977), in which parents rated 20 items, such as “During the last week, how often did you feel sad?,” on a 4-point Likert scale with 0 = rarely and 3 = almost all the time ( $\alpha = .89$ ). Parenting stress was assessed with the Childrearing Stress subscale of the *Parenting Stress Index* (Loyd & Abidin, 1985), in which parents rated nine items, such as “When I do things for my child, I get the feeling that my efforts are not appreciated very much,” on a 5-point Likert scale with 1 = strongly disagree and 5 = strongly agree ( $\alpha = .75$ ). Scores from both measures were standardized and averaged to create a measure of parental distress ( $r = .50, p < .001$ ).

Warm parent-child interactions were assessed with a modified version of the *Post-Visit Inventory* (Dodge, Bates, & Pettit, 1990). After completing interviews, research assistants rated 15 observed interactions, such as “Parent gave attention when child talked,” on a 3-point scale with 0 = didn’t occur and 2 = occurred more than once or on a 5-point Likert scale with 1 = never and 5 = always ( $\alpha = .92$ ).

### 2.3.3. Baseline child functioning and kindergarten and second grade outcomes

In preschool, prior to the beginning of the intervention, children’s emergent literacy skills were assessed with three subscales of the *Test of Preschool Early Literacy* (Lonigan, Wagner, Torgesen, & Rashotte, 2007): the 36-item Print Knowledge subscale, in which children were asked to identify pictures of words and name letters ( $\alpha = .97$ ); the 21-item Blending subscale, in which children demonstrated phonological processing skills by combining different parts of words, such as “hot” and “dog” ( $\alpha = .89$ ); and the 18-item Elision subscale, in which children deconstructed compound words and pointed to correct answers, such as “snowshoe” without “snow” ( $\alpha = .87$ ). The three scores were standardized and averaged to create a composite measure ( $\alpha = .69$ ). In kindergarten, children’s literacy skills were assessed with the Print Knowledge subscale of the *Test of Preschool Early Literacy* ( $\alpha = .93$ ); the Letter-Word Identification subscale of the *Woodcock-Johnson Tests of Achievement III – Revised* (Woodcock, McGrew, & Mather, 2001), in which children were asked to name letters and read words ( $\alpha = .94$ ); the Letter Naming Fluency subscale of the *Dynamic Indicators of Basic Early Literacy Skills* (Good & Kaminski, 2002), in which children were asked to identify as many letters as possible in one minute; and a similar test of letter sound fluency, in which children were asked to sound out as many letters as possible in one minute. The four scores were standardized and averaged to create a composite measure ( $\alpha = .83$ ). In second grade, children’s language arts skills were assessed with the Academic Skills subscale of the *Academic Competence Evaluation Scales* (DiPerna & Elliott, 1999), in which teachers rated grammar,

**Table 1**  
Descriptive statistics of study variables.

	N	Mean	SD	Range
<b>Parent engagement in home visiting</b>				
Intervention attendance	95	12.42	5.12	0–16
Working alliance	92	2.42	.59	.67–3
Use of program materials	87	1.73	.77	0–3
<b>Baseline family characteristics</b>				
Race/ethnicity (0 = white, 1 = black/Latino)	95	.44	.50	0–1
Parent education (P)	95	.35	.48	0–1
Employment status (P)	95	12.91	17.30	0–50
Parental distress (P)	95	0	1	–1.49 to 3.17
Warm parent-child interactions (O)	95	2.43	.42	1.27–3
<b>Baseline child functioning</b>				
Emergent literacy skills (D)	95	0	1	–.95 to 3.13
Attention skills (T)	92	2.26	.70	.29–3
Social adjustment at home (P)	95	0	1	–2.86 to 2.30
Social adjustment at preschool (T)	92	0	1	–2.57 to 1.70
<b>Kindergarten outcomes</b>				
Literacy skills (D)	89	.06	1.04	–4.59 to 1.99
Attention skills (T)	83	2.17	.80	0–3
Social adjustment at home (P)	83	0	1	–3.22 to 2.46
Social adjustment at school (T)	83	0	1	–2.36 to 1.50
<b>Second grade outcomes</b>				
Language arts skills (T)	77	2.85	.83	1–5
Attention skills (T)	77	2.09	.80	.25–3
Social adjustment at home (P)	79	0	1	–2.57 to 2.27
Social adjustment at school (T)	77	0	1	–2.47 to 1.49

Note: P = Parent report, T = Teacher report, O = Observer rating, D = Direct assessment.

punctuation, written communication, and oral communication on a 5-point Likert scale with 1 = far below grade-level expectations and 5 = far above grade-level expectations ( $\alpha = .97$ ).

In preschool, kindergarten, and second grade, children’s attention skills were assessed with the Inattentive-Impulsive subscale of the *ADHD Rating Scale* (DuPaul, 1991), in which teachers rated eight items, such as “Is easily distracted,” on a 4-point Likert scale with 0 = very much and 3 = not at all ( $\alpha = .94-.96$ ).

In preschool, kindergarten, and second grade, children’s social competence was assessed with the *Social Competence Scale* (CPPRG, 1995), in which parents and teachers rated 13 items, such as “Shares with others,” on a 6-point Likert scale with 1 = almost never and 6 = almost always ( $\alpha = .88-.95$ ). Aggression was assessed with the Authority Acceptance subscale of the *Teacher Observation of Classroom Adaptation – Revised* (Werthamer-Larsson, Kellam, & Wheeler, 1991), in which parents and teachers rated seven items, such as “Fights with other children,” on a 6-point Likert scale with 1 = almost always and 6 = almost never ( $\alpha = .84-.91$ ). Scores were standardized and averaged to create a composite measure of social adjustment at home, based on parent reports ( $r = .56-.64, p < .001$ ), and social adjustment at school, based on teacher reports ( $r = .75-.80, p < .001$ ).

## 3. Results

The means, standard deviations, and range of all study variables are presented in Table 1. Correlations among all variables included in the study are highlighted in this Results section and presented in full in Table 1A of the online supplementary materials.

The means suggest that most families received most of the intended REDI-P home visits. Over 50% of families received all 16 home visits; about 25% of families received 8–15 home visits; and about 25% of families received 0–7 home visits. The average working alliance score was 2.42 out of 3, suggesting that most parents were interested in the program and positively engaged in working collaboratively with the home visitor. However, there was substantial variability, with the range extending from quite poor to excellent working alliances. The average score for use of program materials was 1.73 out of 3, suggesting that most parents found

**Table 2**  
Baseline family and child predictors of parent engagement.

	Intervention attendance	Working alliance	Use of program materials
<b>Baseline family characteristics</b>			
Race/ethnicity (0 = white, 1 = black/Latino)	-.29**	-.14	-.02
Parent education	.10	.15	.08
Employment status	-.11	.03	.03
Parental distress	-.05	-.16	-.23*
Warm parent-child interactions	.06	.37***	.30**
<b>Baseline child functioning</b>			
Emergent literacy skills	-.08	.02	.18+
Attention skills	-.01	.21*	.34***
Social adjustment at home	-.05	.16	.33**
Social adjustment at school	-.09	.23*	.35***

Note: +  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

some time to use some of the program materials with their children, but, again, there was variability among families, with the range extending from no use to multiple practice sessions per week.

The correlation between intervention attendance and working alliance was  $.30$ ,  $p < .01$ ; the correlation between intervention attendance and use of program materials was  $.23$ ,  $p < .05$ ; the correlation between working alliance and use of program materials was  $.71$ ,  $p < .001$ . Correlations among the baseline family characteristics and measures of child functioning used as predictors of parent engagement had absolute values ranging from  $.02$ ,  $p = \text{nonsignificant (ns)}$ , to  $.77$ ,  $p < .001$ , with an average correlation of  $.21$ , suggesting they represented distinct constructs for the most part that were not redundant. Correlations among the eight child outcomes across kindergarten and second grade had absolute values ranging from  $.06$ ,  $p = \text{ns}$ , to  $.73$ ,  $p < .001$ , with an average correlation of  $.37$ , suggesting they also represented distinct constructs.

