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The Effects of a Responsive Parenting Intervention on Parent–Child Interactions During Shared Book Reading

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This study examined mother–child shared book reading behaviors before and after participation in a random-assignment responsive parenting intervention called Play and Learning Strategies (PALS) that occurred during infancy (PALS I), the toddler–preschool (PALS II) period, or both as compared with a developmental assessment (DAS) intervention (DAS I and/or II). The efficacy of PALS was previously demonstrated for improving mother and child behaviors within play contexts, everyday activities, and standardized measures of child language. We hypothesized that PALS effects would generalize to influence maternal and child behaviors during a shared reading task even though this situation was not a specific focus of the intervention and that this would be similar for children who varied in biological risk. Participation in at least PALS II was expected to have a positive effect due to children’s increased capacity to engage in book reading at this age. Four groups of randomized mothers and their children (PALS I–II, PALS I–DAS II, DAS I–PALS II, DAS I–II) were observed in shared reading interactions during the toddler–preschool period and coded for (a) mother’s affective and cognitive–linguistic supports and (b) child’s responses to maternal requests and initiations. Support was found for significant changes in observed maternal and child behaviors, and evidence of mediation was found for the intervention to affect children’s behaviors through change in maternal responsiveness behaviors. These results add to other studies supporting the importance of targeting a broad range of responsive behaviors across theoretical frameworks in interventions to facilitate children’s development.

Keywords: shared book reading, affective responsive parenting, early intervention, biological risks, cognitively responsive

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Responsive parenting is considered a critically important set of behaviors to support young children’s development (Ainsworth, Blehar, Waters, & Wall, 1978; Bornstein & Tamis-LeMonda, 1989; Landry, Smith, Swank, Assel, & Vellet, 2001). Responsive parenting, as defined from different theoretical frameworks (e.g., attachment, sociocultural), includes children experiencing interactions where parents provide consistently high levels of warmth and acceptance of their children as unique individuals, responses that are contingently linked to the children’s signals, and cognitively responsive behaviors such as rich language input and maintaining the children’s interests. For example, the child signals a need or interest, the caregiver responds promptly and sensitively to the signal, and the child experiences a supportive consequence that

promotes an interest and willingness to continue to signal and engage in learning interactions (e.g., Bornstein & Tamis-LeMonda, 1989).

The mechanism by which responsive parenting is thought to support children’s development is through specialized support it offers for children’s individual needs and for children’s ability to internalize and then generalize their learning to new experiences based on their repeated experiences in previous responsive interactions (e.g., Grusec & Goodnow, 1994). Findings from experimental research, where interventions targeted facilitation of parent responsiveness, support the hypothesis that increased levels of this parenting style result in higher levels of independent problem-solving, language, and social skills (Landry, Smith, & Swank, 2006; Landry, Smith, Swank, & Guttentag, 2008); social-emotional skills (e.g., attachment security; Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2003); and aspects of behavioral development (Van Zeijl et al., 2006). Enhanced child outcomes were observed while children were interacting with parents in daily activities and toy play, and with other adults during independent play, and skills (e.g., language) were measured with standardized tests (e.g., Landry et al., 2006, 2008).

Potential Importance of Responsive Parenting During Book Reading

One area of young children’s development that has not been examined in relation to interventions that target enhancing respon-

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sive parenting is the child's skills during shared book reading activities. This is a significant gap in our understanding of the potential influences of responsive parenting, as shared book reading between parents and young children is an important activity for promoting oral language and emergent literacy skills (Bus, van IJzendoorn, & Pellegrini, 1995; Fletcher & Reese, 2005; National Early Literacy Panel [NELP], 2008) and is associated with later reading achievement and recreational reading (Lesemen & de Jong, 1998). Thus, this study examines whether the Play and Learning Strategies (PALS) intervention that targets global parenting techniques by facilitating a range of responsive behaviors in everyday activities can also support mothers' use of more effective shared book reading behaviors and, in turn, children's engagement and use of language in this activity.

The question examined in this study is different from those in studies evaluating the efficacy of highly targeted shared reading interventions. Experimental studies have used a parent book reading program called dialogic reading to teach parents evocative techniques that encourage young children to talk about illustrations and scaffold children's responses (e.g., Arnold, Lonigan, Whitehurst, & Epstein, 1994; Whitehurst et al., 1994). A recent meta-analysis of this intervention demonstrates moderate effects on children's expressive vocabulary and small effects on children's receptive vocabulary, but particularly for children at low risk for literacy problems (Mol, Bus, de Jong, & Smeets, 2008). This suggests that further study is needed with at-risk populations, including children from low socioeconomic families and those born with a very low birth weight (VLBW), to determine whether aspects of a broader responsive parenting intervention that promotes repeated positive parent-child interactions in a range of everyday activities will support parents to generalize these practices to book reading. As responsive parenting is, in part, a style of interacting across social contexts and not a behavior specific to one situation, mothers would be expected to generalize their use of this style to a situation (e.g., shared book reading) that was not directly focused on in the intervention. This, in turn, would be expected to facilitate children's generalization of their learning (e.g., enhanced language use) to book reading activities from these previous responsive interactions.

The parents and children targeted in this intervention were all of lower socioeconomic status (e.g., low levels of parent education and job status), as these are families that are reported to be less likely to use responsive behaviors and whose children are less likely to enter school with the skills needed to succeed (Snow, Burns, & Griffin, 1998; Wakschlag & Hans, 1999). This is also true for home experiences in shared book reading, as a recent U.S. survey indicates that the proportion of young children who are read to daily by a family member varies depending on factors such as maternal education, family income, and ethnicity. Only 39% of children whose mothers have a high school diploma are read to every day, whereas 74% of children whose mothers have a bachelor's degree engage in daily reading (Federal Interagency Forum on Child and Family Statistics, 2009). These and other data suggest that children who could most benefit from the warm and cognitively stimulating responsive interaction experiences of daily shared reading may be least likely to experience it (Payne, Whitehurst, & Angell, 1994; Snow et al., 1998).

The present study examined mother-child reading behaviors before and after participation in PALS with parents of both typi-

cally developing children and children born preterm and at VLBW. The efficacy of PALS has been demonstrated during both the infant (Landry et al., 2006) and toddler-preschool (Landry et al., 2008) periods for improving mother and child behaviors within play contexts and everyday activities and on standardized measures of child language skills. Although a variety of programs exist to support parents of children with developmental vulnerabilities (e.g., Reichman & McLanahan, 2001), one distinction is that participation in the PALS program produces significant effects on everyday parenting behaviors (e.g., dressing, feeding, social games; Landry et al., 2006, 2008) that were comparable for the children born VLBW to those born term. Children born VLBW were included, as these are children who have more difficulty learning due to problems in engaging and taking initiative (Garner, Landry, & Richardson, 1991), organizing their behavior (Goldberg, Lojkasek, Gartner, & Corter, 1989), and understanding contingencies (Landry, Leslie, Fletcher, & Francis, 1985). Without specialized support for these problems from responsive interactions, they are more likely to have a range of cognitive and academic problems by school age (Taylor, Klein, Minich, & Hack, 2000). Our previous reports of the efficacy of PALS for a range of outcomes with children born term or at VLBW support the hypothesis that the process by which responsiveness supports children's development is due, in part, to the specialized support provided for children's individual needs. We have not previously examined whether participation in PALS influenced the quality of shared reading interactions or whether this would occur to the same extent for parents of children born term as well as VLBW. However, descriptions of the types of parent behaviors that might be important to effectively support children's engagement and learning during this activity suggest that responsive behaviors should be particularly helpful (e.g., Bus & van IJzendoorn, 1997; Sonnenschein & Munsterman, 2002).

The effectiveness of responsive parenting for promoting engagement of children born VLBW in shared book reading is not known, as to our knowledge only one existing study has directly examined the interactions during shared reading between mothers and their young children who were born preterm (Aaron, 1998). In this study of 13 low-income mothers and their premature 6-month-old infants, 69% of mothers either failed or were only marginally successful at sharing a book with their infants because they struggled to respond appropriately to the child's signals. These findings and other lines of research show that mothers of children born VLBW may lack confidence in their parenting skills (e.g., Achenbach, Phares, Howell, Rauh, & Nurcombe, 1990) or may be more directive than mothers of term-born children (Landry, Chapieski, Richardson, Palmer, & Hall, 1990). Thus, examining supports for both affective and cognitively responsive aspects of mother-child interactions is particularly relevant for this population to better understand how responsiveness can encourage children born prematurely to engage during shared reading and construct meaning from text. The dearth of studies among this population is noteworthy given the known benefits of shared reading for language and literacy development (e.g., NELP, 2008) and given that shared reading is used as a vehicle for interventions among children who are at risk for later academic difficulties (e.g., Mol et al., 2008).

Characteristics of Mother–Child Book Reading

Theoretical and empirical support indicates that two domains of adult book reading behaviors are particularly important for child outcomes. The first domain centers on affective–emotional supports and includes contingently responsive interactions with parents who are warm and sensitive to their child’s signals (e.g., Bus & van IJzendoorn, 1997; Leseman & de Jong, 1998; Sonnenschein & Munsterman, 2002). The second domain centers on cognitive and linguistic supports and includes a rich and responsive linguistic context that uses social activities, such as book reading, to challenge and scaffold children in language and critical thinking that is slightly beyond their current skill level (e.g., Chapman, 2000; Nelson, Welsh, Camarata, Tjus, & Heimann, 2001; van Kleeck, 2003). Patterns of parents’ reading behaviors that have been studied indicate substantial variability across the cognitive domain such that some parents simply read the text and provide minimal input during reading, whereas other parents elaborate on the text and encourage their child to think about literal and inferential aspects of the text’s meaning (Britto, Brooks-Gunn, & Griffin, 2006; Hammett, van Kleeck, & Huberty, 2003). Variability in the affective domain is associated with the amount of disciplining and redirecting during reading as well as the children’s response to the reading experience (e.g., Snow & Ninio, 1986).

The extant research on mother–child interactions during book reading has often focused on the adult’s attempts to engage the child (e.g., Britto et al., 2006; DeBaryshe, 1995; Hammett et al., 2003). However, a richer understanding is developed by considering the child’s responses and initiations simultaneously with the mother’s behaviors (e.g., Pellegrini, Galda, Perlmutter, & Jones, 1994) because book reading is a bidirectional process (Sameroff & Mackenzie, 2003) in which the adult and child both shape the extratextual conversation that unfolds (i.e., any talk beyond reading of the actual text). Below, we briefly summarize relevant research that examines parent and child roles during shared reading across the two domains studied.

Affective–Emotional Domain

Positive affective–emotional parenting behaviors include warm, positive affect and contingent responsiveness to the child’s signals during reading. Positive interactions also involve minimal amounts of maternal discipline, restrictions, or a negative tone of voice during reading (Bus & van IJzendoorn, 1997; Leseman & de Jong, 1998). Researchers further suggest that the mother’s praise and enthusiasm encourage the child’s verbal participation during shared reading (Britto et al., 2006). Though less often studied than cognitive and linguistic aspects of shared reading, evidence suggests that given a responsive affective–emotional climate during shared reading, the child is more likely to demonstrate attention to text and enthusiasm for the reading experience, to cooperate with the mother’s requests, and to be read to more frequently (Bus, Belsky, van IJzendoorn, & Crnic, 1997; Leseman & de Jong, 1998). Affective quality during book reading, rather than the cognitive aspects of adult and child behaviors, predicted children’s later motivation to read, whereas frequency of home-shared reading predicted children’s early literacy skills (Sonnenschein & Munsterman, 2002). This and related work (e.g., Serpell, Sonnen-

schein, Baker, & Ganapathy, 2002) suggests that making early reading interactions warm and engaging can influence children’s later interest in reading.

Cognitive and Linguistic Domain

Under a social-constructivist view of shared reading, children learn not simply from the words in the book but from the adult’s conversation, language supports, and scaffolding provided during reading (e.g., Fletcher & Reese, 2005; Reese & Cox, 1999). Likewise, children actively construct their own knowledge during book reading when they make comments or ask questions about the text (e.g., van Kleeck, 2003). Children gradually move from using nonverbal strategies to engage during book reading to producing more complex verbalizations. Parents can deliberately scaffold and encourage these more sophisticated responses, and at least some evidence suggests a bidirectional relation between the sophistication of children’s behaviors during reading and increased adult supports through scaffolding of children’s responses and encouragement of verbalizations (Bus et al., 1997). Analyses of naturally occurring patterns in maternal reading styles among both typically developing, middle-income children and those at risk due to low-income status demonstrate that when mothers use a combination of simple (e.g., labeling questions) and inferential (e.g., more challenging open-ended questions) language during reading, their preschool-age children demonstrate significantly higher expressive language and abstract thinking skills (e.g., Britto et al., 2006). Adults can recast or expand children’s utterances in longer or more grammatically complete forms to improve children’s oral language (Yoder, Spruytenburg, Edwards, & Davies, 1995). Accumulating evidence suggests that adults’ deliberate elaborations on word meanings during shared reading are particularly beneficial for increasing children’s vocabulary (e.g., Coyne, McCoach, Loftus, Zipoli, & Kapp, 2009; Justice, Meier, & Walpole, 2005).

Study Objectives

The primary study objective was to evaluate the PALS intervention effects specifically on maternal and child behaviors during a shared book reading task. The PALS intervention was conducted in families’ homes across two developmental periods, infancy (PALS I) and toddler–preschool (PALS II), and balanced with respect to children born term versus VLBW. In the infancy period mothers were randomized to either the PALS I or a control condition where mothers received the same number of home visits as provided in PALS but with developmental assessments conducted and information provided as to what children may be expected to develop next. They did not receive information on how to help their children’s development (developmental assessment sessions [DAS]). Prior to the PALS II intervention, mothers who participated in PALS I were rerandomized into similar conditions for the toddler–preschool intervention. Thus, this resulted in four study groups (DAS I–II, DAS I–PALS II, PALS I–DAS II, and PALS I–II) and allowed us the unique opportunity to determine whether there were optimal developmental periods for facilitating parent behaviors and particular child competencies. Although the book reading task assessment was not included in the PALS I assessments, there was opportunity to determine whether behavioral changes evident in other situations would generalize to shared

book reading and whether there was evidence not only for change over time (pre- to postassessment) but also for maintenance of change (pre- to follow-up assessment).

Previous evaluations of PALS intervention effects (Landry et al., 2006, 2008) on gains in mothers' responsiveness behaviors during daily activities that are relevant to the present study include the finding that contingent responsiveness, a behavior from an attachment framework, was best supported by participation in both PALS I and PALS II for optimal child outcomes. Rich language input, a behavior from the sociocultural framework, showed the best intervention results if mothers participated in at least PALS II. The intervention effects for children's social engagement during daily activities were best supported by their mothers' participation in PALS I and II, whereas their cooperation was best supported by mothers' participation in PALS II. Children's use of language during daily activities and performance on standardized language tests were also best supported by their mothers' participation in PALS II. As expected, findings for both mother and child behaviors typically were similar for those born term and VLBW. Hypotheses regarding intervention effects on specific book reading behaviors for the present study were guided by these results.

Hypotheses Regarding Intervention Effects on Mothers' Book Reading Behaviors

Aspects of maternal affective and linguistically supportive behavior during book reading were evaluated, including affective supports (praise and encouragement and rating of responsiveness) and cognitive-linguistic supports (frequency of book-related rich language input, including use of verbal scaffolding strategies, open prompts, and book-related comments). The percent of time mothers only read text was also evaluated. On the basis of previous findings, the intervention effectiveness was expected to be similar for mothers of term-born children as compared with those with children born VLBW.

1. Responsiveness during shared book reading was expected to require participation in both PALS I and PALS II for mothers to show the highest levels and/or greatest increases. This was expected, as use of responsiveness behaviors requires mothers to adapt and change to meet the child's changing developmental needs.

2. Greater frequencies of praising and encouragement of children's engagement in the shared reading activity was hypothesized for mothers who participated in at least PALS II. Given children's greater language skills during the toddler-preschool age, mothers who at least had PALS II were expected to be more responsive to their children's efforts during this task with the use of praise and encouragement.

3. The frequency with which mothers scaffold children's verbal responses to requests about the book through provision of a range of techniques known to enhance children's language in interventions focused specifically on shared reading (e.g., dialogic reading) was also expected to require participation in both PALS I and PALS II in order to show the highest levels and/or increases. As scaffolding techniques often require verbal support that is closely linked to the child's attention and verbalization, the mothers with intervention support across both developmental periods were expected to be more responsive to the child's attention focus and language skills through greater frequencies of rich verbal scaffolding that included expansions, assists, and lead-ins for support of

children's language use; use of open prompts; and book-related comments.

4. The percent of time in which mothers only read text was expected to be at lower levels and/or decrease over time for those who participated in PALS II. It was expected that mothers in PALS II would use more extratextual talk due to the PALS intervention focus on labeling objects and actions and verbal scaffolding and that this would assist parents in moving beyond the text itself to increase the cognitive challenge of book reading through evocative techniques that are suited to children's increasing verbal skills and inferential thinking abilities.

Hypotheses Regarding Intervention Effects on Children's Book Reading Behaviors

Children's engagement in shared book reading was examined through ratings and frequencies of children's responses to mothers' requests, both verbal and behavioral, and initiations that involved questions or requests and comments. The frequency with which children were able to coordinate use of language and book-related gestures (e.g., pointing) was also examined for PALS intervention effects. On the basis of previous findings, the intervention effectiveness was expected to be similar for children born term as compared with those born VLBW.

1. Children's ability to respond behaviorally was expected to be best supported by mothers' participation in PALS I, as we previously found that level of social engagement was facilitated by PALS I. In contrast, responding verbally to maternal requests regarding the book was expected to show the greatest gains if their mothers participated in at least PALS II. This was also expected for children's ability to initiate interactions with their mothers in the form of questions or requests and ability to make novel comments, as well as children's overall level of engagement during the book reading. Participation in PALS II was expected to be most important to these child behaviors because of the increased complexity of language that occurs during the toddler-preschool period

2. Children's coordination of language and book-related gestures was expected to show the greatest gains if their mothers participated in both PALS I and PALS II, as previous findings show that this more complex skill requires greater support from mothers across time.

Mediation of Intervention Influence on Children's Outcomes

It also was of interest to determine whether different aspects of maternal responsiveness during shared book reading mediated the impact of the intervention on child language and engagement during this activity. On the basis of previous findings (Landry et al. 2006, 2008), it was hypothesized that responsive behaviors from both affective-emotional and cognitive-linguistic domains would be important for understanding the intervention effect on child shared book reading outcomes.

Method

Participants

Study groups. Children born term ($n = 80$) had a gestational age at birth of ≥ 36 weeks, Apgar scores greater than 8, and a

normal maternal pregnancy history. Children born VLBW ($n = 86$) had a gestational age at birth of ≤ 36 weeks and a birth weight of $\leq 1,600$ grams, and they ranged in severity of medical complications known to predict risk for developmental difficulties (e.g., respiratory disorders, intracranial insults). Infants with the most severe types of intracranial insults (i.e., intraventricular hemorrhage, Grade 4) were not recruited due to the high incidence of severe neurological difficulties for which this intervention was not expected to have a positive impact.

Recruitment of sample. A medical record review approved by the institutional review board at both academic institutions involved in the intervention was used to determine eligibility. The cohort was recruited from clinics in three hospitals serving families from lower income backgrounds in the greater Houston and Galveston, Texas, areas. Telephone calls and letters were used to invite families to participate. Infants were excluded if the mother had a history of drug abuse or severe mental illness or was less than 18 years of age. To obtain a randomly split sample between the two study conditions while also keeping the infant risk groups equal across conditions, we used an equal number of markers per condition for each risk group and drew out one marker per family, without replacement, after preassessment was completed (Landry et al., 2006). Of the families contacted, 35% declined participation in the infant intervention, with no differences on a range of demographic and medical factors found between those that agreed and those that declined to participate. The PALS I study included 264 infants (term, $n = 95$; VLBW, $n = 169$), and average age at the start of the study was 6.2 months ($SD = 0.66$). Of these, 242 completed the study, with no differential attrition across the risk groups. At recruitment, all mothers reported being the primary caregiver; therefore, mothers were chosen as the focal caregiver for intervention, although fathers or another family member or close friend could be involved in the intervention by participating in two review sessions.

Of those who completed PALS I, 222 mother–child dyads were eligible for recruitment for PALS II, as the child was between the ages of 24 and 28 months at the time of recruitment. In the process of obtaining funding for the second study phase, 20 of the 242 families that completed the PALS I study were used to collect pilot data for the development of the new intervention (PALS II). Of the remaining families, 166, or 75%, agreed to participate. Those that declined tended to do so because of not having time to meet on a weekly basis or due to our inability to locate them. No significant differences in demographic or medical factors were found between those that continued to participate and those that did not.

Procedure

Randomization procedures. Mother–child pairs were randomly assigned to the PALS II or DAS II condition in the following manner in order to balance the four study groups based on the child’s biological risk status. Two envelopes were used for the term versus VLBW groups, with each envelope including an equal number of study group markers (i.e., PALS II, DAS II). After the preassessment, one marker was drawn from the appropriate envelope to determine the family study condition. Markers were drawn without replacement. Analysis of the rerandomized groups showed that mother and child variables were comparable at pretest. The rerandomization resulted in four study groups: PALS I–II ($n = 34$), PALS I–DAS II ($n = 33$), DAS I–PALS II ($n = 50$), and DAS I–II ($n = 49$). Under similar study attrition criteria to those in PALS I (i.e., not completing all home visits; Landry et al., 2006), 90% of study families had a posttest assessment and 88% had a follow-up assessment.

Characteristics of the four study groups. Table 1 summarizes the children’s medical and demographic information for the four study groups, with no expected differences found. Table 2 summarizes the demographic information for the children’s mothers and the family structure, and only a significant difference for maternal age was found. Overall, the socioeconomic status (Hollingshead, 1975) of our sample remained in the upper lower to lower middle-class range, which is consistent with a high school education and clerical or semiskilled occupations.

Home visitation sessions. Trained facilitators met with PALS II and DAS II families in their homes for 11 weekly visits that each lasted approximately 1.5 hr. To ensure that all families had access to developmentally appropriate toys, families in all four study conditions received a book, puzzle, and medium-sized ball. Facilitators made the same number of home visits to participants in both conditions, but the content of the visits differed. A systematic approach to training and supervising facilitators was used to ensure fidelity of implementation (procedures discussed below; for further details, see Landry et al., 2008).

PALS condition sessions. Both PALS I and PALS II conditions followed a detailed curriculum that targeted responsive behaviors across infancy and into the preschool ages. Detailed descriptions of each of these are provided in previous publications (Landry et al., 2006, 2008). The overarching goals of PALS were to increase responsive parenting behaviors that included responding warmly and promptly to children’s signals in ways that maintained (rather than redirected) the child’s focus of attention and

Table 1
Child Medical and Demographic Characteristics by Intervention Group

Variable	PALS I–II		PALS I–DAS II		DAS I–PALS II		DAS I–II	
	Term	Preterm	Term	Preterm	Term	Preterm	Term	Preterm
Birth weight, in grams (<i>M</i>)	3,444 (326)	992 (337)	3,274 (381)	994 (320)	3,326 (383)	1,203 (501)	3,305 (371)	1,177 (388)
Gestational age, in weeks (<i>M</i>)	39.9 (0.3)	28.7 (2.3)	39.9 (0.2)	28.7 (2.2)	40.0 (0.0)	30.2 (3.2)	40.0 (0.0)	29.5 (2.9)
Female (%)	57	43	60	40	44	55	48	52
<i>n</i>	15	19	19	14	23	28	23	26

Note. Values in parentheses represent the group standard deviation. PALS = Playing and Learning Strategies; I = intervention in infancy; II = intervention in toddler–preschool period; DAS = developmental assessment sessions.

Table 2
Maternal and Family Demographic Characteristics by Intervention Group

Variable	PALS I-II	PALS I-DAS II	DAS I-PALS II	DAS I-II
Age, in years (<i>M</i>)	31.2 _a (6.1)	29.4 _a (6.0)	28.9 _b (6.7)	28.3 _b (5.5)
Education, in years (<i>M</i>)	11.9 (3.3)	12.8 (2.4)	12.2 (2.2)	12.6 (2.5)
Socioeconomic status ^a (<i>M</i>)	35.3 (19.3)	33.0 (16.8)	31.6 (14.6)	34.4 (13.3)
Siblings ^b (<i>M</i>)	1.6 (0.3)	0.8 (0.6)	1.1 (0.3)	0.9 (0.3)
Marital status ^c (%)	62	51	49	52
Ethnicity (%)				
African American	25	42	35	33
Hispanic	47	39	32	39
Caucasian	28	19	27	24
Other	0	0	6	4
<i>n</i>	34	33	50	49

Note. Values in parentheses represent the group standard deviation. Subscripts indicate significant group differences. PALS = Playing and Learning Strategies; I = intervention in infancy; II = intervention in toddler–preschool period; DAS = developmental assessment sessions.

^a Based on Hollingshead (1975) Four Factor Index of Social Status. ^b Number of siblings in the home. ^c Percent of mothers who were married.

that provided rich language input and scaffolding. Table A1 in the supplemental materials summarizes the topic for each home session in both PALS I and PALS II. The session format always included (a) review of the previous week's experiences with a focus on the mother's efforts to try the targeted behaviors, (b) description of the next targeted behavior, (c) viewing and discussion of an educational video of mothers demonstrating the target skills, (d) videotaping coached mother–child interactions in a context chosen by the mother (e.g., toy play, feeding), (e) playback of the videotaped practice with a focus on helping the mother critique her behaviors and her child's responses, and (f) planning how to integrate the targeted behavior in everyday activities across the next week. The intervention was conducted in English or Spanish, depending on mother's primary language, with 24% receiving it in Spanish.

Mothers were not explicitly trained in shared book reading strategies during PALS I or II. Book reading was included in some educational videotapes used in the PALS I and II sessions that focused on a specific responsiveness topic (e.g., responding to the child's signals), but this was only one of many everyday activities included in the videotapes. There were three times in which book reading was discussed as one of several everyday activities that could be improved with responsive parenting. First, in the contingent responsiveness session, the educational video and discussion included examples of following the child's lead and sharing control in activities that included reading (e.g., share page turning, point to pictures that interest the child). Second, when teaching about rich language input, book reading was described as one of the best ways to help children learn new words because it provides natural opportunities to label and describe objects and actions in illustrations. Third, to teach mothers how to scaffold children's learning, book reading was suggested as one activity in which parents could provide conceptual links between pictured persons and objects and their functions. Additionally, mothers and children could choose to use a book from the coach's toy bag for the videotaped coaching and playback portion of home visits. Anecdotally, facilitators reported that books were chosen relatively infrequently compared with other toys such as puzzles, balls, and blocks. Thus, the program differed significantly from interventions that specifically target book reading behaviors.

Comparison condition sessions. Mothers randomly assigned to the DAS II condition were encouraged to talk with facilitators about new child skills observed during the previous week. Facilitators screened a range of child skills, provided feedback, and answered questions about these skills, although questions about how to facilitate development were answered by encouraging mothers to consult their health care provider. For each skill (e.g., feeding), mothers received a handout addressing the topic. PALS II mothers received the same handouts.

Systematic training of facilitators and fidelity assessment. In both PALS I and PALS II, an intense and systematic approach to training and supervision of facilitators and assessment staff to ensure fidelity of the intervention implementation was used (Landry et al., 2006, 2008). All facilitators had at least a bachelor's degree and had experience working with parents and children. Training included review of session topics, practice with coaching by the supervisor, and discussion of the type of information provided in each condition. A stringent, multimethod monitoring system was used to ensure that fidelity of implementation by facilitators remained at high levels, via (a) supervisor accompanying facilitator on home visits with a fidelity checklist, (b) monthly 3-hr group meetings with supervisor that included review of videotaped home visits and discussion of problems, and (c) a mother knowledge and engagement scale checklist used in two sessions in PALS I and II as mothers taught key target behaviors to an "alternative caregiver."

Assessment procedures. During the PALS II intervention, research staff blind to study condition conducted assessments of shared book reading behaviors at (a) pretest, 2 weeks before Home Visit 1; (b) posttest, 1 month after Home Visit 11; and (c) follow-up test, approximately 3 months later (see Landry et al., 2008, for mean child age at each time point). Posttest and follow-up assessments were completed only for families that attended all 11 home visits.

Assessments of book reading behaviors occurred in a naturalistic living room situation in the laboratory or in participants' homes, according to the family's preference; in PALS I most families were assessed in the laboratory, but in PALS II about half the families came to the laboratory and the others were seen in their homes for assessments. Mother–child book reading interactions were video-

taped for 3 min, and mothers were requested to read as they normally would with their child. The assessor left the room, with a camera positioned to face the mother and child to capture verbal and nonverbal behaviors. After 3 min, mothers were asked to stop reading and a new assessment activity began. The use of a 3-min shared reading assessment was chosen for two reasons: (a) given the children's young age, a brief book reading session was thought to be appropriate for immature attention spans; and (b) research indicates that relatively brief segments of behavior, called "thin slices" and sometimes only several seconds in duration, can be used to make accurate evaluations (Ambady & Gray, 2002).

Mothers and children were presented with four texts that varied in content and genre and were allowed to read as many books as they liked during the assessment. The titles that were presented at all six assessments sessions included (a) *Five Little Monkeys Jumping on the Bed* (Christelow, 1989), a classic patterned, counting and rhyming narrative about monkeys that jump on the bed despite the doctor's orders not to; (b) *My Crayons Talk* (Hubbard, 1999), a rhyming, anthropomorphic narrative about crayons that talk to a young girl as she draws a picture; (c) *Let's Look at Animals* (Lorenz Books, 1999), an informational genre featuring colored photographs of common animals (e.g., horse, dog, chick) and words labeling each animal; and (d) *My First Word Book* (Wilkes, 2002), an informational genre including over 1,000 photographs and a few illustrations of objects and labels that are arranged by category (e.g., supermarket, animals on the farm). A variety of narrative and informational genres were provided so that participants had the option to select a genre they were comfortable with, as research shows differential mother-child extratextual talk depending on the familiarity and comfort across genres (Pellegrini, Galda, Perlmutter, & Jones, 1994). We did not examine whether mothers and children selected the same book or different books from this set of four titles at each assessment session, so familiarity or genre effects cannot be directly assessed.

Measures

This report included observational measures of maternal responsiveness and use of a broad range of language scaffolding behaviors. Children's behaviors during book reading sessions measured included behavioral and verbal responses to mothers' book-related requests, a range of language behaviors, and engagement in the activity. Tables A2 and A3 in the supplemental materials provide the maternal- and child-coded variables, definitions, and generalizability coefficients.

Coding procedures. Book reading behaviors, including extratextual talk, were coded with a system similar to those observed by other researchers (e.g., Pellegrini et al., 1994; Sénéchal, Cornell, & Broda, 1995) and those shown to predict children's development in previous work that included daily activities and toy play contexts (e.g., Landry et al., 2006, 2008). This coding system included three types of codes: (a) frequency counts at the utterance level, (b) binary codes (yes/no) to determine whether a behavior of interest occurred during a continuous event (i.e., sustained attention to a single topic), and (c) global ratings based on the entire book reading session. Codes were not mutually exclusive, such that a mother's question would be coded first as open versus closed prompt, and then might also receive a language facilitation code if it builds on the topic of a child's question. The three types of codes

were used to achieve different purposes. Frequency counts allowed us to determine variability in occurrence of utterances of particular interest, whereas global 5-point rating scales allowed us to assess behaviors that reflect an overall disposition during reading (e.g., responsiveness, engagement). For behaviors that tend to occur with regularity (e.g., mother comments, child nonverbal gestures), binary yes/no coding within events was used to simplify video coding. Specific rules were used to determine when distinct events started and stopped, including (a) mother reading only the text for ≥ 3 s; (b) continuous sequence of maternal attention-directing behaviors and corresponding child responses without a 3-s pause, (c) mother brought attention to a new book, or (d) mother responded to her child's initiation of a noncontingent or novel topic.

Maternal book reading behaviors. Observed maternal behaviors (defined in Table A2) representing affective (e.g., praise or encouragement, responsiveness global rating) and cognitive-linguistic supports (e.g., scaffolding, verbal prompting) were coded. The mother responsiveness rating is a composite of what was originally coded as three correlated ratings: enthusiasm, flexibility, and intrusiveness ($\alpha = .67-.73$). Combined coefficient alphas were sufficient for three items to form composite ratings.

Child behaviors during book reading. Child behaviors (defined in Table A3) were coded as (a) responses to maternal requests (e.g., cooperation) if they followed within 3 s of an attention-directing behavior; (b) initiations (e.g., comments, gestures) if they occurred outside this time interval or during mothers' reading of text only, or if the child introduced a noncontingent, novel topic; and (c) global child engagement-enthusiasm rating. The child engagement rating is a composite of what was originally coded as three correlated ratings: social engagement, cooperation, and book interest ($\alpha = .81-.87$).

Interrater reliability. Systematic training procedures were used to ensure reliability across coders. A senior expert coder conducted initial training for the coding staff ($n = 5$) where each coder was required to achieve $\geq 80\%$ agreement across codes to be considered reliable. Monthly refresher trainings and checks of interrater agreement were conducted to guard against observer drift. These trainings included coding videotapes as a team and checking independent interrater agreement to assure that they continued to meet the criterion of $\geq 80\%$ per variable.

A second rater coded 15% of the videotapes, and generalizability coefficients via repeated-measures analyses of variance were calculated (Fleiss, 1986). This method is recommended for studies using continuous, behavioral observational data and has the advantage of evaluating both the consistency across subjects for each rater (absolute) and the rater variance within subjects (relative) for those variables used in the analyses (Frick & Semmel, 1978). Coefficients above .50 indicate adequate reliability (Mitchell, 1979). Generalizability coefficients for the maternal and child behaviors are included in Tables A2 and A3.

Data Analyses

The study design was a 2 (PALS I, DAS I) \times 2 (PALS II, DAS II) \times 2 (VLBW, term) \times 3 (pretest, posttest, follow-up) design with repeated measures on the last factor. To evaluate the effect of the intervention on differences in change in maternal behaviors and child outcomes during the book reading activity, we did mixed-model repeated-measures analyses of variance using SAS

PROC MIXED. This allows for the inclusion of data for all families that had at least two assessments and controls for the nesting of observations within subjects.

Because of our objective to evaluate intervention effects, we made planned comparisons of change from pretest to posttest to follow-up test. The analysis included all main effects and interactions, both between and within subjects. Although a significant difference was found between the study conditions for maternal age, inclusion of this as a covariate did not change the model results in any case. Thus, significant results without this covariate are reported. The clinical significance of the findings are provided based on Cohen's d : small effect, $d = 0.2$; moderate effect, $d = 0.5$; and large effect, $d = 0.8$ (Cohen, 1988). Summaries of the parameter estimates, degrees of freedom, F tests, and related p values for all factors included in the final model for each analysis are provided for maternal behaviors in Tables 3–5 and for child outcomes in Tables 6–8. Appendices include correlations among mother behaviors and among child behaviors and least square means and standard deviations for these variables.

To determine the most appropriate analysis to use, we conducted an examination of the distribution of each maternal and child behavior. When the residuals were normally distributed, we used a linear mixed model, and when it was positively skewed, we used a nonlinear mixed model (SAS Version 9.1). For the maternal behaviors, we used a linear mixed-model analysis to examine intervention effects on responsiveness and comments. All other maternal variables were analyzed with a nonlinear mixed model. For the child outcomes, we analyzed verbal and behavioral responses and child engagement using a linear mixed-model approach and all other child behaviors with a nonlinear approach. We scaled the following child variables using a Rasch modeling approach: behavioral responses and verbal responses to mothers' requests.

Results

Descriptive statistics and correlations are provided in the supplemental materials, Tables B1–B6.

Table 3
Analyses for Maternal Behaviors: Affective Behaviors and Time Reading Text

Variable	Praise and encourage ^a				Percent time only reading text ^b				Responsiveness rating ^c			
	Parameter				Parameter				Parameter			
	Estimate	SE	F	p	Estimate	SE	F	p	Estimate	SE	F	p
Intercept	1.73	0.15			2.70	0.21			9.66	0.47		
Risk level	0.12	0.16	0.15	.701	0.72	0.23	0.28	.600	0.61	0.29	4.32	.039
PALS I	-0.12	0.21	0.44	.507	0.30	0.23	1.28	.260	-0.45	0.31	0.89	.347
PALS I × Risk Level	-0.14	0.21	1.08	.300	-0.46	0.16	7.71	.006	—	—	—	—
PALS II	0.19	0.23	0.54	.464	0.44	0.28	3.43	.066	-0.53	0.41	1.49	.224
PALS II × Risk Level	-0.46	0.24	1.12	.291	-0.63	0.28	1.60	.207	—	—	—	—
PALS I × PALS II	-0.14	0.30	3.76	.054	0.12	0.29	1.29	.258	0.24	0.51	3.12	.079
PALS I × PALS II × Risk Level	0.59	0.31	3.67	.057	—	—	—	—	—	—	—	—
Time	—	—	1.39	.250	—	—	0.02	.984	—	—	3.29	.039
Pre to follow-up	-0.06	0.19			0.36	0.27			-0.83	0.53		
Post to follow-up	0.00	0.19			0.28	0.28			0.45	0.54		
Time × Risk Level	—	—	—	—	—	—	0.67	.514	—	—	—	—
Pre to Follow-Up × Risk Level	—	—	—	—	-0.70	0.28	—	—	—	—	—	—
Post to Follow-Up × Risk Level	—	—	—	—	-0.35	0.30	—	—	—	—	—	—
Time × PALS I	—	—	0.91	.404	—	—	0.72	.489	—	—	0.29	.746
Pre to Follow-Up × PALS I	-0.17	0.26	—	—	0.05	0.28	—	—	-0.50	0.70	—	—
Post to Follow-Up × PALS I	0.11	0.25	—	—	-0.26	0.30	—	—	-0.58	0.72	—	—
Time × PALS I × Risk Level	—	—	—	—	—	—	—	—	—	—	—	—
Pre to Follow-Up × PALS I × Risk Level	—	—	—	—	—	—	—	—	—	—	—	—
Post to Follow-Up × PALS I × Risk Level	—	—	—	—	—	—	—	—	—	—	—	—
Time × PALS II	—	—	1.10	.335	—	—	0.16	.852	—	—	3.98	.020
Pre to Follow-Up × PALS II	-0.16	0.29	—	—	-0.61	0.39	—	—	0.68	0.80	—	—
Post to Follow-Up × PALS II	-0.35	0.29	—	—	-0.24	0.39	—	—	-1.17	0.79	—	—
Time × PALS II × Risk Level	—	—	—	—	—	—	3.48	.032	—	—	—	—
Pre to Follow-Up × PALS II × Risk Level	—	—	—	—	0.99	0.39	—	—	—	—	—	—
Post to Follow-Up × PALS II × Risk Level	—	—	—	—	0.30	0.40	—	—	—	—	—	—
Time × PALS I × PALS II	—	—	0.26	.771	—	—	0.12	.889	—	—	1.23	.295
Pre to Follow-Up × PALS I × PALS II	0.26	0.38	—	—	0.03	0.40	—	—	0.68	1.03	—	—
Post to Follow-Up × PALS I × PALS II	0.18	0.37	—	—	0.18	0.41	—	—	1.61	1.03	—	—
Time × PALS I × PALS II × Risk Level	—	—	—	—	—	—	—	—	—	—	—	—

Note. Dashes indicate parameter estimate not reported; variable not in final model. In all models, Developmental Assessment Sessions I and II coded as 0; