



Published in final edited form as:

*Child Dev.* 2015 November ; 86(6): 1877–1891. doi:10.1111/cdev.12448.

## Helping Head Start Parents Promote Their Children's Kindergarten Adjustment: The REDI Parent Program

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### Abstract

Head Start enhances school readiness during preschool, but effects diminish after children transition into kindergarten. Designed to promote sustained gains, the REDI (Research-based Developmentally Informed) Parent program (REDI-P) provided home visits before and after the kindergarten transition, giving parents evidence-based learning games, interactive stories, and guided pretend play to use with their children. To evaluate impact, 200 4-year-old children in Head Start REDI classrooms were randomly assigned to REDI-P or a comparison condition (mail-home math games). Beyond the effects of the classroom program, REDI-P promoted significant improvements in child literacy skills, academic performance, self-directed learning, and social competence, demonstrating the utility of the approach in promoting gains in cognitive and social-emotional skills evident after the transition into kindergarten.

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Children who grow up in poverty often exhibit significant delays in areas of both academic and social school readiness (Raver, Jones, Li-Grining, Zhai, Bub, & Pressler, 2011). These delays undermine their school progress at kindergarten entry, and initiate a life-long trajectory of underachievement and subsequent underemployment (Ryan, Fauth, & Brooks-Gunn, 2006). Begun in 1965, Head Start was designed to reduce these disparities in school readiness by enriching early learning opportunities for economically disadvantaged children and by providing supports for their parents (Administration for Children and Families [ACF], 2010). Although Head Start has produced significant gains for children during preschool ( $d = .13 - .34$ ; ACF, 2010; Zhai, Brooks-Gunn, & Waldfogel, 2011), these positive effects tend to dissipate quickly after the transition into kindergarten. For example, the randomized-controlled Head Start Impact Study found no sustained Head Start effects in kindergarten and only one effect in first grade (ACF, 2010). Clearly, additional efforts are needed to strengthen the sustained impact of Head Start as children transition into kindergarten. Helping parents teach their children at home may be a valuable and underutilized strategy to achieve this important goal.

This study describes an innovative attempt to extend the impact of an evidence-based classroom enrichment program, the REDI (Research-based Developmentally Informed) classroom program, by enhancing the home visiting program and expanding it to extend across the kindergarten transition. In this REDI-Parent (REDI-P) program, parents received

books, learning games, and pretend play materials to use with their children in the spring of the Head Start prekindergarten year and the fall of the kindergarten year. Learning materials paralleled and built upon the REDI classroom programming, and were designed to reinforce and extend the emergent literacy and social-emotional skills targeted at school. In the following sections, the REDI classroom program is described briefly, followed by the rationale and prior research that informed the design of the REDI-P home visiting program.

## The REDI Classroom Program

Initiated in 2003, the REDI classroom program was designed to promote child school readiness in the dual domains of social-emotional development and language-emergent literacy skills. REDI used the Preschool PATHS (Promoting Alternative Thinking Strategies) curriculum to support the acquisition of prosocial skills, emotional understanding, self-regulation, and social problem-solving skills (Domitrovich, Cortes, & Greenberg, 2007). In addition, REDI integrated a dialogic reading program with PATHS to promote oral language skills and reinforce social-emotional understanding; REDI also included a Sound Games program to build phonological sensitivity, along with Alphabet Center activities to strengthen print knowledge. By enriching classrooms in social-emotional and language-literacy domains with coordinated evidence-based programming, REDI sought to stimulate synergistic gains that would enhance school readiness and promote sustained benefits (Nix, Bierman, Domitrovich, & Gill, 2013).

A randomized-controlled trial revealed that the REDI classroom program had significant benefits for children. At the end of Head Start, four-year-old children who had experienced one year of REDI in the classroom, compared to those in “usual practice” Head Start classrooms, showed benefits on measures of social-emotional adjustment, including emotion knowledge and social problem-solving skills ( $d_s = .21 - .35, p < .05$ ), decreased aggression ( $d = .28, p < .05$  for teacher ratings;  $d = .13, p < .10$  for parent ratings), and observed learning engagement ( $d = .29, p < .05$ ). In addition, benefits emerged on measures of language-emergent literacy skills, including vocabulary ( $d = .15, p < .05$ ), phonological sensitivity ( $d = .35-.39, p < .05$ ), and print awareness ( $d = .16, p < .10$ ; Bierman et al., 2008). After the transition into kindergarten, sustained effects were evident on four measures of social-emotional adjustment (competent social problem-solving skills,  $d = .38$ ; teacher- and parent-rated aggression,  $d = .20-.25$ ; and teacher-rated learning behaviors,  $d = .27$ ; all  $ps < .05$ ), and on one measure of language-literacy skills (phonemic decoding,  $d = .27, p < .05$ ; Bierman et al., 2014). Additional social-emotional benefits of the REDI classroom program were evident for the subset of children who attended schools characterized by low student achievement, including teacher-rated social competence and teacher- and parent-rated attention problems (Bierman et al., 2014). Consistent with the logic model of the REDI program, these findings suggest that the concurrent growth in social-emotional competencies and language-emergent literacy skills promoted by the intervention during Head Start had synergistic benefits for children at the transition into elementary school (see also Nix et al., 2013). At the same time, some intervention gains (particularly the emergent literacy gains) had faded by the end of kindergarten. The REDI-P program was designed to strengthen sustained effects by partnering with parents to provide learning support at home that

paralleled and reinforced the REDI classroom programming over the transition into kindergarten.