### 3.1. What predicts parent engagement?

Bivariate correlations showing which of the baseline family characteristics and measures of child functioning predicted each component of parent engagement are presented in Table 2. Family race/ethnicity predicted intervention attendance,  $r = -.29$ ,  $p < .01$ , but not working alliance or use of program materials. On average, black and Latino families participated in about three fewer home visits than white families, 10.79 versus 13.72. Parent education and employment status were not related to any of the components of parent engagement. However, higher levels of parental distress predicted less use of program materials,  $r = -.23$ ,  $p < .05$ . Parents who had warmer interactions with their children were more likely to form better working alliances with their home visitors,  $r = .37$ ,  $p < .001$ , and they were more likely to use program materials between sessions,  $r = .30$ ,  $p < .01$ .

Children's emergent literacy skills in preschool were not related to any of the components of parent engagement. However, when children had better attention skills, their parents were more likely to have better working alliances with their home visitors,  $r = .21$ ,  $p < .05$ , and were more likely to use program materials,  $r = .34$ ,  $p < .001$ . When children displayed better social adjustment at home, parents were more likely to use program materials,  $r = .33$ ,  $p < .01$ . In addition, when children displayed greater social adjustment at preschool, parents were more likely to have better working alliances with their home visitors,  $r = .23$ ,  $p < .05$ , and were more likely to use program materials,  $r = .35$ ,  $p < .001$ .

### 3.2. Does parent engagement predict future child outcomes?

In the final stage of data analyses, bivariate correlations were examined to assess the full magnitude of the association between

each component of parent engagement and each child outcome at the end of both kindergarten and second grade. Hierarchical multiple regression equations were then estimated to isolate the unique effect of each component of parent engagement on each outcome.<sup>1</sup> The five baseline family characteristics were entered in the first step of these regression equations to statistically control for plausible selection effects that might simultaneously lead to higher levels of parent engagement in the intervention and better child outcomes. The baseline measure of child functioning corresponding to the outcome was entered in the second step to statistically control for stable child factors – as well as additional family characteristics that had an impact on those stable child factors – that otherwise would be captured in the relations between parent engagement and child outcomes. By including the baseline measure of child functioning in the second step, the regression equations now modeled *growth* across the time period covered in this study. Intervention attendance was entered in the third step to examine the unique effect of the *quantity* of parent engagement. Finally, working alliance and use of program materials were entered in the fourth step to examine the unique contribution of the *quality* of parent engagement to each child outcome. A recent Monte Carlo simulation demonstrated that this number of independent variables for a sample this size is below the limit at which regression coefficients become untrustworthy (Austin & Steyerberg, 2015). Correlations among the independent variables yielded variance inflation factors less than 2.65, well below even conservative thresholds at which multicollinearity poses problems (O'Brien, 2007).

All analyses were re-run multiple times to determine whether any of the five baseline family characteristics or child functioning moderated the relation between each component of parent engagement and the child outcomes. These analyses did not produce many more statistically significant findings than would be expected by chance, and there was no clear pattern to the findings that did emerge. Thus, all results can be considered robust across families, regardless of race/ethnicity, parent education, employment status, parental distress, quality of parent-child interactions, and baseline child functioning.

#### 3.2.1. Kindergarten outcomes

The analyses for children's kindergarten outcomes are summarized in Table 3 and were based on data from 78–83 families (82–87% of the original sample). The full results of the hierarchical regression equations for each of the four child outcomes in kindergarten are presented in Tables 3A–3D of the online supplementary materials.

Bivariate correlations revealed that intervention attendance was not related to any of the four child outcomes in kindergarten. However, Step 3 of the hierarchical multiple regression equations revealed that intervention attendance uniquely predicted improvements in children's social adjustment at home across the intervention year, standardized regression coefficient ( $\beta$ ) =  $.15$ ,  $p < .05$ , once baseline family characteristics and child functioning were controlled. This indicates that, with every standard deviation increase in parents' intervention attendance, there was a corresponding one-sixth standard deviation improvement in children's social adjustment at home. Bivariate correlations showed that working alliance was related to social adjustment at home at the end of the intervention year,  $r = .29$ ,  $p < .01$ , but the regression equations showed that working alliance did not uniquely predict growth in social adjustment at home or any of the other child outcomes across the intervention year, once baseline family char-

<sup>1</sup> The nesting of families within home visitor caseload was not accounted for in these regression equations because the intraclass correlation coefficient was negligible, with an average value below  $.02$ .

**Table 3**  
Relations among parent engagement and children's outcomes in kindergarten.

	Literacy skills	Attention skills	Social adjustment at home	Social adjustment at school
<b>Bivariate correlations</b>				
Intervention attendance	-.10	.03	.11	-.05
Working alliance	.14	.21+	.29**	.18
Use of program materials	.32**	.29**	.50***	.22*
<b>Hierarchical regression equations</b>				
Step 1: Baseline family characteristics				
Race (0 = white, 1 = black/Latino)	.28**	.19+	.09	.16
Parent education	.22*	.01	.16+	-.09
Employment status	.01	.09	-.02	.22+
Parental distress	.00	.07	-.57***	-.15
Warm parent-child interactions	.25*	.25*	.15+	.24*
<i>R-square</i>	.18**	.11	.41***	.20**
Step 2: Baseline child functioning				
Preschool measure of outcome	.46***	.69***	.65***	.56***
<i>Change in R-square from Step 1</i>	.19***	.43***	.25***	.27***
Step 3: Quantity of parent engagement				
Intervention attendance	.08	.02	.15*	.02
<i>Change in R-square from Step 2</i>	.01	.00	.02*	.00
Step 4: Quality of parent engagement				
Working alliance	-.08	-.02	-.03	.07
Use of program materials	.27*	.03	.27**	-.10
<i>Change in R-square from Step 3</i>	.04+	.00	.06**	.01

Note: +  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

acteristics and child functioning, intervention attendance, and use of program materials were controlled. In stark contrast, bivariate correlations revealed that use of program materials was related to children's literacy skills,  $r = .32$ ,  $p < .01$ , attention skills,  $r = .29$ ,  $p < .01$ , social adjustment at home,  $r = .50$ ,  $p < .001$ , and social adjustment at school,  $r = .22$ ,  $p < .05$ , at the end of the intervention year. Moreover, Step 4 of the regression equations revealed that use of program materials uniquely predicted improvements in children's literacy skills,  $\beta = .27$ ,  $p < .05$ , and social adjustment at home,  $\beta = .27$ ,  $p < .01$ , even once baseline family characteristics and child functioning, intervention attendance, and working alliance were controlled.

### 3.2.2. Second grade outcomes

The analyses for children's second grade outcomes are summarized in Table 4 and were based on data from 73–76 families (77–80% of the original sample). The full results of the hierarchical regression equations for each of the four child outcomes in second grade are presented in Tables 4A–4D of the online supplementary materials.

Bivariate correlations showed that intervention attendance was not related to any of the child outcomes in second grade, and the regression equations showed that intervention attendance did not uniquely predict growth in any of those outcomes. Bivariate correlations revealed that working alliance was related to attention skills,  $r = .33$ ,  $p < .01$ , social adjustment at home,  $r = .24$ ,  $p < .05$ , and social adjustment at school,  $r = .47$ ,  $p < .001$ , at the end of second grade. In contrast to the findings by the end of kindergarten, Step 4 of regression equations revealed that working alliance also uniquely predicted growth in children's language arts skills,  $\beta = .37$ ,  $p < .05$ , attention skills,  $\beta = .32$ ,  $p = .05$ , and social adjustment at school,  $\beta = .51$ ,  $p < .01$ , from Head Start through the end of second grade, even once baseline family characteristics and child functioning, intervention attendance, and use of program materials were controlled. Although bivariate correlations showed that use of program materials was, once again, related to attention skills,  $r = .33$ ,  $p < .01$ , social adjustment at home,  $r = .34$ ,  $p < .01$ , and social adjustment at school,  $r = .32$ ,  $p < .01$ , at the end of second grade, regression equations showed that use of program materials no longer uniquely predicted growth in any of the child outcomes through the end of second grade once baseline family character-

istics and child functioning, intervention attendance, and working alliance were controlled.

## 4. Discussion

This study examined three components of parent engagement in a home visiting program designed to support low-income children's successful transition to school. This study adds to the understanding of family and child characteristics that predict parent engagement in home visiting programs designed to promote school readiness. It also adds to the understanding of what needs to happen within such programs to promote sustained positive child outcomes over time and counteract the tendency of most preschool program effects to fade after school entry (Bailey, Duncan, Odgers, & Yu, 2017). At its most basic level, this study validates the REDI-P logic model. Among the heterogeneous group of low-income parents successfully recruited into REDI-P to learn how to support their children's school success, those parents who engaged fully with the program were most likely to realize the greatest benefits for their children.

### 4.1. Family and child characteristics associated with parent engagement

Intervention attendance in REDI-P was high: The maximum number of home visits, 16, was also the modal number. Home visitors were able to establish supportive and productive relationships with almost all parents, reflecting a positive working alliance. Although usually still satisfactory, there was more variability in parent use of program materials between sessions.

None of the baseline family characteristics included in this study, aside from race/ethnicity, predicted intervention attendance. In this way, the findings are similar to previous research on participation in a preventive intervention (Nix et al., 2005), which suggests that some home visit programs can be an effective and especially welcome means of reaching families who are at-risk for lower program participation. Among the low-income families served in REDI-P, factors such as race/ethnicity, parent education, and parent occupation were not related to working alliance or use of program materials. The parents who had warm parent-child interactions showed higher levels of a positive work-

**Table 4**  
Relations among parent engagement and children's outcomes in second grade.

	Language arts skills	Attention skills	Social adjustment at home	Social adjustment at school
<b>Bivariate correlations</b>				
Intervention attendance	-.09	.06	.05	.14
Working alliance	.19	.33**	.24*	.47***
Use of program materials	.19	.33**	.34**	.32**
<b>Hierarchical regression equations</b>				
Step 1: Baseline family characteristics				
Race (0 = white, 1 = black/Latino)	.23+	.09	.21+	.01
Parent education	.02	.23+	.16	.13
Employment status	.06	.13	.01	.19
Parental distress	.00	.13	-.34**	.07
Warm parent-child interactions	.07	.15	.07	.18
R-square	.07	.09	.20**	.09
Step 2: Baseline child functioning				
Preschool measure of outcome	.41***	.41***	.62***	.42***
Change in R-square from Step 1	.15***	.15***	.22***	.15***
Step 3: Quantity of parent engagement				
Intervention attendance	.10	.06	.14	.18
Change in R-square from Step 2	.01	.00	.02	.03
Step 4: Quality of parent engagement				
Working alliance	.37*	.32*	.09	.51**
Use of program materials	-.13	-.01	.12	-.17
Change in R-square from Step 3	.06+	.07*	.02	.12**

Note: +  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

ing alliance, indicating a greater enthusiasm for the program and openness to collaborate with the home visitors. Similarly, parents who experienced less distress and had warm parent-child interactions were more likely to use the program learning materials at home and practice new parenting strategies between sessions. These findings highlight the success of the REDI-P intervention in overcoming most barriers to parent engagement among families living in poverty by delivering services at home, working hard to build and maintain supportive relationships between parents and home visitors, and creating educational materials that are fun, easy to use, and high in face validity regarding how they will help children succeed in school. However, these findings also suggest that program adjustments may be needed to help parents experiencing greater distress and more strained parent-child interactions find the time and energy to use the program materials between sessions.

Compared to the baseline family characteristics, child functioning appeared much more likely to be related to the working alliance between parents and home visitors and parents' use of program materials between sessions. Usually, family characteristics have been studied as predictors of parent engagement in parenting programs, based on the notion that parents are the central targets for recruitment and delivery. Although the presence of difficult child behaviors may increase parents' interest in preventive interventions such as REDI-P (Dumas et al., 2007; Gross et al., 2009), difficult child behaviors can undermine the quality of participation (Nix et al., 2009). In this study, when children were more attentive and displayed better social adjustment, parents formed stronger working alliances with their home visitors and engaged in more home practice between sessions. In all likelihood, the program was easier and more rewarding for parents to use at home when their children were responding positively. Parents who faced greater child challenges may have become more easily discouraged in terms of their perception of program utility, thus diminishing the working alliance. Similarly, child challenges may have reduced parents' efforts to use the program materials and parenting strategies at home. It is possible that parents who are struggling to manage children's behavior would be better served by a parenting program focused on positive management strategies (Brotman et al., 2013; Begle & Dumas, 2011; Gross et al., 2009; Webster-Stratton et al.,

2001) prior to – or as a supplement to – a home learning program such as REDI-P.

#### 4.2. Parent engagement as a predictor of child outcomes

As noted above, child functioning in preschool was the strongest predictor of parent engagement, especially working alliance and use of program materials. In turn, working alliance and use of program materials were the strongest predictors of further improvements in child functioning over time. When children were primed to flourish, the REDI-P program offered their parents the support necessary to nurture that potential.

The number of home visits parents received was not related to children's outcomes at the end of kindergarten or second grade. This is consistent with the findings of previous research demonstrating that, when attendance is fairly high, dose is not a robust predictor of therapeutic response (Nix et al., 2009). A high dose may be necessary but not sufficient.

In this study the other two components of parent engagement, working alliance and use of program materials, despite being very highly correlated, had different patterns of effects, depending on whether child outcomes were measured at the end of the REDI-P intervention versus two years later.

Working alliance was minimally related to children's outcomes in kindergarten. On the other hand, parents' use of program materials was related to children's literacy skills, attention skills, and social adjustment at both home and school (with bivariate correlations of .22–.50). Moreover, use of program materials uniquely predicted growth in literacy skills and social adjustment at home (with standardized regression coefficients of .27 in both cases), controlling for baseline family and child characteristics.

In contrast, both working alliance and use of program materials were related to children's outcomes in second grade (with bivariate correlations of .24–.47). Interestingly, though, only working alliance uniquely predicted growth over time in language arts skills, attention skills, and social adjustment at school (with standardized regression coefficients of .32–.51), controlling for baseline child and family characteristics.

Thus, parents' use of program materials uniquely predicted children's early growth, but it was working alliance that uniquely predicted sustained growth. Those evolving relations over time

among these two components of parent engagement and child outcomes may reflect important aspects of therapeutic change. REDI-P was able to design program materials and specify learning support strategies that were most relevant to children's immediate adjustment. As long as parents actually used the program materials, the materials themselves could help improve children's school readiness. However, REDI-P was not able to anticipate as well what each individual child might need in the future. Parents had to have a deeper, more internalized understanding of REDI-P core principles so they could effectively generalize, adapt, and tailor appropriate strategies to help their children navigate the normative challenges they would encounter. By definition, when parents had good working alliances with their home visitors, they were actively engaged in more frequent and richer conversations about how to do that. As a consequence, REDI-P may have bolstered parents' and children's capacity to maintain gains and overcome future obstacles in ways that were less evident immediately after the intervention ended, but that emerged over time. Overall, the findings of this study suggest that, in the context of high intervention attendance, working alliance and use of program materials are both important to optimize initial and longer-term child outcomes.

#### 4.3. Study strengths and limitations

In examining parent engagement within a home visiting program, this study had several strengths. This study included a high-risk sample of families living in poverty. Not only did this study assess three components of parent engagement, but it also featured multiple child outcomes that were derived from direct testing as well as parent and teacher reports. This study followed children for four years, including two years beyond the end of the intervention, thereby, uncovering the different effects that each component of parent engagement had on initial and longer-term child outcomes. This study statistically controlled for multiple baseline family characteristics. In addition, because this study statistically controlled for baseline child functioning, it also would have controlled for other family and child characteristics that had early and stable influences on child functioning. All of these covariates in the statistical models reduce plausible alternative explanations and help isolate the effects of working alliance and use of program materials on changes in child functioning during the years of this study.

As always, there were also limitations of this study, which qualify its conclusions. Most important, the REDI-P clinical trial could rely on its randomized controlled design to determine that the home visiting program improved children's academic and social-emotional functioning, compared to the Head Start REDI-Classroom program alone (Bierman et al., 2015, 2016). However, that same design could not be used to make causal claims regarding therapeutic mechanisms. Unobserved factors not included in this study could account for the relations between working alliance, use of program materials, and changes in child functioning. Although this study could examine variation in intervention attendance, working alliance, and use of program materials, it could not identify thresholds of those dimensions of parent engagement that are necessary for positive associations with changes in child functioning to emerge. In addition, parent engagement in this study was measured by home visitor ratings only, and the sample was relatively small.

This study focused only on individual family level factors related to parent engagement and children's functioning, not factors related to the broader social ecology in which families lived. This study did not address previous research on issues like school climate and the social support provided among members of a school community, which can also affect parent engagement (McKay, Atkins, Hawkins, Brown, & Lynn, 2003) and be remedied from

a systems approach (Comer & Haynes, 1991). Promoting parent engagement at the individual family level through programs such as REDI-P and from a larger community perspective may have synergistic effects and help ensure that all parents receive the kind of support they need so their children can thrive.

#### 4.4. Conclusions and implications

Previous research has demonstrated the importance of early language and literacy skills to long-term academic achievement (Duncan et al., 2007), and the critical role of social-emotional skills to long-term success (Jones, Greenberg, & Crowley, 2015). Although growing up in poverty exposes children to developmental risks that reduce their school readiness in both of these domains, effective preschool parenting programs may reduce the readiness gap and enhance child preparation for school success (Reynolds, 2000). Based on the power of parent support to promote resilience in the face of poverty, Head Start is committed to partnering with parents to support children's academic and social-emotional readiness for school (Administration for Children and Families, 2006).

Prior research from REDI-P suggests that home visits, like those offered through Head Start, can be extended and enhanced in ways that amplify benefits for children above and beyond what they gain from high-quality classroom learning experiences alone (Bierman et al., 2015, 2016). A key goal of this study was to peer into the "black box" of REDI-P and explore how the program produced the benefits it did. This study demonstrated that multiple different components of parent engagement may play critical roles affecting the degree to which children gain from parent-focused school readiness programs. Such an understanding of the parent engagement process can inform intervention design and thereby enhance the positive impact of future programs.

#### Author's note

This project was supported by National Institute of Child Health and Human Development (grant HD046064) and the Institute of Education Sciences (grant R305B090007). We appreciate the cooperation of our partners in this project: the parents, students, teachers, and program personnel of the Head Start programs of Huntingdon, Blair, and York counties in Pennsylvania. In addition, this work reflects the particular efforts and talents of Gloria Rhule and Julia Gest, who contributed to the home visiting program development and served as program supervisors. Correspondence concerning this article should be addressed to: Robert Nix, University of Wisconsin-Madison, School of Human Ecology, Department of Human Development and Family Studies, 1300 Linden Drive, Madison WI 53706; robert.nix@wisc.edu.

#### Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <https://doi.org/10.1016/j.ecresq.2018.06.006>.

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