

The Pennsylvania State University

The Graduate School

College of the Liberal Arts

**PARENT MEDIATORS OF CHILD ACADEMIC OUTCOMES IN A HOME-VISITING
PROGRAM TARGETING SCHOOL READINESS**

A Thesis in

Psychology

by

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Submitted in Partial Fulfillment

of the Requirements

for the Degree of

Master of Science

May 2015

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ABSTRACT

School readiness at kindergarten entry is a robust predictor of children’s future academic success. The strong influence of parenting on school readiness is well-documented, as are the school readiness deficits of children from low-SES families relative to their upper income peers. While a variety of parent-focused interventions exist to address this gap, to date, these interventions have rarely examined hypothesized mechanisms of change, nor have they have directly targeted parent academic expectations. This study examines the mechanisms of change in a school readiness intervention, focusing on the influence of intervention-driven gains in parent academic expectations, along with the parenting skills targeted in the intervention (i.e., parent dialogic reading and language use). Participants were 210 prekindergarten children attending Head Start and their caregivers, who were randomized to either the REDI (Research-based Developmentally Informed) Parent program (REDI-P), a 16-session home-visiting intervention that promoted parent-child interactions designed to foster language, literacy, and social-emotional development, or a control group that received “mail home” math games. Results showed that gains in parent academic expectations associated with intervention significantly mediated intervention effects on child literacy skills and self-directed learning. Although intervention promoted gains in parent self-reported reading quality and language use, these gains did not mediate child outcomes. Results are discussed in terms of their implications for future directions as well as intervention development.

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Introduction

School readiness at kindergarten entry is a robust predictor of a child's future academic performance (Duncan et al., 2007). While there is some disagreement with regard to the precise definition of school readiness (Snow, 2006), it is generally conceptualized as emergent pre-academic skillsets in areas of language, literacy, and math, as well as self-regulatory capacities, including emotion and cognitive regulation (e.g., Blair, 2002; Welsh, Nix, Blair, Bierman, & Nelson, 2010). The importance of promoting school readiness in order to prevent a host of problems associated with academic underachievement has been established, both in research (e.g., Abbott-Shim, Lambert, & McCarty, 2003) and in policy (e.g., National Governors' Association, 1992). Yet, a large percentage of children continue to begin kindergarten without the fundamental skills necessary to succeed (Rimm-Kaufman, Pianta, & Cox, 2000). Children from socioeconomically-disadvantaged families are particularly at risk for starting school with cognitive and social-emotional delays relative to their peers (Coley, 2002). Given the profound ramifications of a child's academic performance for later achievement, psychosocial, and health-related outcomes as well as the demonstrated amenability of school readiness to intervention (Yoshikawa et al., 2013), it is crucial to understand the specific program components and mechanisms of change that will maximize intervention efforts.

Interventions designed to promote child school readiness have included both preschool classroom-based models (e.g., Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008; Raver, Jones, Li-Grining, Zhai, Bub, & Pressler, 2011) and parent-focused programs (Reese, Sparks, & Leyva, 2010). Whereas classroom interventions enable teachers to promote socialization and to build children's early learning skills in an ecologically valid context, parent-focused interventions capitalize on the large and lasting influence of parents in the social, emotional, and

cognitive development of children (e.g., Deater-Deckard, 2000; Landry, Smith, & Swank, 2006; Lugo-Gil & Tamis-LeMonda, 2008). A wide array of parenting programs have been designed to foster positive parenting practices and support child development (Brooks-Gunn & Markman, 2005); a subset of these programs focus specifically on preschool children and seek to improve academic school readiness at kindergarten entry. For example, preschool parenting programs have targeted parent-child conversations and language use (Levenstein, Levenstein, & Oliver, 2002; Madden, O'Hara, & Levenstein, 1984), interactive reading (e.g., Justice & Ezell, 2000; Mol, Bus, de Jong, & Smeets, 2008), and a variety of parent-child games and activities to foster phonological awareness and print concepts (Ford, McDougall, & Evans, 2009; Jordan, Snow, & Porche, 2000). Despite the evidence that these parenting behaviors are consistently associated with children's school readiness in longitudinal studies, intervention studies have produced mixed effects, with little evidence that observed improvements in these parenting variables are linked directly with improvements in children's school readiness and kindergarten academic success (Brooks-Gunn & Markman, 2005).

This study aims to address this gap in the literature by considering the mechanisms of change and parenting mediators associated with the REDI (Research-Based, Developmentally Informed) Parenting program (REDI-P). Intended to supplement an existing classroom-only version of the same intervention (Head Start REDI; Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008), REDI-P brought classroom curriculum components to parents, utilizing home visitors to coach parents in optimal use of these materials. In addition to influencing parenting practices around language and literacy promotion and interactive reading skills, REDI-P sought to maximize the possibility that these practices would be enacted by targeting parent's motivation and goals for their children, particularly their attitudes toward learning and beliefs

that their children could succeed academically. Although most parent-focused interventions have focused on improving parenting skills specific to teaching (“parents as teachers”) as a strategy for strengthening academic school readiness, intriguing recent research suggests that enhancing parent beliefs about their children’s future success may be equally important to promote children’s development of school readiness skills (Martini & Sénéchal, 2012).

Prior analyses documented that parents randomly assigned to the REDI-P intervention, relative to a control group who received “mail home” math games, reported reading in a more interactive way with their children ($d = .28, p < .05$) and having longer and more frequent conversations with their children ($d = .27, p < .05$). Children in the intervention condition showed enhanced literacy skills in kindergarten ($d = .25, p < .05$), improved academic performance and self-directed learning based on teacher ratings ($d = .28 - .29$, respectively, $p < .05$) and higher levels of social competence ($d = .28, p < .05$; Bierman, Welsh, Heinrichs, Nix & Mathis, 2014). This study added a test of intervention effects on parent academic expectations, and tested the proposed parent-mediated mechanisms of change in the REDI-P intervention, examining the extent to which gains in parent language use and conversations with children, interactive reading, and academic expectations mediated child outcomes.

School Readiness at Kindergarten Entry and Future Academic Success

Approximately 16% of children in the United States begin kindergarten without the basic school readiness skills needed to succeed in the classroom (Rimm-Kaufman, Pianta, & Cox, 2000). Children who begin school with low social-emotional skills often exhibit oppositional behavior problems in the classroom, struggle to interact appropriately with peers, and are inattentive and disengaged during instructional time (Fantuzzo, Bulotsky-Shearer, Fusco, & McWayne, 2005). These problems often persist into early elementary school (Konold & Pianta,

2005), and may hamper the development of positive teacher-child relationships, which further places students at risk for suspension and academic failure in middle school (Hamre & Pianta, 2001). Similarly, low scores on tests of vocabulary, language comprehension, and numeracy at kindergarten entry set children on a trajectory of low reading and math performance throughout elementary school relative to their school-ready peers (Duncan et al., 2007; McClelland, Acock, & Morrison, 2006). The consequences of early low academic functioning ultimately predict a host of negative outcomes into adolescence and early adulthood, including psychopathology, functional illiteracy, and criminality (Baydar, Brooks-Gunn, & Furstenberg, 1993; Tremblay, Masse, Perron, LeBlanc, Schwartzman, & Ledingham, 1992).

Poverty, Parenting, and School Readiness

Children from low socioeconomic status (SES) backgrounds are at an elevated risk for starting school with cognitive and social-emotional delays (Coley, 2002). At kindergarten entry, socioeconomically disadvantaged children are more likely to have language deficits and exhibit severe behavior problems relative to their peers (Kaiser, Hancock, Cai, Foster, & Hester, 2000). These initial difficulties tend to persist as these children often enter poor quality elementary schools (Peske & Haycock, 2006); however, even with subsequent exposure to high-quality teaching, the initial school readiness deficits place low-SES students at a chronic relative disadvantage, from which they do not appear to recover (Ramey & Ramey, 2004). Many of these children drop out of school prior to high school graduation, increasing the likelihood that they will obtain low-paying employment (Ryan, Fauth, & Brooks-Gunn, 2006). Thus, interventions aimed at increasing school readiness for low-SES children may offer a way to help narrow the achievement gap throughout school and, ultimately, break the cycle of poverty.