## Home Visiting Programs and Child School Readiness

Parent involvement has been a fundamental aspect of Head Start since its inception (Manz, 2012). Recognizing that low-income parents typically face multiple challenges that compromise their well-being and parenting efficacy (e.g., low levels of formal education, elevated stress exposure, financial insecurity, social isolation), Head Start seeks to empower parents as individuals and as advocates for their children using a two-generation approach that provides parent education to enhance parenting skills and supports parent well-being to improve child well-being and learning (ACF, 2006; Manz, 2012; Ryan et al., 2006). Head Start centers serving preschool children offer a minimum of two home visits per year; typically, these sessions focus on delivering information about child health, dental care, and nutrition, as well as adult education and mental health services (ACF, 2006; Manz, 2012).

Several parent intervention studies targeting very young children (age 0–3) have promoted gains in child skills using a two-generation approach (Landry, Smith, & Swank, 2006; Love et al., 2005; Olds et al., 2004). However, benefits to parents typically exceed benefits to children in these programs (Landry et al., 2006; Madden, O’Hara, & Levenstein, 1984), and improvements in the targeted parenting skills such as sensitive-responsiveness and language do not necessarily lead to the expected gains in child skills (Caughy, Huang, Miller, & Genevro, 2004; Madden et al., 1984), raising some concern about the power of this approach to significantly improve children’s kindergarten adjustment and achievement. Indeed, by the preschool years (age 4–5), there is little evidence that home visiting focused on parent education or improved parent-child interaction quality promotes positive kindergarten outcomes (see reviews by Brooks-Gunn & Markman, 2005; Gomby, 2005; Welsh, Bierman, & Mathis, 2014). For example, the widely-diffused Parents as Teachers program teaches parents the principles of child development, modeling appropriate activities, and facilitating access to social and support services (Pfannenstiel, Lambson, & Yarnell, 1991). Although quasi-experimental evaluations have supported program utility (Pfannenstiel et al., 1991), two recent randomized trials have documented few intervention effects for the Parents as Teachers program (Wagner, Spiker, & Linn, 2002) or its Born to Learn curriculum (Drotar, Robinson, Jeavons, & Kirchner, 2008).

An alternative intervention approach with evidence of emerging promise encourages parents to use specific parent-child learning activities and teaching strategies to promote child language and emergent literacy skills (see reviews by Manz, Hughes, Barnabas, Bracaliello, & Ginsburg-Block, 2010; Mol, Bus, DeJong, & Smeets, 2008; Reese, Sparks, Leyva, 2010). For example, in home-based interactive reading programs, parents are taught to ask questions and use active listening and descriptive expansions when reading with their children, prompting their children to describe the pictures and events in the stories. A meta-analysis of randomized trials found significant effects for interactive parent-child reading programs on both receptive and expressive language skills (Mol et al., 2008). Moreover, additional studies suggested that parent-focused interactive reading programs enhanced child language skills beyond the benefits of school-based interactive reading alone (Anthony,

Williams, Zhang, Landry, & Dunkelberger, 2014; Lonigan & Whitehurst, 1998; Whitehurst et al., 1994). Some interactive reading programs have also produced increases in child print knowledge (Chow & McBride-Chang, 2003), particularly if parents are encouraged to make explicit verbal and non-verbal references to print while reading (Justice & Ezzell, 2000). Interventions that encourage parents to play with their children in ways that involve letter identification and letter-sound skill practice (Ford, McDougall, & Evans, 2009) or to engage in teaching activities targeting print awareness and emergent literacy skills (Mehran & White, 1988) have also produced gains in child letter identification skills and early reading. In general, these successful programs have in common the provision of strategically-selected learning materials along with a focus on coaching parents in how to use them effectively (Anthony et al., 2014; Reese et al., 2010).

Considerably less research is available to guide the design of home visit interventions to promote child social-emotional competencies and adaptive learning behaviors in kindergarten. One approach is to train parents in behavioral management skills (Webster-Stratton, Reid, & Hammond, 2001). This approach appears particularly useful for reducing behavior problems among the subset of children with elevated aggression – about 28% of the Head Start population – but has not shown generalized effects on social-emotional competencies or learning behaviors (Reid, Webster-Stratton, & Baydar, 2004). One prior randomized-controlled study using preschool home learning materials found positive intervention effects on kindergarten teacher ratings of social skills, as well as on teacher ratings of learning behaviors and academic performance (Ford et al., 2009). Similarly, a randomized evaluation of the Home Instruction for Parents of Preschool Youngsters (HIPPPY) program, which used home learning materials across the preschool to kindergarten transition, found positive intervention effects on kindergarten teacher ratings of classroom adaptation for one cohort of families, although these effects were not replicated in a second cohort (Baker, Piotrkowski, & Brooks-Gunn, 1998). These studies suggest that promoting positive parent-child interactions with home learning materials might have the potential to improve child social-emotional competencies and learning behaviors in kindergarten. Conceptually, this impact might be strengthened if home learning materials included an explicit focus on social-emotional skill-building and self-regulation skills (Denham & Burton, 2003; Elias, Tobias, & Friedlander, 1999).

## The REDI-P Program and Present Study

Based on the existing literature, the REDI-P program was designed to extend the number of home visits offered to Head Start parents before and after the transition into kindergarten, enriching these visits with evidence-based learning activities and support strategies. Parallel to the classroom program and based on evidence of synergistic benefits (Nix et al., 2013), REDI-P focused on skills in both language-literacy and social-emotional domains. REDI-P provided parents with guided books to encourage dialogic reading (Justice & Ezzell, 2003; Whitehurst et al., 1994), and included learning games and pretend play activities that taught letters and letter-sound recognition (Evans, Bell, Shaw, Moretti, & Page, 2006; Senechal, 2006). These learning games were arranged along a scope and sequence and adjusted developmentally to child skill levels, progressing from letter identification to letter-sound associations to phonetic word families and simple sight words. To support social-emotional

skill development, REDI-P stories featured characters and skills from the Preschool PATHS classroom curriculum, and home activities included PATHS routines (e.g., compliment lists, feeling face chart). In addition, parents were encouraged to use techniques children already were learning in school to support self-regulation and resolve conflicts (i.e., “doing turtle” to calm down, identifying feelings, and describing problems in words; Denham & Burton, 2003; Landry et al., 2006; Lengua, Honorado, & Bush, 2007). In order to customize the program for low-income parents, REDI-P provided streamlined, ready-to-use materials that minimized literacy demands and included embedded guidelines and illustrations. For example, pretend play activities included story-book protocols (e.g., “How to play restaurant”) along with play materials, and stories included embedded questions for dialogic reading. Skills were introduced first in the classroom and then introduced at home, so that children were familiar with the content and “primed” to respond positively when parents read about the PATHS characters, asked questions, and used REDI games and activities.

It was hypothesized that the REDI-P program would leverage the gains children made in the classroom program and, by reinforcing and extending skill practice at home across the transition into elementary school, would increase intervention effects evident at the end of kindergarten. Benefits for children were expected to occur as a function of exposure to the home learning materials combined with increases in positive parent support for learning (e.g., increases in sensitive-responsive interactions, enriched language use and conversation, and dialogic reading). Unique features of REDI-P included a dual-domain focus of the home learning activities (language-literacy and social-emotional skills), coordination with a classroom program, and intervention timing to bridge the gap from Head Start to kindergarten (Love et al., 2005; Reynolds, Temple, Robertson, & Mann, 2001).

The goal of the present study was to evaluate the impact of the REDI-P program on child kindergarten outcomes. All of the Head Start classrooms participating in this study were using the REDI program enrichments in the classroom, which included evidence-based curriculum components to promote child language and literacy skills (e.g., dialogic reading, phonemic awareness training, and letter knowledge centers) and to enhance social-emotional learning (e.g., the Preschool PATHS curriculum; Bierman et al., 2014; Bierman, Domitrovich et al., 2008; Bierman, Nix et al., 2008). Hence, this study examined the added value of the REDI-P program. The guiding hypothesis was that extending components of the REDI classroom program into the home would enhance the generalization of program gains over time, promoting kindergarten outcomes beyond those attained with the REDI classroom program alone. This hypothesis was tested with a randomized-controlled design in which families received the REDI-P home visiting program or, alternatively, received four mail-home packets of parent-child math games.

## Method

### Participants

Participants included 200 children (55% European American, 26% African American, 19% Latino; 56% male), age 4.45 years old ( $SD = .29$ ), and parents (39% single; 54% unemployed; median annual family income = \$18,000). Families were recruited from 24 Head Start centers in three urban and rural Pennsylvania counties during the 2008–09 and

2009–10 academic years (cohorts 1 and 2). Each year, letters describing the study were sent home with all prekindergarten children in participating classrooms. To be included in the study, parents and children had to complete pre-intervention assessments, and parents had to agree to a lottery in which they would either participate in the home visiting program or receive packets of learning activities to use at home. REDI-P successfully recruited 52% of all eligible families who were individually randomized to condition ( $n = 95$  for REDI-P intervention group and  $n = 105$  for the comparison group). All intervention activities occurred at home, making it possible to randomize children within classrooms to different conditions without contamination or spillover across condition, resulting in groups that were equivalent on all demographic variables. Primary caregivers who participated in the intervention included 89% mothers, 4% fathers, 5% grandmothers; any additional adults in the home were also invited to attend sessions when possible. Sixteen percent of the intervention families reported that Spanish was spoken in the home; all of these families reported that English was spoken as well. These families were offered intervention materials in Spanish, but all opted for English materials. Attrition before the end of kindergarten was quite low, with post-test kindergarten data missing for only 8 families (4% of the sample).

### Intervention

REDI-P included 10 home visits during the spring of the child's Head Start prekindergarten year and six "booster" sessions after the child transitioned into kindergarten. Visits followed a well-specified manualized curriculum, synchronized with the REDI classroom curriculum and targeting the same two domains of child language-emergent literacy and social-emotional skills with evidence-based instructional practices. Parents were shown how to use dialogic reading strategies (Whitehurst et al., 1994), and they were provided with modeling stories that featured characters from the classroom PATHS curriculum designed to teach social-emotional skills. Embedded questions in these stories encouraged parent-child conversations and helped parents reinforce target skills in areas of prosocial behavior, emotional understanding, self-control, and problem-solving skills. Parents also received monthly activity boxes containing play materials designed to support parent-child dramatic play and letter identification 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 restaurant orders. Videotapes demonstrated the home learning activities, and parents also received feedback and support for program implementation from the home visitors.

The intervention focused primarily on increasing positive parent support for learning, by increasing sensitive-responsive interactions, enriching parent language use, extending parent-child conversations, and promoting dialogic reading. There was also an emphasis on the use of PATHS strategies at home to support child social-emotional learning, including the use of compliments and specific praise, emotion coaching, and supporting self-control with the use of the turtle technique and collaborative problem-solving. In the kindergarten sessions, parents received a "positive parenting pyramid" that illustrated how these different strategies could be generalized throughout the day; however, the program did not include focused training in behavioral management strategies. In some cases (about 25%) home visitors reported that parents needed additional support in order to engage their children

effectively in the learning activities, based on parent reports that children were distractible, disinterested, or oppositional during some activities. In these cases, home visitors took a problem-solving approach and discussed how they could use the positive parenting strategies, along with scheduled routines and reinforcements to more effectively engage their children in the program activities.

The six home visitors were recruited from the communities where Head Start centers were located. All had undergraduate degrees in early education or human services and experience working with parents of young children, and were selected based upon their strong communication skills and abilities to form positive working alliances with at-risk families. Although home visitors were dispersed geographically, they came together for formal training workshops held at the start of the program (3 days) and mid-way through the program (2 days). Home visitors also participated together in a weekly group supervision call to debrief completed sessions and discuss the concepts and activities in the upcoming sessions. To maintain program fidelity, home visitors also had a weekly individual supervision call with the intervention supervisor to report on their progress with specific families and get feedback regarding any implementation challenges. In addition, the supervisor made a bi-monthly visit to each site, attending 20% of the home visits to provide individual feedback and guidance to each home visitor, and to assure standard intervention implementation across the various home visitors.

The dose and engagement of parents in the REDI-P intervention implementation was measured with an adapted version of the *Home Visit Process Measure* (Bierman, Nix, Maples, Murphy, & Conduct Problems Prevention Research Group [CPPRG], 2006). Home visitors completed this measure after each home visit. Based on parent reports of their activities during the week and their own observations, home visitors rated the parents on 4 items (use of the program materials and parenting strategies; interest in and response to the program; understanding of the parenting skills presented; openness to consultation) and rated their program implementation on 2 items (coverage of the content of the session; adaptation or abbreviation of content of the session). All items were assessed on a 4-point scale, and averaged across weeks to represent parent engagement in and responsiveness to the intervention ( $\alpha = .93$ ).

### Outcome Measures

Assessments were conducted in the fall of prekindergarten (pre-intervention) and the end of kindergarten (post-intervention). At each time point, trained research assistants visited homes to interview parents and videotape a structured parent-child interaction (described below); research assistants also visited schools to explain rating forms to teachers and conduct child assessments during individual pull-out sessions. Research assistants, Head Start teachers, and kindergarten teachers were naïve concerning the intervention-comparison group status of children and families. Effects on child outcomes in kindergarten were assessed with standard achievement tests and teacher ratings. Parents reported on their interactions with their children, and observers rated the quality of parenting during a home visit and videotaped parent-child interactions. Parents and teachers were compensated financially for completing assessments.

**Language and literacy skills**—Four measures were included to assess child language and emergent literacy skills. First, vocabulary was assessed with the *Expressive One-Word Picture Vocabulary Test* (Brownell, 2000) which required children to state the word that best described pictures they were shown ( $\alpha = .92$ ). Second, kindergarten emergent literacy skills were assessed with a composite that included the Letter-Word Identification scale of the *Woodcock-Johnson Tests of Achievement III – Revised*, which assessed letter knowledge and sight word recognition (Woodcock, McGrew, & Mather, 2001); the Letter Naming Fluency subscale of the *Dynamic Indicators of Basic Early Literacy Skills*, which tallied the number of letters correctly identified in one minute (Good, Gruba, & Kaminski, 2001), and Letter Sound Fluency, which tallied the number of letter sounds children could produce correctly in one minute (composite  $\alpha = .82$ ). Third, reading fluency was assessed with the *Test of Word Reading Efficiency* (Torgesen, Wagner, & Rashotte, 1999), which gave children 45 seconds to read as many short words and then as many phonetic non-words as they could ( $\alpha = .85$ ). Finally, teachers rated children’s academic performance with the 12-item Academic Success subscale of the *Academic Performance Rating Scale* (DuPaul, Rapport, & Perriello, 1991), which assessed the accuracy and quality of the child’s language arts and math work during the past week (1 = *poor* to 5 = *excellent*;  $\alpha = .96$ ) and included a ranking of the child’s performance relative to classroom expectations in areas of reading, writing, math, and general academic skills (1 = *near the very bottom of the class* to 5 = *near the very top of the class*;  $\alpha = .91$ ). These two measures were standardized and averaged ( $r = .83$ ).

**Social-emotional adjustment**—Three teacher-rated measures assessed social-emotional adjustment. First, teachers reported on child self-directed learning with 5 items from the *School Readiness Questionnaire* (e.g., can work independently, has the self-control to do well in school; Bierman, Domitrovich et al., 2008), each rated on a 6-point Likert scale (1 = *strongly disagree* to 6 = *strongly agree*), and 5 items from the *Learning Behaviors Scale* (e.g., responds in a manner that shows attention, accepts new tasks without resistance; McDermott, Green, Francis, & Stott, 1999), each rated on a 3-point Likert scale (1 = *does not apply* to 3 = *most often applies*); subscales were standardized and averaged to reflect self-directed learning ( $\alpha = .91$ ). Second, teachers rated children on 13 items describing prosocial behavior (e.g., sharing, helping) and emotion regulation (e.g., ability to calm down when upset) from the *Social Competence Scale* (CPPRG, 1995;  $\alpha = .93$ ). Ratings were made on a 6-point Likert scale (1 = *never* to 6 = *almost always*), and item scores were averaged. Third, teachers rated children on 7 items describing aggression (e.g., stubborn, yells, fights) from the *Teacher Observation of Child Adaptation-Revised* (Werthamer-Larsson, Kellam, & Wheeler, 1991;  $\alpha = .90$ ). On this scale, ratings were also made on a 6-point Likert scale and item scores were averaged.

**Parent support for learning**—Parent support for learning was assessed by parent report, videotaped observations of parent-child interactions, and observations conducted in the home. Parents described the degree to which they read interactively with their children, using 5 items from the Participation subscale of the *Reading Belief Inventory* (e.g., I ask my child a lot of questions when we read;  $\alpha = .78$ ; DeBaryshe & Binder, 1994). Parents also described their conversations with their children in response to 4 questions (e.g., How many



times in a typical week do you and your child have a conversation that lasts 10 minutes or more? and How often does your child volunteer to tell you about something that happened when you were not with him or her?;  $\alpha = .56$ ). During the parent assessments, parents were videotaped interacting while book-reading and helping their children solve puzzles. Trained coders later rated the structured tasks along 6 dimensions, using a 5-point scale, to describe parental warmth, sensitivity, responsiveness, collaborative orientation, emotional support, communication, and enjoyment ( $\alpha = .93$ ; inter-rater  $r = .87 - .96$ ). After completing the parent assessments, research assistants rated informal interactions they observed with a 19-item modified version of the *Post-Visit Inventory* (Dodge, Bates, & Pettit, 1990), using 3-point scales, to describe parental warmth and supportive parent-child interactions (e.g.; Parent spoke to child in a positive tone and Parent gave attention when the child talked;  $\alpha = .90$ ; inter-rater  $r = .57$ ).