Decisions about how best to focus early interventions to promote school readiness depend upon longitudinal research that identifies the developmental precursors and predictors of school success at kindergarten entry. For intervention programs designed to help parents living in the context of poverty, this requires taking into account the multiple adversities they face, including economic strain, unequal access to high-quality education, and low levels of social support. Indeed, parents living in poverty report high levels of stress from a variety of sources, as well as less availability of family and community resources, such as adequate childcare (Middlemiss, 2003). This high stress, low resource combination appears to take its toll on parenting via its effects on parents' physical and psychological functioning (Magnusson & Duncan, 2002), ultimately predicting poor early school performance in children (Chazan-Cohen et al., 2009; Jackson, Brooks-Gunn, Huang, & Glassman, 2000). Thus, given the evidence that poverty negatively influences parenting, it is important to identify the components of parenting that both influence children's school readiness and that may be amenable to change.

Several key aspects of parenting have been specified as highly influential in promoting school readiness and, moreover, prior research has found that these aspects may be particularly susceptible to the influence of poverty. One identified behavior, explicit teaching, has been empirically linked to children's subsequent academic achievement. Children of parents who directly teach them academic skills through reading (e.g., Haney & Hill, 2007) and math activities (e.g., LeFevre, Skwarchuk, Smith-Chant, Fast, Kamawar, & Bisanz, 2009), tend to excel in these subjects in kindergarten and beyond. Functioning in tandem with explicit teaching, cultivation of enjoyment and rich engagement around learning activities, as opposed to purely skills-based learning, is also associated with children's development of early academic skills (Lynch, Anderson, Anderson & Shapiro, 2006; Sonnenschein, Baker, Serpell, Scher,

Truitt, & Munsterman, 1997). Children growing up in poverty have a vastly decreased likelihood of being exposed to these optimal teaching and enrichment of learning experiences in the home (Foster, Lambert, Abbott-Shim, McCarty, & Franze, 2005).

Another factor linked to school readiness is the amount and complexity of parents' language use and conversation with their children. Zimmerman et al. (2009) demonstrated that parent-child conversations were not only associated with child language ability, but also served to overcome the negative influence of television viewing on child language development. Cristofaro and Tamis-LeMonda (2011) further demonstrated that, in addition to the quantity of conversation, parents' use of qualitatively open-ended conversational prompts, as opposed to statements, was associated with children's scores on standardized math and reading tests prior to kindergarten entry. As with teaching and learning enrichment, socio-economic disadvantage is also associated with lower levels of parent-child conversations. Hart and Risley's (1995) seminal study revealed a vast disparity in the number of words heard by young children in the homes of lower- versus upper-income families linked with subsequent gaps in child academic performance, illustrating the lasting effects of these early learning processes in children.

Inextricably tied to parent language use, conversation, and teaching behaviors are the underlying beliefs, emotions, attitudes, and motivations that compel and modulate parent efforts to promote their children's school readiness (Jones & Prinz, 2005). Indeed, children's school readiness and subsequent academic performance is predicted by a number of parental attitudes toward learning, including their beliefs and attributions with respect to their child's academic performance (Murphey, 1992), and their expectations for their child's future academic and career success (e.g., Davis-Kean, 2005). Interestingly, emerging evidence suggests that some of these beliefs, particularly parent academic expectations, make unique direct contributions to children's

school readiness and academic success, in ways that are independent from the parent teaching efforts they motivate (Martini & Sénéchal, 2012).

As far back as the 1960s, researchers documented an association between parent academic expectations for their children and child academic success (e.g., Bloom, 1964; Douglas, 1964). Recent studies confirm that parent expectations remain a relevant predictor of child academic performance. Neuenschwander, Vida, Garrett, and Eccles, (2007), for example, examined the expectation-outcome association in a sample of more than 2,500 pre- and early adolescents living in the United States and Switzerland. Even after controlling for socioeconomic status and current grades, parents' predictions for the level of school their child would ultimately complete were predictive of children's math and language achievement in both countries. Sy and Schulenberg (2005) demonstrated that this association emerged for kindergarten children as well, with parental academic expectations predicting children's reading and math achievement, both concurrently and into first grade. Similarly, Gut, Reimann, and Gob (2013) demonstrated that, even when parents had little or no information about their child's actual grade achievement (i.e., the child had just started kindergarten or early elementary school), academic expectations predicted children's grade point averages three years later.

Parents living in low-SES circumstances generally tend to hold lower expectations for their children's future success and feel less efficacious in their capacity to help them succeed than do parents in more economically-advantaged situations (Bandura, Barbaranelli, Caprara, & Pastorelli, 2001; Trusty & Pirtle, 1998; Tynkkynen, Vuori & Salmela-Aro, 2012). While a variety of approaches have been taken to explain this expectation gap, evidence increasingly points to the complex interplay of multiple parent, child, and contextual factors which shape expectations and efficacy (e.g., Bradley & Corwyn, 2002; Jones & Prinz, 2005; Raikes &

Thompson, 2005). Despite the complexity of the cause, however, high parental academic expectations for kindergarten children appear to attenuate the link between SES and child academic attainment at sixth grade (De Civita, Pagani, Vitaro, & Tremblay (2004). As children grow up, this attenuating effect appears to remain constant, with high parent expectations even buffering children from the effects of low teacher expectations (Benner & Mistry, 2007).

One recent study directly compared associations between parent teaching efforts at home (including both formal and informal parent-child learning activities) and parent academic expectations for their children (Martini & Sénéchal, 2012). Although they anticipated an indirect path of influence, in which parent teaching efforts would mediate the association between academic expectations and child literacy skills, they found that parent expectations and parent teaching efforts each made unique contributions to child literacy outcomes. This led to a modification of their Home Literacy Model (Sénéchal & LeFevre, 2002), adding parent academic expectations to parent teaching efforts as two areas in which early intervention could conceivably promote child academic school readiness and literacy skill acquisition.

Parent-Focused Interventions Designed to Enhance School Readiness in Preschool

Given the strong empirical evidence for the role of parenting in the development of children's social, emotional, and academic abilities, coupled with the challenges associated with parenting in the context of poverty, it is not surprising that a number of intervention programs exist that attempt to involve parents from low-SES backgrounds in promoting the school readiness of their children. Many of these programs target parents of infants and toddlers (age 0-3) and target broad parenting skills designed to promote healthy child development and create a strong foundation for later school readiness (see Brooks-Gunn & Markman, 2005 for a review). The present review focuses specifically on programs designed for parents of preschool children

that have the explicit goal of promoting child academic school readiness skills. These include programs focused on informal teaching strategies (for example, enhancing the quality of parent-child conversation and play), as well as programs focused on formal teaching strategies (for example, teaching parents how to use dialogic reading methods and play learning games).

Programs focused on informal teaching strategies. One intervention approach has been to help parents enrich the quality of their parent-child interactions, particularly the way that they talk and play with their preschool children. For example, the Parents as Teachers Program (PAT; Pfannenstiel, Lambson, & Yarnell, 1991) and Home Instruction Program for Preschool Youngsters (HIPPO; Lombard, 1981) both provide parents with home visitors who share information about child development, model appropriate activities, encourage self-reflection, and help them connect with appropriate social services.

Quasi-experimental studies have shown positive results for both of these programs. For example, within-group analyses revealed that the majority (85%) of children whose parents had participated in the HIPPO program were rated by kindergarten teachers as “school ready” in classroom adaptability and verbal behavior (Johnson, Martinez-Cantu, Jacobson, & Weir, 2012). However, results from randomized-controlled trials have not revealed significant effects for the PAT program on child outcomes of cognitive development, language development, or adaptive behavior (Drotar, Robinson, Jeavons, & Kirchner, 2009; Wagner, Spiker, & Linn, 2002). A randomized-controlled trial of HIPPO showed improved first-grade reading skills for one cohort, but no effects for a second cohort (Baker, Piotrkowski, & Brooks-Gunn, 1998).

Programs focused on formal teaching strategies. Using an alternative approach, other parent-focused school readiness interventions teach parents to use explicit, evidence-based teaching strategies with their young children. For example, one well-researched and efficacious

intervention strategy teaches parents how to read interactively with their children, asking questions and engaging children around story content during parent-child book-reading. This strategy, known as dialogic reading, has promoted the development of language skills in preschool children, including those who initially lagged behind their peers in vocabulary and other language skills (e.g., Arnold, Lonigan, Whitehurst, & Epstein, 1994; Hargrave & Sénéchal, 2000). A meta-analysis by Mol, Bus, DeJong and Smeets (2008) found that dialogic reading interventions promoted gains in measures of children's expressive and receptive vocabulary (Cohen's *ds* were .59 and .22, respectively) and that, for receptive vocabulary, effects were particularly beneficial for pre-kindergarten children, indicating that preschool years are a crucial window of opportunity for this type of intervention.

Dialogic reading programs may also complement and enhance the effects of other classroom-based reading interventions. Anthony, Williams, Zhang, Landry, and Dunkelberger (2014), for example, investigated the added value of pairing a classroom-based academic program (Texas Early Education Model; Landry, Anthony, Swank, & Monseque-Bailey, 2009) with "Family Nights" in which parents were instructed in dialogic reading techniques and subsequently given opportunities to practice these skills with their children. The addition of this dialogic reading training demonstrated effect sizes ranging from .10 to .15 on children's receptive vocabulary, expressive grammar, and memory for sentences, relative to a condition in which parents did not receive this training. Another program, ProjectEASE (Jordan, Snow, & Porche, 2000), utilized school-based consultation sessions to train parents of kindergarten children in how to support their children's literacy, providing structured activities to facilitate extended parent-child book discussions at home. Children whose parents received the

intervention had greater language and literacy gains across the kindergarten year relative to a control group.

Coordinating home-school learning programs. One additional program warrants mention, as it represents an alternative strategy for eliciting parent support for child school readiness. The Getting Ready intervention (Sheridan, Knoche, Kupzyk, Edwards, & Marvin, 2011) utilized a parent consultation model in which Head Start teachers and behavioral consultants helped parents set goals for their children’s skill development and, subsequently, helped them to monitor their children’s progress toward these goals. In this case, the specific goals and activities used at home varied across children, and were designed to coordinate with and complement the Head Start program. A recent randomized controlled trial demonstrated Getting Ready intervention effects on children’s social-emotional competencies and language and literacy skills (Sheridan et al., 2011; Sheridan, Knoche, Edwards, Bovaird, & Kupzyk, 2010).

The REDI Parent Program

The REDI-P intervention combined efficacious informal and formal “parents-as-teachers” training with motivational strategies designed to increase parent investment in their child’s school readiness and explicitly take note of their beliefs about their children’s future success. The intervention was created to supplement the classroom-based Head Start REDI program (Bierman et al., 2008). Briefly, Head Start REDI was designed to be integrated into one of the two most common Head Start curricula, the High/Scope or Creative Curriculum, without supplanting either. Trainings and ongoing mentorship were arranged to support teacher’s optimal use of the REDI curriculum materials, which consisted of the Preschool PATHs program (Domitrovich, Greenberg, Cortes, & Kusche, 1999) to promote social-emotional skills as well as

language and literacy enrichment components that targeted children’s vocabulary, syntax, phonological awareness, and print awareness (e.g., dialogic reading, sound games, and print center activities).

Supporting parent teaching activities in REDI-P. The REDI-P program extended the reach of classroom REDI, enabling parents and children to utilize parallel language and literacy and social-emotional activities in their homes. Each month, parents were provided with a “REDI activity club” box, which contained a “menu” of activities in which parents could engage with their children. Parents were given a series of stories to read with their children that presented common developmental issues and challenges for preschoolers (e.g., feelings, sharing, etc.). These stories featured characters from the Preschool PATHS curriculum and included scripted questions for parents to use to engage children in conversation about the stories. Following the principles of dialogic reading (Whitehurst et al., 1994), but designed to provide more concrete support for low-income parents, these questions were highlighted at the bottom of every other page and helped parents focus child attention on the narrative and the causes and effects of character actions and events (e.g., “why do you think [the character] feels this way,” “what would you do if you were her?”). In addition, the activity box menu included materials and guidelines to support parent-child dramatic play designed to increase child exposure to print concepts. 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.

In addition to the delivery of these home learning materials, REDI-P utilized home visitors to coach parents in the implementation of the REDI materials. Home visits occurred twice a month for ten weeks during the child’s pre-kindergarten year, with six additional booster

sessions spanning the summer and initial months of the Kindergarten year. Table 1 describes each visit, indicating a sample objective and activity. During home visit sessions, parents were instructed in dialogic reading techniques and ways of promoting language development in their children through letter and sound recognition games. They watched modeling videotapes and role-played with the home visitor. On three occasions, parents were videotaped interacting with their children, using the REDI-P materials. These videotapes were later reviewed with parents in order to promote self-reflection and provide performance feedback on their implementation of the learning materials. Home visitors focused on promoting positive support for learning, including specific praise to reinforce child engagement and effort, responsive listening, emotion coaching, and the use of problem-solving dialogue.

Supporting parent goal-setting, feelings of efficacy, and positive expectations.

Focused specifically on promoting parent motivation and positive expectations for child learning, REDI-P included a set of parent goal-setting and self-reflection activities. These were designed to help parents recognize the positive impact of their support on their child's feelings and functioning, and their belief that they could make a positive difference in their child's life and enhance their child's future school success. For example, the program used a "Memory Book" to track highlights of positive parent-child interactions and child progress. At the start of the program, parents completed card sorts and discussed their goals and concerns for their child's developmental progress and their capacity to support their child's success. Home visitors helped parents see how the REDI-P program could help them move forward toward their individualized goals, and support their hopes for positive child skill acquisition. Each session then began with a check-in that allowed parents to reflect on their accomplishments and challenges they were experiencing with the program, and the growth they were observing in themselves as parents and

in their children's skills. Each session ended with a review of the program materials menu, along with personalized goal-setting and commitments regarding the parent's plan for future program implementation to maximize benefits for themselves and their child (e.g., "which of these activities do you think your child will most enjoy?; "which of these activities would you like to plan to do with your child?").

These activities were built into the REDI-P program based on the expectation that they would enhance parent engagement in the program and motivate parents to use the program activities. For example, similar kinds of individualized goal-setting and self-reflection activities have been used in the Family Check-up intervention to enhance parent engagement and involvement (Lunkenheimer et al., 2008). Conceptually, these program components might also have a direct effect on parent academic expectations for their child. That is, as parents are encouraged to focus on their goals for their child's school success, as they increase their efforts to promote their child's school readiness skills, and as they notice and reflect on the child's skill acquisition, one might anticipate direct increases in their confidence that their child is developing enhanced school readiness which will help the child better adjust to and succeed in the school setting.

REDI-P Mechanisms of Change: Practice and Beliefs

The REDI-P program targeted specific parent-teaching behaviors that were designed to increase child academic school readiness. These included enriched parent language use designed to enhance parent-child conversation and dialogic reading skills designed to increase parent-child interaction and child engagement during shared book-reading. Prior analyses of the randomized-controlled trial documented significant positive intervention effects on parent-child

conversations and parent use of interactive reading strategies ($d = .27$ and $.28$, respectively, $p < .05$; Bierman et al., 2014).

In addition, this study examined the possibility that REDI-P may also have had an impact on parent attitudes and beliefs, particularly their academic expectations for their children. This outcome was not examined in the prior study. However, several features of the REDI-P design suggest that it may have promoted positive expectations. The parent-child activity components of REDI-P were relatively brief and straightforward. By providing simple, high quality instructional materials to parents in combination with home visitation sessions, the program made it easy for parents to feel effective in their efforts to teach the children and promote child school readiness skills. In addition, the REDI-P program included individualized goal-setting and self-reflection activities specifically designed to motivate parents to focus on promoting their child's school readiness and to observe their child's skill acquisition and their success in promoting it. These activities may well have enhanced parent beliefs that their children were ready for school and would succeed in that context.

Given research suggesting that parent language use, teaching skills, and academic expectations may each contribute independently to child school readiness (Martini & Sénéchal, 2012), it is important to understand how these parenting factors are affected during a parent-focused school readiness intervention. In addition, it is of considerable interest to understand the degree to which changes in any of these parenting domains is linked with child skill acquisition in areas of academic and social-emotional school readiness.

While there are clearly a number of effective parent-focused school readiness interventions, rarely are underlying mechanisms of change examined. A few studies have examined gains in parenting skills as mediators of child outcomes in parenting programs for

infants and toddlers with mixed findings: one study finding evidence for mediation (Lunkenheimer et al., 2008) but two studies finding no association between gains in parenting skills and child outcomes (Caughy, Huang, Miller, & Genevro, 2004; Madden et al., 1984). Studies testing for associations between parenting changes and child outcomes in preschool programs are needed. In particular, a better understanding of how parent expectations, as well as parent teaching behaviors, may affect child outcomes is needed. A recent review article (Gorard, See, & Davies, 2012) and a thorough search of the literature failed to find any school readiness intervention study that directly targeted parent academic expectations for change, nor that examined how these expectations may affect program outcomes.

The Present Study

The present study addressed two research questions: (1) Did the REDI-P intervention have a significant impact on parent academic expectations for their children? and (2) To what extent was the impact of REDI-P on child academic outcomes mediated by the REDI-P promotion of increases in parent teaching behaviors and/or an intervention impact on increase parent academic expectations?

It was hypothesized that REDI-P would promote positive changes in parent academic expectations. That is, by encouraging parents to articulate their goals for their child's future school success, engage in activities designed to promote child school readiness, and reflect on their child's skill acquisition and their effective support, we anticipated that parents in the intervention condition would have higher academic expectations for their children than parents in the control condition (controlling for baseline expectations).

Given the large body of evidence supporting the proposed mechanisms of change in the REDI-P intervention, it was hypothesized that gains in parent language use and conversations

with their children and their use of dialogic reading practices would mediate child gains in social-emotional and language and literacy domains. It was further hypothesized growth in parental academic expectations for their children would contribute uniquely to and also mediate these positive child outcomes.

Method

Participants

Two successive cohorts of preschool children were recruited through 26 Head Start classrooms across Pennsylvania, in both rural and small urban communities. To participate in the study, parents of the preschool children had to agree to a randomization procedure (a lottery) in which they would either receive home learning materials through home visits (the REDI-P intervention) or receive home learning materials via mail (the control group). Of the eligible population, 52% agreed to participate in the study. The resulting sample consisted of 210 children (aged 4.26-5.36 years old, $M = 4.80$, $SD = .29$) and their caregivers (89% mothers). Other participating caregivers included fathers (4%) and grandmothers (5%). Children were primarily European American (55%), followed by African American (25%), and Hispanic (20%). Ninety-nine percent of parents reported that English was spoken in the home, while 16% reported that Spanish was spoken as well. The majority of caregivers were either married (39%) or living with a partner (26%), while the remaining 36% were single. The median annual household income for the sample was \$18,000 ($M = \$21,667$; range = \$2,400 - \$72,000; $SD = \$14,319$). Fifty-six percent of caregivers reported that their highest level of education was high school or less. An additional 22% had attended some college or technical school, and 4% had obtained a bachelor-level degree.

Children transitioned from 26 pre-kindergarten classrooms into 145 kindergarten classrooms. The attrition rate between the prekindergarten pre-assessment and kindergarten post-assessment in this study was 5%, with no baseline family characteristics systematically related to attrition.

Data Collection Procedures

During Fall of the Head Start school year, parents were sent a letter describing the study. Interested parents were visited in their homes by a team of two trained research assistants. After obtaining informed consent, parents were administered a structured interview by one research assistant while the other played with the child. Following the parent interview, a three-episode parent-child interaction was videotaped, consisting of free play, book-reading, and a parent-guided teaching task involving tangram puzzles. A second identical in-home interview was conducted during the Spring of the Kindergarten year. Parents were compensated \$50 for each interview. Direct assessment of children was conducted by trained research assistants at the Head Start center during “pull-out” sessions. These assessments lasted approximately 30-45 minutes and were repeated during the child’s Kindergarten year.

A research assistant met with each Head Start lead and assistant teachers and, after obtaining informed consent, explained how to complete the teacher-rating measures. These forms were sent back to the research office via a prepaid mailer and, upon receipt of the measures, teachers were compensated with \$10 per student for whom they completed rating forms. Kindergarten teacher ratings were also obtained for each child in the same manner. In Head Start, there were two classroom teachers who each provided ratings, which were averaged. In Kindergarten, there was just one classroom teacher who provided ratings. Figure 1 depicts the intervention and data collection timeline.

Measures

Child outcomes.

Literacy skills. To assess children's emergent reading and writing abilities, children completed the Letter-Word Identification Scale of the *Woodcock-Johnson Test of Achievement III – Revised* (Woodcock, McGrew, & Mather, 2001), which tests letter knowledge and word recognition. In addition, children were administered the Letter Naming and Letter Sound Fluency subscales of the *Dynamic Indicators of Basic Early Literacy Skills* (Good, Gruba, & Kaminski, 2001), which tally the number of correctly identified letters and letter sounds produced within one minute. Scores from all subtests were averaged to create a literacy skills composite ($\alpha = .82$).

Academic performance. Children's academic abilities in the classroom were assessed via teacher-report on the Academic Success subscale of the *Academic Performance Rating Scale* (DuPaul & Rapport, 1991), which included ratings of children's accuracy and quality of work in language arts and math (1 = poor to 5 = excellent; $\alpha = .90$) as well overall performance in reading, writing, math, and general academic skills, relative to classroom expectations (1 = near the very bottom of the class to 5 = near the very top of the class; composite $\alpha = .91$).

Self-directed learning. Teachers rated children's learning-oriented behaviors in the classroom using items from both the *School Readiness Questionnaire* (e.g., can work independently, has the self-control to do well in school, and can follow the rules and routines that are part of the school day; Bierman, Domitrovich et al., 2008) and the *Learning Behaviors Scale* (e.g., accepts new tasks without resistance; McDermott, Green, Francis, & Stott, 1999). Items were rated on a 6-point Likert scale (1 = strongly disagree to 6 = strongly agree) and averaged to create a composite score ($\alpha = .89$).

Social competence. Teachers rated children's prosocial behavior (e.g., sharing, helping) and emotion regulation capacity (e.g., ability to calm down when upset) using the 13-item Social Competence Scale (CPPRG, 1995). Items were rated on a 6-point Likert scale to reflect the frequency with which children displayed these behaviors (1 = never to 6 = almost always; $\alpha = .94$).

Additional covariates. The control for the influence of children's pre-intervention functioning, baseline measures of child outcomes were obtained and included in all analyses. In addition, pre-intervention measures of children's cognitive abilities were included as covariates. 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, including *Backward Word Span* (Davis & Pratt, 1996), *Peg Tapping* (Diamond & Taylor, 1996), *Dimensional Change Card Sort* (Frye, Zelazo & Palfai, 1995), and *Walk-a-Line Slowly* (Kochanska, Murray, Jacques, Koenig, Vandegest, 1996).

Parent mediators.

Reading quality. 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; DeBaryshe & Binder, 1994). An average score was created from these items ($\alpha = .78$).

Language/conversation. Parents 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?; $\alpha = .56$).

Academic expectations. Parent academic expectations for their children were assessed using two items from a parent-report adaptation of the Expectations/Aspirations Scale (Loeber, Stouthamer-Loeber, Van Kammen, & Farrington, 1991). Items used for analyses were “Knowing your child as you do, how far do you think she or he will go in school?” and “Knowing your child as you do, what is the average grade you expect him/her to receive in school?” Each item was rated on a 7 point Likert scale, with higher values indicating greater academic expectations. An average academic expectations score was computed by taking the mean of the item responses ($\alpha = .58$).

Results

Intervention Impact on Parent Academic Expectations

Study variables were examined for distributional assumptions and showed relatively normal distribution, with acceptable skewness and kurtosis. The first set of analyses focused on academic expectations. Descriptives (means and standard deviations) for baseline (preschool) academic expectations and child and family characteristics, and correlations among them are shown in Table 2. The mean level of academic expectations was 4.80, which may further be broken down into parents’ expectations for how far their children will go in school ($M = 5.09$, indicating “some college”) and expected average grades ($M = 4.50$, indicating expected grades between “Bs” and “As and Bs”). Academic expectations were significantly correlated with parent socio-economic status (SES; $r = .17, p < .05$), with greater expectations associated with higher SES. Similarly, higher parent education level was associated with greater expectations ($r = .19, p < .05$). No significant associations emerged for maternal depression or single-parent status. For child variables, parents of girls were more likely to report higher expectations ($r = .24, p < .01$). Expectations were negatively associated with child aggression ($r = -.23, p < .01$).

Interestingly, academic expectations were not associated with child vocabulary scores, but were positively associated with child cognitive capacity as reflected in the Block Design task ($r = .17$, $p < .05$) and executive functioning ($r = .29$, $p < .01$).

To test the first hypothesis, that the REDI-P program had a positive impact on parent academic expectations, cross-classified hierarchical linear models were computed (Raudenbush & Bryk, 2002). Because children were randomized to intervention condition within Head Start classrooms, the intervention indicator was a Level 1 variable. Level 1 control variables included child characteristics (age, sex, race, pre-intervention vocabulary, cognitive ability, and aggression), family demographics (socioeconomic status, single-parent status, and maternal depression), and the pre-intervention assessment of each variable. Level 2 control variables included study design features (county and cohort).

Results are shown in Table 3. With respect to covariates, the model showed that parents' pre-intervention academic expectations for their children were a significant predictor of post-intervention expectations ($\beta = .56$, $p < .001$). Expectations were marginally predicted by SES ($\beta = -.01$, $p = .08$) as well as child characteristics, including cognitive capacity (Block Design; $\beta = .06$, $p < .001$), and surprisingly, aggression ($\beta = .28$, $p < .05$). Accounting for all covariates in the model, the REDI-P intervention significantly predicted parents' academic expectations for their children ($\beta = .32$, $p < .01$).

Table 4 shows intervention effect sizes based on this model as well as control and intervention group pre and post means. This table highlights that the REDI-P had a significant positive intervention effect on parent academic expectations ($d = .36$, $p < .01$). Parents in the intervention group initially had average expectations of 4.67 ($SD = 1.01$), which grew to 4.91 ($SD = .93$) following the intervention. The control group, on the other hand, decreased in

expectations from an average of 4.92 ($SD = .98$) at baseline to 4.87 ($SD = 1.07$) post-intervention. A rating of 4 is equal to expectations that the child will attend a vocational or technical school and receive Bs on average, while a 5 represents expectations that the child will attend some college and receive As and Bs. These findings demonstrate that the REDI-P intervention had a significant impact promoting positive academic expectations, supporting the first study hypothesis.

Prior to testing the mediation analyses, this same analytic model was applied to the other parent mediators and child outcomes. We anticipated that the findings would be the same as those published in the prior study (Bierman et al., 2014), with the potential for some small differences due to alterations in the analytic model. As expected, all of these analyses produced estimates that were very similar to previously reported effects, with only slight differences due to differences in the models, including significant intervention effects on reading quality ($d = .30, p < .05$), parent use of language and conversation ($d = .30, p < .05$), children's literacy skills ($d = .33, p < .05$), academic performance ($d = .33, p < .05$), self-directed learning ($d = .35, p < .05$), and social competence ($d = .30, p < .05$).

Testing for Mediation of Intervention Outcomes

Next, analyses were undertaken to test hypothesis two regarding the mechanisms of action of the REDI-P intervention. Specifically, these analyses tested the degree to which intervention effects on three dimensions of parenting (e.g., parent reading quality, language use, and academic expectations) mediated the intervention impact on child outcomes (literacy skills, academic performance, self-directed learning, and social competence.) In line with procedures recommended by MacKinnon (2008), mediation was tested using a structural equation modeling (SEM) approach. This had the advantage of allowing for all hypothesized mediators to be

simultaneously tested against one another. Analyses were conducted in MPlus, using Full Information Maximum Likelihood (FIML) estimation to address missing data. To create mediation variables, change scores were computed for proposed mediators (gains in parent reading quality, language use, and academic expectations), representing the difference between baseline and post-intervention levels of the variables. These change scores were used in all mediational models. Baseline models initially estimated the direct effect of the intervention on child outcomes. Next, all three mediators were simultaneously entered into each outcome model in order to determine both the reduction in intervention effects on child outcomes when the mediators are present in the model as well as the size of indirect paths between the mediators and child outcomes. To determine the significance of indirect paths, follow-up tests using asymmetric confidence intervals were estimated, in line with recommendations by MacKinnon, Fritz, Williams, & Lockwood (2007).

Correlations among the change scores for the three parent mediators and their associations with the child kindergarten outcomes are shown in Table 5. Direct effects and indirect effects models are depicted in the upper and lower halves, respectively, of figures 2 – 5. The first the model (figure 2) predicts child literacy skills. The direct effect of the REDI-P intervention shown at the top of the figure indicates a significant intervention effect on kindergarten literacy outcomes, $\beta = .11, p < .05$. When the change scores for the three parent mediators are added to the model, significant intervention effects emerge for all three, demonstrating that intervention promoted significant change in parent academic expectations, $\beta = .13, p < .05$, parent reading quality, $\beta = .14, p < .05$, and parent language/conversation, $\beta = .13, p < .05$. However, only one of these dimensions of parenting – change scores for parent academic expectations – significantly contributes unique variance to child literacy skills in

kindergarten. A test of the asymmetric confidence intervals demonstrated that gains in parent academic expectations associated with intervention significantly mediated intervention effects on child literacy skills ($\mu = .02, p < .05, 95\%$ asymmetric confidence interval for the mediated effect [CI] = .001–.048).

The outcome of child academic performance is shown in figure 3. The initial direct effect of the intervention is depicted in the top half of the figure ($\beta = .12, p < .05$). The lower half of the figure shows that, once the three mediators are entered into the model, the direct effect is reduced to non-significance. As with child literacy, the only mediator with a significant path to the outcome is change in parents' academic expectations. A follow up test of this indirect path, however, indicated that it did not reach the threshold for statistical significance.

Figure 4 depicts the outcome of children's self-directed learning. The initial direct effect of intervention ($\beta = .10, p < .05$) is reduced to non-significance once the mediators are entered into the model. Once again, changes in academic expectations represented the only significant mediating path in the model. A follow up test supported the significance of this indirect path ($\mu = .02, p < .05, CI = .001–.053$).

Finally, figure 5 shows the model for the outcome of children's social competence. Although the mediational model shows a reduction from significance to non-significance of the initial direct effect of intervention ($\beta = .10, p < .05$), no mediators appeared to account for a significant unique portion of that reduction.

Discussion

This study had two goals: to determine whether the REDI-P program promoted significant changes in parent academic expectations, and to investigate the mechanisms of change in the REDI-P program, a parent-focused school readiness intervention targeting children

enrolled in Head Start. Although it has been well-established that school readiness is a crucial component in determining children's future academic success and wellbeing and, further, that children from low-SES backgrounds are at a greater risk of starting school without this skillset, there is scant research to guide the identification of the most potent mediating processes in intervention with these children. The findings of this study are among the first to address this knowledge gap. It was posited that, by bolstering parents' capacities to optimally support their children's learning, children would make gains in school readiness competencies that would prepare them to succeed in Kindergarten.

Guided by a framework that accounted for the unique set of stressors faced by parents living in poverty, REDI-P focused on providing materials and guidance for parents to engage with their children in brief, straightforward activities that have been shown to boost children's school readiness. Specifically, use of dialogic, or interactive, reading, in which questions for parents to ask their children about the story are printed on the page, was targeted and parents were encouraged to engage in activities with their children that would promote language use and conversation. Gains in these areas were hypothesized to drive children's gains in language, literacy, and social-emotional competencies. An additional mechanism of change, parent academic expectations for their children, was proposed in this study. Although there is abundant evidence supporting an association between parent academic expectations and child academic performance, parent expectations have not previously been an explicit intervention target nor has their tractability been examined.

An important new finding of the present study is that the REDI-P intervention significantly promoted parent academic expectations for their children, in addition to promoting the positive changes in parent language use/conversation and dialogic reading reported in a prior

study (Bierman et al., 2014). Following from this, a second primary finding of this study is that intervention-driven gains in parent academic expectations were significantly predictive of children's outcomes on measures of literacy skills, academic performance, and self-directed learning. Follow-up tests indicated significant indirect paths for the latter two outcomes, demonstrating that gains in parent academic expectations significantly mediated the intervention effect on academic performance and self-directed learning.

In the broader literature on parent academic expectations, a number of prior studies have aimed to illuminate the dynamics of the link between parent expectations and child outcomes, with expectations emerging as both a protective factor in the face of adverse circumstances (e.g., De Civita, Pagani, Vitaro, & Tremblay, 2004; Hopson & Weldon, 2013) and a mediator between family wealth and child achievement (Grinstein-Weiss, Yeo, Irish, & Zhan, 2009). The present findings add to this literature, underscoring the importance of parent academic expectations for children's academic development and achievement and demonstrating that it is possible to positively influence them in the context of an early intervention.

Intervention Effects on Parent Academic Expectations

Most of the existing research literature has focused on understanding links between parent academic expectations and child academic outcomes. Relatively few studies have sought to understand the determinants of parent academic expectations and none that we could find tested the effects of early intervention on those expectations. With regard to how parents form expectations, a number of empirical studies have demonstrated a link between academic expectations and markers of SES, such as parent education and household income (e.g., Davis-Kean, 2005; Jones & White, 2000), indicating that their own educational experiences along with their occupational and economic circumstances may partially determine what parents believe

their children may achieve. Indeed, we found that academic expectations were significantly correlated with parents' highest level of schooling as well as their SES, which took into account both parents' level of schooling as well as the status of their current occupation. This is a notable finding, given the restricted range of education and background in this low-income sample of families with children in Head Start, where only four percent had college degrees.

The existing developmental research on parent academic expectations suggests several potential explanations for the intervention effect found in this study. First, it could be that expectations capture not only parents' predictions for their children's success but also the degree to which they feel efficacious to influence that success. In this sense, by providing parents with activities and materials to improve their children's school readiness and guiding them in how to optimally use these materials, REDI-P may have bolstered parents' feelings of self-efficacy around teaching their children and, as result, increased academic expectations. Alternatively, or in addition, parent's expectations of their children may have risen as they observed, both independently and through the encouragement of the home visitor, that their children were, indeed, benefitting from the REDI-P program and acquiring key school readiness skills. It is also possible that positive feedback from the teacher or child at kindergarten entry bolstered parents' confidence in their child's capacity to succeed in the school context. The present study design does not allow for a clear determination of the mechanisms of action whereby intervention improved parent academic expectations, nor exactly how changes in expectations promoted positive child outcomes. However, they document the potential importance of this aspect of parenting, and suggest that parent academic expectations be included as a core outcome variable in other preschool intervention programs designed to enhance child school readiness.

Parent Mediators of Intervention Impact on Child Outcomes

There are a number of reasons that change in parent academic expectations could promote growth in children's school readiness competencies. Yamamoto and Holloway (2010) proposed that children may perceive and internalize their parents' expectations, leading them to feel capable to navigate the challenges associated with school. Thus, children of parents in the REDI-P program may have noticed that their parents were showing an increased interest and belief in their academic growth and, as a result, felt more confident as they transitioned to Kindergarten. Another proposed way that expectations might influence children's outcomes is via parental involvement. Many studies have found that academic expectations are predictive of the degree to which parents are involved in their children's education through activities such as volunteering in the classroom and helping with homework (e.g., Hoover-Dempsey & Sandler, 1997; Jones & White, 2000). These activities, in turn, may both communicate to children that school is an important priority and, further, serve to develop a positive parent-teacher relationship, which is associated with a positive child-teacher relationship as well as child academic motivation (Hughes & Kwok, 2007; Wyrick, & Rudasill, 2009).

In this study, gains in expectations uniquely contributed to and mediated gains in child literacy skills (assessed directly) and gains in self-directed learning (as rated by kindergarten teachers), suggesting particular impact on child academic progress. It is of note, however, that gains in expectations were not found to mediate children's outcomes in the area of social competence. This is not necessarily unexpected given that most prior research on academic expectations has focused on predictions to academic outcomes, such as reading ability, math achievement, and grade point average (Gut, Reimann, & Gob, 2013; Halle, Kurtz-Costes, & Mahoney, 1997), and may speak to the domain specificity of academic expectations. That is, although the concept of school readiness encompasses both academic and social-emotional

domains and gains in one domain may influence those in another (Nix, Bierman, Domitrovich, & Gill, 2013), parents' academic expectations for their children may represent a more exclusively academic construct. For example, parent expectations are predictive of their involvement in school and extracurricular activities, as well as the complexity of language they use with their children around academic topics, such as math and science (Fan & Chen, 2001; Hill et al., 2004; Tenenbaum & Leaper, 2003); however, children's social-emotional competence appears to be more strongly associated with parent beliefs and associated behaviors that are specific to the social and emotional domains, such as emotion understanding, social competence, and social problem solving, (Baker, Fenning, & Crnic, 2011; Denham, Mitchell-Copeland, Strandberg, Auerbach, & Blair, 1997; Rubin & Mills, 1990).

Counter to expectations, intervention-driven gains in parents' use of dialogic reading strategies and increased language use and conversation with children did not significantly mediate any child outcome. These findings must be considered in light of the compelling evidence that these parenting behaviors consistently predict children's academic success in both language and literacy as well as social-emotional domains (Bus, Van Ijzendoorn, & Pellegrini, 1995; Cristofaro, & Tamis-LeMonda, 2011; Zimmerman et al., 2009). One possible explanation for this inconsistency is that the influence of parent effects on child effects may lag behind the overall intervention effects. In other words, while the intervention directly influenced parents' use of dialogic reading and conversation with children as well as children's academic skills, the hypothesized mediation, in which parent gains measurably account for children's gains, may take longer to appear. In the short term, children may have benefitted from parent use of REDI-P materials during the intervention program, which included books that were scripted to support dialogic reading and games structured to support conversation. Gains in the generalized use of

dialogic reading practices and spontaneous parent-child conversation tapped by the outcome measures were evident at the post-test assessments, and may have occurred concurrent with child gains in academic skills rather than preceding them. Further analyses are needed to determine whether parent gains in those skills will enhance sustained child progress in the years following the intervention.

Alternatively, it is possible that a mediating association may not emerge because changes in parent behaviors around reading and conversation do not fully capture the dynamics of parental influence on the development of children's academic abilities. Indeed, Whitehurst et al. (1999) found that the effects of a parent-focused dialogic reading intervention on children's emergent reading skills were not present beyond kindergarten, suggesting that the narrow-band increases in parent's interactive reading skills did not generalize to children's overall reading abilities. Similarly, Evans, Shaw, & Bell (2000) found no effects of shared book-reading on children's emergent literacy. It may be that, rather than parents' changes in reading and language behaviors influencing children's outcomes, the effects on child outcomes found in this study were driven by the broader effect of the intervention on unmeasured parent use of in-home learning materials, and not isolated to the documented intervention impact on the specific behaviors of parent-child conversations and dialogic reading. A meta-analysis by Mol and Bus (2011) is consistent with this conclusion, as they found that exposure to print material, along with parent-child reading, played an important role in predicting preschool children's oral language and reading skills, particularly for those children with lower reading abilities.

The findings of this study highlight the importance of investigating the processes that are assumed to underlie school readiness interventions. While a number of parent-focused intervention programs exist, the results presented here suggest that their mechanisms of action

may not be straightforward. Only by carefully assessing the associations between intervention impact on parents and intervention impact on children can the logic models underlying these interventions be tested.

The results of this study further suggest that parents' state of mind with respect to their expectations for their children's academic success may represent a powerful, but as yet untapped, direct target of intervention. Given the strong evidence that expectations influence a broad range of behaviors that are crucial to academic development, it follows that targeting expectations, themselves, may more effectively yield behavioral changes in a variety of areas than attempting to change each behavior, individually. In the REDI-P program, although not explicit in the logic model, expectations may have been a de facto focus as home visitors helped parents recognize their children's progress in the program via observation, reflection, and goal-setting activities.

Strengths, Limitations, and Future Directions

This study examined the mechanisms of change in a parent-focused school readiness intervention. It is one of only a handful of studies that have engaged in this type of intervention process research and the only study to propose parent expectations as an intervention mediator. Findings are strengthened by the overall study design, which randomized parents to an intervention and control group. They are further strengthened by the use of multi-informant, multi-method assessment strategies, including parent-report, teacher-report, and direct assessment of children.

One study limitation is that the construct of parent academic expectations, while found to mediate intervention effects, was measured with only a two-item scale. A broader representation and measurement of parent academic expectations might have provided a more nuanced understanding of the ways in which these expectations were influenced by intervention and how

they, in turn, affected parenting behaviors or responses to children. Thus, although this study demonstrates that academic expectations may be an important target of intervention, more research is needed to better understand the nature of these expectations and how they affect and are affected by intervention. Future studies should attempt to capture the parenting behavior changes that may accompany changes in academic expectations.

Also requiring further investigation is the finding that neither parent gains in use of dialogic reading nor language and conversations mediated child outcomes. This is somewhat unexpected given the consistent cross-sectional association between children's academic performance and parents' use of language and interactive reading. This raises the possibility that the assumptions underlying parent-focused language and literacy programs with respect to mechanisms of change for the child may not conform to expectations. Thus, future studies should directly test assumed intervention mediators.

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Appendix A

Table 1. *REDI-P home visitation sessions with sample objectives and activities*

<u>Session</u>	<u>Sample Objectives for Parents</u>	<u>Sample Activities</u>
Pre-Kindergarten		
1: Introduction to the Program	Become familiar with REDI goals and objectives	Watch videos introducing program; set up visitation schedule
2: Getting Acquainted	Think about strengths and areas for learning as a parent	Create "memory book" to set goals, track progress, etc.
3: Building a Strong Relationship with Your Child	Discuss strategies for supporting child's pretend and creative play	Practice "alphabet soup" letters game
4: Talking with Your Child	Learn to read interactively	Watch "reading with your child" video
5: Videotaping of Parent-Child Sharing	Engage in parent-child play	Videotape parent reading book with child
6: Talking About Feelings	Reflect on successes and update goals	Review strengths and struggles from videotaped interaction
7: Promoting Self-Control	Hear concepts regarding feelings vs. behaviors	Review "All Feelings Are Okay" poster and handout
8: Fostering Parent-Child Teamwork: Sharing Memories and Making Plans	Reflect on experiences using emotion coaching and self-control strategies with child	Discuss "Dear Abby" parenting scenarios
9: Videotaping of Parent-Child Sharing	Teach child a new craft, supporting child's learning efforts	Parent and child engage in imaginative art project
10: Pre-Kindergarten Reflections and Looking Ahead	Explore summer enrichment activities	Present parent with certificate of accomplishment
Kindergarten		
11: (Held in August prior to Kindergarten) Starting Kindergarten	Develop plans to help child prepare for start of school	Show parent "getting ready" learning activity binder
12: (Held after child has started Kindergarten) Talking Things Over	Discuss how bedtime and morning routines are going	Show poster "How To Keep A Conversation Going"
13: Supporting Learning Effort and Practice	Hear about ways parent can be a learning coach for their child	Introduce parent to story "Sayer Gets Some Help"

14: Promoting Self-Control and Problem-Solving Skills	Examine literacy and math learning activities to use with child at home	Review PATHS concepts about feelings and behaviors
15: Videotaping of Parent-Child Sharing	Read a book in an interactive manner with child	Parent and child make collage (Family Crest)
16: Kindergarten Reflections & Positive Parenting	Review REDI parenting strategies	Give parent card recognizing efforts
17: The Launch	Receive learning activities to use in the Spring	Obtain feedback on program from parent

Appendix B

Table 2. Means and correlations of academic expectations with control variables

	<i>Mean (SD)</i>	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Academic Expectations	4.80 (1.00)										
2. SES	22.26 (10.33)	.17*									
3. Education	5.24 (1.49)	.19*	.50**								
4. Depression	.35 (.48)	-.06	.22**	-.13							
5. Single-Parent	.36 (.48)	.09	-.16*	.03	.10						
6. Gender	.44 (.50)	.24**	-.10	-.07	-.02	.14					
7. Age	4.80 (.29)	.08	.09	.08	-.03	-.01	-.13				
8. Aggression	1.84 (.74)	-.23**	-.11	.04	.04	.10	-.16	.03			
9. Vocabulary	88.01 (13.68)	.09	.26**	.19**	.00	-.05	-.04	-.03	-.08		
10. Peg-Tapping	9.07 (6.17)	.29**	.08	.02	-.01	.01	.15*	.17*	.20**	.40**	
11. Block Design	8.17 (3.47)	.17*	.09	.09	.00	-.02	.09	.00	-.14*	.28**	.40**

Appendix C

Table 3. *HLM estimates of fixed effects on growth in parent academic expectations*

Fixed Effect	Coefficient	Standard error	<i>t</i> -ratio	<i>p</i> -value
Intercept	.62	1.08	.57	.67
REDI-P Intervention	.32	.12	2.63	< .01
Control Variables				
Pre-intervention Academic Expectations	.56	.06	9.02	<.001
<u>Family Demographics</u>				
SES	-.01	.01	-.23	.08
Maternal Depression	.05	.12	.39	.70
Single-Parent Status	-.03	.12	-.23	.82
<u>Child Characteristics</u>				
Gender	-.09	.12	-.76	.45
Age	-.10	.19	-.53	.59
Aggression	.28	.11	2.43	.02
Vocabulary	.00	.00	.54	.59
Peg-Tapping	-.01	.01	-.56	.58
Block Design	.06	.01	4.18	<.001

Appendix D

Table 4. Means and Intervention Effects on Parent Mediators and Child Outcome Variables

	<u>Control group</u>		<u>Intervention Group</u>		<u>Intervention Effect</u>
	Pre	Post	Pre	Post	Effect (<i>d</i>)
<u>Parent Change Variables</u>					
Academic Expectations	4.92 (0.98)	4.87 (1.07)	4.67 (1.01)	4.91 (0.93)	.36**
Reading Quality	3.81 (0.53)	3.82 (0.66)	3.75 (0.66)	3.90 (0.59)	.30*
Language/Conversation	4.51 (0.86)	4.42 (0.97)	4.38 (0.83)	4.48 (0.89)	.30*
<u>Child Outcome Variables</u>					
Literacy Skills	-0.02 (0.99)	-0.04 (0.98)	0.02 (1.01)	0.05 (1.02)	0.33*
Academic Performance	0.07 (0.95)	-0.06 (1.01)	-0.07 (1.05)	0.06 (0.99)	0.33*
Self-Directed Learning	3.63 (0.68)	3.10 (0.68)	3.53 (0.77)	3.13 (0.82)	0.35*
Social Competence	4.09 (0.80)	4.26 (0.89)	4.01 (0.92)	4.33 (0.99)	0.30*

Note: Standard deviations are presented in parentheses below the group means. Literacy Skills and Academic Performance pre-intervention measures were captured via

equivalent constructs, but on slightly different composite scales and are presented as standardized scores. * $p < .05$. ** $p < .01$.

Appendix E

Table 5. *Correlations between SEM variables*

	1.	2.	3.	4.	5.	6.
<u>Parent Change Variables</u>						
1. Academic Expectations						
2. Reading Quality	-.02					
3. Language/Conversation	.17*	.07				
<u>Child Outcome Variables</u>						
4. Literacy Skills	.16*	.04	.05			
5. Academic Performance	.15*	.08	.07	.63**		
6. Self-Directed Learning	.10	.00	-.02	.46**	.64**	
7. Social Competence	.10	.00	.01	.28**	.44**	.74**

Note: * $p < .05$. ** $p < .01$.

Appendix F

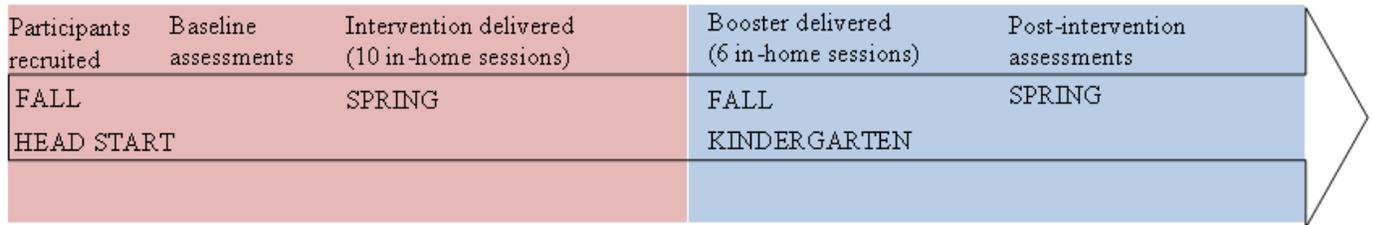


Figure 1. Study Timeline.

Appendix G

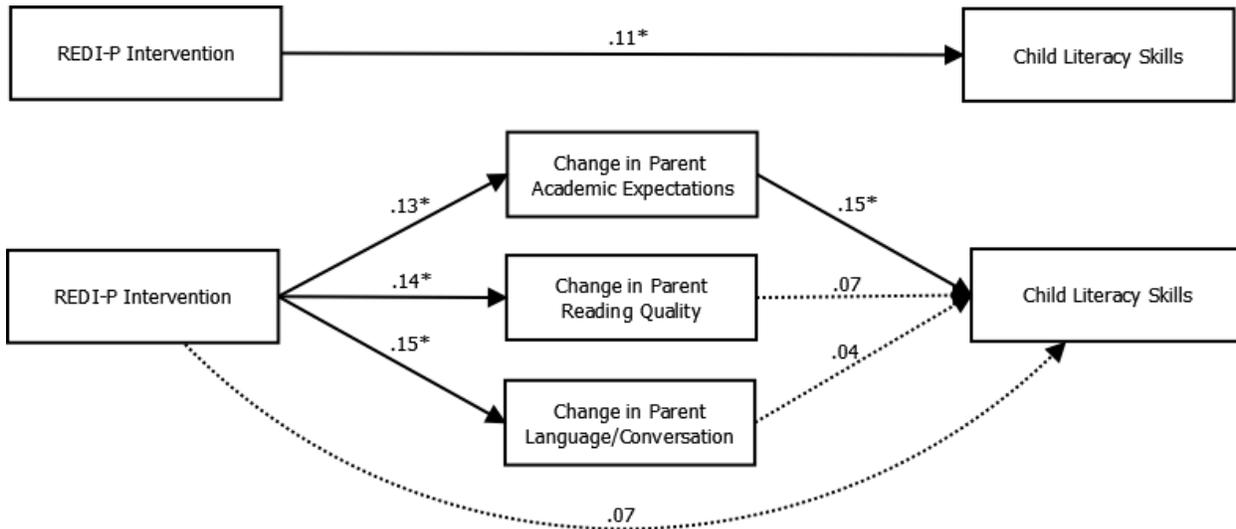


Figure 2. Mediated intervention effects on child literacy skills. $\chi^2 (38, N = 210) = 16.26, p = .99$; CFI = 1.0; SRMR = .03. $*p < .05$.

Appendix H

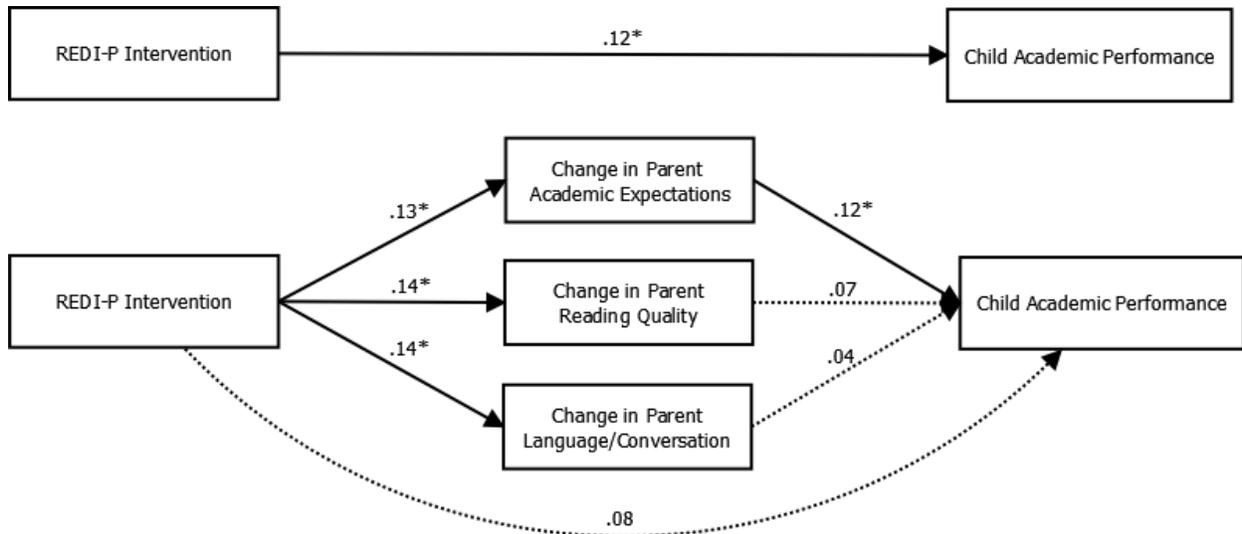


Figure 3. Mediated intervention effects on child academic performance. $\chi^2(42, N = 210) =$

32.34, $p = .89$; CFI = 1.0; SRMR = .04. * $p < .05$.

Appendix I

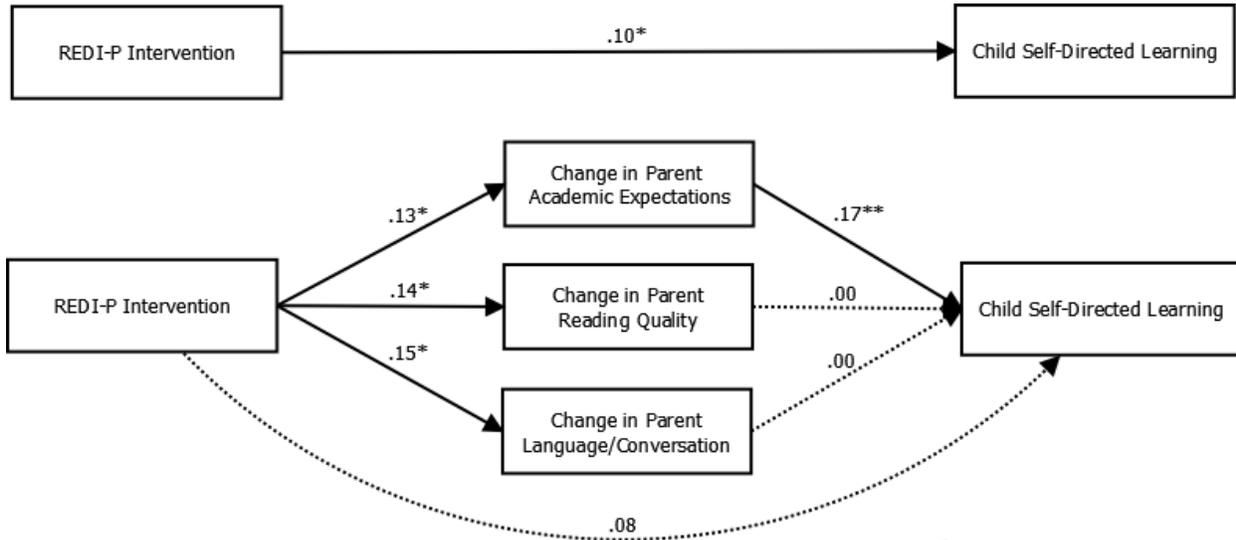


Figure 4. Mediated intervention effects on child self-directed learning. $\chi^2 (42, N = 210) = 36.02$, $p = .73$; CFI = 1.0; SRMR = .05 * $p < .05$. ** $p < .01$.

Appendix J

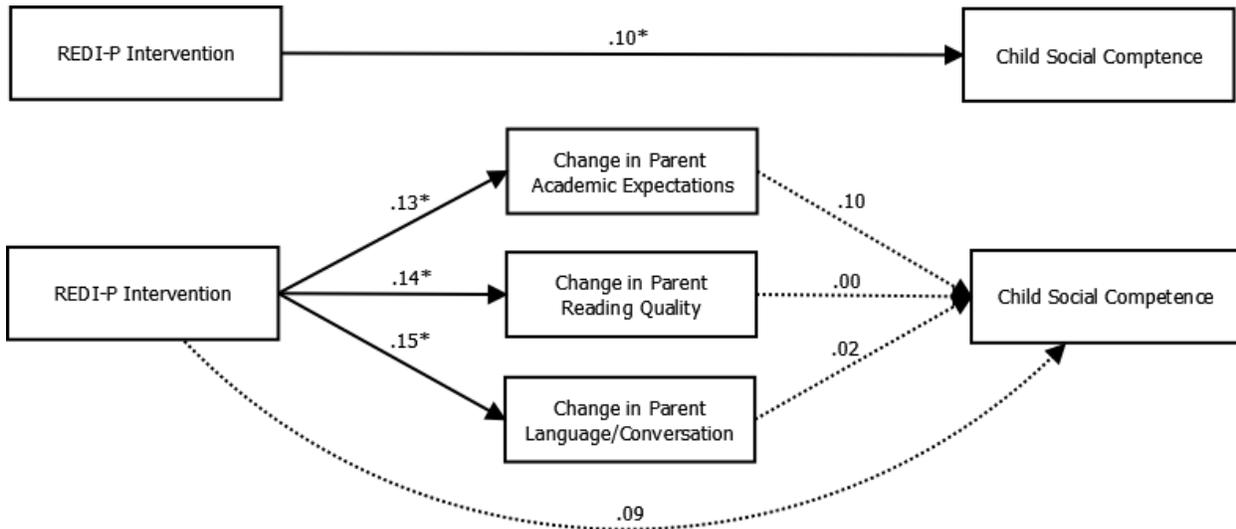


Figure 5. Mediated intervention effects on child social competence. $\chi^2 (42, N = 210) = 27.19, p = .96$; CFI = 1.0; SRMR = .05 * $p < .05$. * $p < .05$.