**Additional covariates**—To assess intervention effects, pre-intervention measures of each study outcome were included as covariates. In the case of emergent literacy skills and reading fluency, the Print Knowledge scale from the *Test of Preschool Early Literacy* (Lonigan, Wagner, Torgesen, & Rashotte, 2007) served as the pre-intervention covariate. The Print Knowledge scale required children to identify letters and simple words ( $\alpha = .97$ ). Teacher-rated academic performance was not measured at the pre-intervention assessment, but to fully control for the impact of the child's initial cognitive ability on this outcome and others, pre-intervention measures of cognitive ability were included as covariates in all analyses. These measures were Block Design from the *Wechsler Preschool and Primary Scale of Intelligence - III* (Wechsler, 2002) and vocabulary (EOWPVT, Brownell, 2000), as well as measures of child executive functioning, *Backward Word Span* (Davis & Pratt, 1996), *Peg Tapping* (Diamond & Taylor, 1996), *Dimensional Change Card Sort* (Frye, Zelazo & Palfai, 1995), *Walk-a-Line Slowly* (Kochanska, Murray, Jacques, Koenig, Vandegest, 1996), and the *Adapted Leiter-R Assessor Report* (Smith-Donald, Raver, Hayes, & Richardson, 2007).

To control for kindergarten school quality, school-level achievement (the percent of the student body in each school who scored “below basic” on third grade state math and reading achievement tests; see Bierman et al., 2014), and county and cohort were noted. To control for child characteristics, age, sex, race, and aggression (Werthamer-Larsson et al., 1991) were included as covariates. Finally, to control for family context, single-parent status, caregiver depressive symptoms as assessed with the *Center for Epidemiologic Studies Depression Scale* (Radloff, 1977), and family income-to-needs ratio were included as covariates.

## Results

### Intervention Process

Initial analyses focused on the level and quality of intervention implementation. Out of 16 planned home visits, parents completed 12 sessions on average ( $M = 12.00$ ,  $SD = 5.48$ , range = 0 – 16). Sixty-six percent of the families completed 12–16 visits, representing 75 –100% of the intended dose, and another 13% of the families completed 8–11 sessions,

representing 50–75% of the intended dose. Of the 21% of the families who received less than half of the intended intervention dose, 8% received 4–7 sessions and 13% received 0–3 sessions. Whenever parents were unable or unwilling to participate in visits, home visitors still “dropped off” the learning materials for parents to use. All analyses reported in this paper are “intent to treat” and include all families assigned to the intervention condition.

Ratings made by home visitors to describe the intervention engagement of parents during intervention sessions were also examined. The average composite rating of intervention engagement was 2.27 out of a possible 3 ( $SD = .54$ , range = .74–3), indicating that most parents were engaged and responsive during the intervention sessions. One specific aspect of parental engagement included the use of the intervention materials at home. Home visitor ratings on this item suggested a high level of use for 38% of the families (e.g., most of the materials being used several times per week, mean rating 2–3 out of 3), a more moderate level of use of the materials for 49% of the sample (e.g., some of the materials being used some of the time during the week, mean rating 1–2), and little to no use of the materials for 13% of the sample (mean rating 0–1).

### **REDI-P Intervention Impact**

Next, analyses were undertaken to assess the impact of the intervention on child and parent outcomes. Correlations among the kindergarten outcome measures are presented in Table 1. Means and standard deviations for pre-intervention (Head Start) and post-intervention (kindergarten) scores on the outcome measures are in Table 2. One measure (observations of parent support for learning reported on the Post-Visit Inventory) favored the comparison group at pre-intervention; all other measures were equivalent across the intervention and comparison groups at pre-intervention.

**Plan of analysis**—To assess the effects of the REDI-P program, cross-classified hierarchical linear models were computed, nesting children within their Head Start classrooms and elementary school districts. Although children were widely dispersed across kindergarten classrooms and schools, nesting in school district was included to account for variation across districts in the structure and curricula used in kindergarten. ICCs were near zero for Head Start classroom and elementary school district on many of the outcomes. However, small inter-dependencies were found for child emergent literacy scores (Head Start ICC = .16; elementary school district ICC = .15), teacher-rated academic performance (Head Start ICC = .14; elementary school district ICC = .12), parent-child conversations (Head Start ICC = .04), and structured task observations of parent-child interaction quality (Head Start ICC = .08).

Because children were randomized to intervention condition within Head Start classrooms, the intervention indicator was a Level 1 variable, rather than a Level 2 variable as is the case in many school-based interventions. Level 1 control variables included child characteristics (age, sex, race, pre-intervention vocabulary, cognitive ability, and aggression), family demographics (single-parent status, caregiver depression, and family income-to-needs ratio), and the pre-intervention assessment of the outcome variable. Level 2 control variables

included study design features (county and cohort) and (for child outcomes) elementary school achievement scores.

All measures were grand-mean centered and standardized, so that coefficients for intervention effects on each outcome are comparable to effect sizes ( $d$ ; Cohen, 1977) and represent the difference in average expected change scores between children in the intervention and comparison conditions as a proportion of a standard deviation.

**Child outcomes**—Intervention effects on children’s academic outcomes are shown at the top of Table 2. The REDI-P home visiting program promoted statistically significant gains in direct assessments of child emergent literacy skills ( $d = .25, p < .05$ ) and teacher-rated academic performance ( $d = .28, p < .05$ ) in kindergarten. Effects on vocabulary and reading fluency were not significant.

Intervention effects on children’s social-emotional outcomes are shown in the middle of Table 2. Teachers rated children in REDI-P as significantly more self-directed in their learning behaviors ( $d = .29, p < .05$ ) and significantly more socially competent ( $d = .28, p < .05$ ) than children in the comparison condition. No effects were found for teacher-rated aggression.

**Parent outcomes**—Intervention effects on parent outcomes are shown at the bottom of Table 2. Parents who received the REDI-P intervention reported reading in a more interactive way with their children ( $d = .28, p < .05$ ) and having longer and more frequent conversations with their children ( $d = .27, p < .05$ ) than parents in the comparison condition. However, parent support for learning as assessed by observation ratings of the structured tasks on videotapes or the home observations that occurred during the research assessment visits did not differ across conditions.

### Intervention Dose and Engagement in Relation to Intervention Outcomes

A final set of exploratory analyses was undertaken to determine whether the amount of intervention that parents received or the level of parental engagement in the intervention was associated with child or parent outcomes. These analyses were conducted within the intervention group only, and involved partial correlations between intervention dose and engagement and child and parent outcomes, controlling for the baseline pre-intervention value of those outcomes. As shown in Table 3, the number of home visits received (e.g., intervention dose) was unrelated to child outcomes, but was significantly correlated with increased parent support for learning on the structured tasks (partial  $r = .24, p < .05$ ) and marginally significantly correlated with increased dialogic reading quality (partial  $r = .21, p < .10$ ). In contrast, the level of parental engagement in the intervention, which included the extent to which and quality with which parents used the home learning materials as rated by home visitors, significantly predicted increases in child reading fluency (partial  $r = .21, p < .05$ ) and teacher-rated academic performance (partial  $r = .23, p < .05$ ), as well as parent support for learning as assessed by observation ratings of the structured tasks (partial  $r = .25, p < .05$ ) and home observation ratings collected after the research assessment visits (partial  $r = .26, p < .05$ ). Neither intervention dose nor engagement predicted improvements in child social-emotional outcomes.

## Discussion

With the goal of improving the sustained impact of Head Start, REDI-P extended and enriched Head Start home visits to include 16 sessions held before and after the kindergarten transition. Aligned with the content of the REDI classroom program, parents were provided with evidence-based learning games, guided pretend play, and interactive modeling stories to use with their children to support and reinforce the language-emergent literacy skills and social-emotional skills introduced in the Head Start classroom. Results revealed that a majority of the participating parents were receptive to the approach, with 79% of the families participating in at least 50% of the planned sessions and 87% of the families making at least moderate use of the materials. Analyses of child outcomes at the end of kindergarten revealed that, relative to the randomized comparison group, children in the REDI-P home visiting group showed significantly higher reading achievement on direct assessments, and were rated more positively by their kindergarten teachers on measures of academic performance, self-directed learning, and social competence. Parents in the REDI-P condition reported higher levels of dialogic reading and longer and more involved parent-child conversations, although no group differences emerged in the quality of parent support for learning during direct observations.

### Key Features of the REDI-P Program

There are four features of the REDI-P program that may have contributed to the positive effects on children's kindergarten outcomes. First, REDI-P greatly extended the number of home visits that parents were offered, relative to the two home visits that are the "usual practice" for Head Start during each preschool year. Prior research suggests that the number of home visits that Head Start parents receive is one factor affecting program impact (Raikes, Green, Atwater, & Kisker, 2006).

Second, the timing of the REDI-P program, right before and after children transitioned into kindergarten, may have capitalized on parental interest and concern regarding their children's school readiness, and increased parents' motivation to engage in home learning activities to boost their children's early school success (Manz, 2012).

Third, REDI-P used a streamlined, guided home learning curriculum that targeted specific child school readiness skills with activities sequenced and adjusted developmentally to each child's skill level. Parents were taught to use intentional evidence-based strategies (e.g., dialogic reading, play involving reading and writing skills) to teach letter knowledge and social-emotional skills. Parents received explicit coaching from the home visitors in how to use the learning materials effectively and sessions focused specifically on supporting child skill acquisition, which also likely increased benefits to children (Raikes et al., 2006). Exposure to these learning materials and specific parenting behaviors (interactive reading, conversation) may have promoted child skill acquisition.

Finally, the home learning curriculum was carefully coordinated and synchronized with the Head Start REDI classroom curriculum to maximize home-school synchrony and cross-setting support. Emerging research suggests that linking learning activities across home and school settings during the preschool years may enhance child skill acquisition (Sheridan,

Knoche, Edwards, Bovaird, & Kupzyk, 2010). Given the study design, it is not possible to determine which of these processes (or others) were responsible for child kindergarten outcomes, but all are worth further study in future parent interventions of this kind.

It is also worth speculating about factors that may have reduced REDI-P impact on child outcomes that showed no significant intervention effects, particularly vocabulary and aggression. Prior meta-analyses suggest that parent dialogic reading has a small to moderate effect on child vocabulary growth ( $d = .22 - .59$ ; Mol et al., 2008). In most cases, however, dialogic reading is provided on its own, and in many cases families are not as low in income as families in this study. When Anthony et al. (2014) implemented a parent dialogic program in coordination with a school-based kindergarten reading program, the effect they found was much smaller ( $d = .15$ ). Although not significant, our intervention effect was similar in magnitude ( $d = .13$ ). It may be that children in REDI-P already reaped many of the benefits of dialogic reading in the classroom curriculum, which children in the control condition also experienced. It must be acknowledged, though, that by narrowing the content of books used for dialogic reading to social-emotional themes that interfaced with PATHS, REDI-P also may have reduced parent emphasis on teaching new vocabulary words.

REDI-P also failed to reduce child aggression in kindergarten, despite improving child self-directed learning and social competence. REDI-P did not specifically target parent behavioral management training, which may be needed by parents of children who exhibit aggressive behaviors at school (Reid et al., 2004).

### Intervention Effects on Parents

REDI-P included coaching strategies designed to help parents use home learning materials with increased positive affect, sensitivity-responsiveness, and verbal interaction. Hence, positive intervention effects were expected on the four core measures of parent support for learning included in this study. Two specific intervention effects emerged: parents in the intervention group reported that they read more interactively and talked more frequently and intensively with their children relative to parents in the comparison group. However, no intervention effects emerged on general levels of support for learning observed during videotaped parent-child interaction tasks or at home. The fact that REDI-P produced significant cross-domain benefits for children, promoting improvements in both academic and social-emotional adjustment, yet engendered only narrow improvements in the targeted parenting behaviors was unexpected and requires careful consideration.

One possibility is that the parenting measures used in this study lacked validity and failed to assess parenting behaviors associated with child school readiness. However, with the exception of parent reports of interactive reading, most of the correlations between measures of parenting used in this study and child kindergarten outcomes were statistically significant, suggesting the parenting behaviors that were measured were associated with child kindergarten adjustment and attainment (as shown in Table 1). In addition, exploratory analyses suggested that the number of home visits parents participated in (intervention dose) and their interest in and use of program materials (intervention engagement) were positively correlated with changes over time in three of the four parenting measures (as shown in Table 3), suggesting the parenting measures had external validity and were sensitive to

intervention effects. One alternative interpretation of this pattern of findings is that many of the participating parents had “good enough” parenting skills to use the REDI learning materials effectively. It may be that it was the use of the learning materials rather than gains in parenting skills that promoted child skill acquisition. This interpretation is consistent with the finding that parent engagement in the intervention (reflecting the extent and quality of parental use of the learning materials) predicted child gains in academic performance and reading fluency.

Although it is somewhat counter-intuitive, other home visiting studies have also found a disconnect between intervention outcomes for parents and children. Two-generation home visiting programs that emphasize the promotion of parenting skills often find more improvements for parents than benefits for children (Landry et al., 2006; Madden et al., 1984). In addition, improvements in the parenting skills targeted by these programs do not necessarily promote gains in child skills as posited by the intervention logic models (Caughy et al., 2004; Madden et al., 1984). For example, Madden et al. (1984) found that improvements in maternal language use and child outcomes in the Mother-Child Home Program were uncorrelated, and improved parenting did not mediate child outcomes. Similarly, Caughy et al. (2004) found no evidence that improvements in the quality of mother-child interaction mediated the improvements in attachment or decreased child behavior problems observed in the Healthy Steps program. In general, the present findings along with the findings from these other studies suggest that more research is needed to better understand the mechanisms underlying the impact of home visiting programs on child school readiness skills and kindergarten outcomes.

Hypotheses emerging from this study and warranting additional research include the possibility that the timing and duration of the intervention, the nature of the learning materials provided to parents, and the coordination of program content across school and home contexts may each affect program impact on child kindergarten outcomes. In addition, other potential parenting factors not studied here warrant study as possible mediators of program impact, such as parent self-efficacy, parent beliefs about their role as a teacher, and parent academic expectations for their child (Martini & Sénéchal, 2012).

### **Study Strengths and Limitations**

A key strength of this study was its strong design, with parents randomly assigned to receive the REDI-P intervention or alternative mail-home math activity packets. The research assistants who tested children and observed parents were naïve concerning study condition as were Head Start and kindergarten teachers, making them unbiased in their perceptions. However, several study limitations warrant mention.

First, only 52% of the eligible Head Start parents signed up for the study. This participation rate is comparable to other home visiting interventions, but suggests that a number of Head Start parents may not be easily engaged in programs that offer home learning opportunities for their children. On the positive side, most of the parents who signed up for the study completed it, with high rates of engagement observed in the home visiting intervention. Second, there were limitations associated with the measures used in this study. Although child language and literacy skills were measured with direct assessments, child social-

emotional outcomes were measured only by kindergarten teacher ratings. Teachers were unbiased raters in this study, but the inclusion of additional direct measures of child social-emotional functioning and learning behavior would have enhanced confidence in the findings. In addition, two of the parenting measures used in the study (the Post-Visit Inventory and report of parent-child conversation) had weak psychometric characteristics, suggesting attenuated reliability. Third, although the study sample was diverse, it was limited to participants in Pennsylvanian Head Start programs. The findings may not necessarily generalize to other low-income samples. For example, in the current sample, all of the participating Latino families spoke both English and Spanish at home and chose to use English language intervention materials. Latino families in other regions might have different preferences. In general, understanding how cultural and regional differences affect participation in and response to parent-focused interventions like this one is an important area for future research. A fourth limitation was the cost of the intervention. Head Start currently supports two home visits at the preschool level, which is considerably fewer than the 16 home visits included in the REDI-P study. Finally, this study focused on assessing the effects of the intervention using an intent-to-treat model. Additional analyses are needed to more fully understand factors associated with parent engagement in the intervention, and to determine whether intervention effects were moderated by child or parent characteristics. Follow-up analyses are also needed to determine whether the benefits to children documented in this study are sustained in the later elementary school years.

### **Implications for Policy and Practice**

The intervention effects of REDI-P emerged even though the children in the comparison condition received the enriched REDI classroom curriculum. This suggests substantial potential for parent interventions to boost the impact of high-quality preschool programming and enhance impact on kindergarten outcomes at the important developmental transition into elementary school.

To maximize benefits for economically-disadvantaged children, current widely-diffused home visiting models may need modifications. Although some two-generation home visiting programs have produced benefits for children by promoting parent well-being and parenting skills, effective programs typically target infants and toddlers, such as Early Head Start (Love et al., 2005), Play and Learning Strategies (Landry et al. 2006), and Nurse-Family Partnership (Olds et al., 2004). The parenting demands associated with rearing a younger child (age 0–3) versus an older preschooler (age 4–5) are quite different, as are the child's educational needs and school readiness expectations.

What parents want and need from home visiting programs also changes developmentally as children mature (Manz, 2012). By the later preschool years (age 4–5), programs that coach parents to use specific, guided parent-child learning activities at home may fit well with parent interests in promoting their children's school readiness (Manz et al., 2010; Mol et al., 2008). In addition, increased parental interest in and focus on learning activities at home may be particularly important for children when they are making their initial transition into elementary school and face the stress of adaptation to the behavioral and academic demands of the formal school setting. One of the more intriguing findings of this study is the

possibility that a well-conceived curriculum of home-based learning activities may promote kindergarten adjustment and attainment, even when it does not substantially alter the quality of parent-child interaction patterns. Certainly, a critical assessment of the ways in which various approaches to home visiting during the preschool years are – or are not – producing consistent gains in child skills that are sustained into kindergarten is important to maximize the benefits of educational programs and reduce the achievement gap associated with growing up in poverty.

## Acknowledgments

This project was supported by National Institute of Child Health and Human Development Grants HD046064 and HD43763. Appreciation is expressed to the teachers, students, parents, and program personnel who served as partners in this project in the Huntingdon, Blair, and York County Head Start Programs of Pennsylvania. In addition, this work reflects the particular efforts and talents of Gloria Rhule and Julia Gest, who contributed to the home visit program development and served as program supervisors.

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**Table 1**

Correlations among Measures at the Kindergarten Assessment

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
<u>Language and Literacy Skills</u>										
1. Vocabulary										
2. Emergent Literacy	.32**									
3. Reading Fluency	.40**	.63**								
4. Academic Performance	.36**	.65**	.54**							
<u>Social-Emotional Adjustment</u>										
5. Self-directed Learning	.21**	.44**	.34**	.65**						
6. Social Competence	.12	.24**	.11	.42**	.69**					
7. Aggression	-.11	-.25**	-.11	-.24**	-.55**	-.61**				
<u>Parent Support for Learning</u>										
8. Reading Quality	-.07	.06	.06	.07	.11	-.01	-.02			
9. Conversations	.12	.15	.18*	.24**	.20*	.11	-.14	.24**		
10. Home Observations	-.03	.22**	.16*	.19*	.14	.17*	-.16*	.15*	.28**	
11. Structured Tasks	.06	.22**	.20**	.17*	.12	.06	.02	.05	.14	.45**

Note:

\*  $p < .05$

\*\*  $p < .01$

**Table 2**

**Intervention Effects on Child Skills and Parent Support for Learning**

Variable	Control group		Intervention Group		Intervention Effect	
	Pre	Post	Pre	Post	Effect (d)	SE
<b>Language and Literacy Skills</b>						
Vocabulary	40.50 (11.39)	53.38 (12.03)	41.31 (11.09)	56.04 (13.11)	.13	(.11)
Emergent Literacy	N.A.	-.04 (.96)	N.A.	.05 (1.05)	.25*	(.13)
Reading Fluency	N.A.	-.04 (.92)	N.A.	.05 (1.09)	.03	(.14)
Academic Performance	N.A.	2.87 (1.05)	N.A.	3.00 (1.03)	.28*	(.11)
<b>Social-Emotional Adjustment</b>						
Self-directed Learning	3.63 (.68)	3.10 (.68)	3.53 (.77)	3.13 (.82)	.29*	(.13)
Social Competence	4.09 (.80)	4.26 (.89)	4.01 (.92)	4.33 (.99)	.28*	(.14)
Aggression	1.81 (.70)	2.03 (.75)	1.87 (.78)	2.14 (.69)	.01	(.14)
<b>Parent Support for Learning</b>						
Reading Quality	.04 (.88)	-.07 (1.05)	-.05 (1.12)	.09 (.93)	.28*	(.14)
Conversations	4.53 (.87)	4.47 (.97)	4.37 (.92)	4.51 (.92)	.27*	(.14)
Home Observations	2.58 (.42)	2.48 (.41)	2.42 (.46)	2.39 (.43)	-.04	(.16)
Structured Tasks	2.70 (.68)	2.59 (.67)	2.78 (.69)	2.63 (.62)	.01	(.16)

Note: Standard deviations are presented in parentheses below the group means. For descriptive purposes, raw scores are shown here (except for the composited variables of kindergarten emergent literacy and reading fluency). Analyses used standardized scores.

\*  $p < .05$

**Table 3**

Partial Correlations between Intervention Dose/Engagement and Outcomes

<b>Kindergarten Outcomes</b>	<b>Intervention Dose</b>	<b>Intervention Engagement</b>
<u>Language and Literacy Skills</u>		
Vocabulary	-.08	.04
Emergent Literacy	.08	.13
Reading Fluency	-.16	.21*
Academic Performance	.04	.23*
<u>Social-Emotional Adjustment</u>		
Self-directed Learning	-.01	.07
Social Competence	.11	-.02
Aggression	.04	.03
<u>Parent Support for Learning</u>		
Reading Quality	.21 <sup>+</sup>	.13
Parent-Child Conversations	-.10	.16
Home Observations	.04	.25*
Structured Tasks	.24*	.26*

Note: These correlations include the intervention group only, and control for the pre-intervention values of the outcomes.

<sup>+</sup>  $p < .10$

\*  $p < .05$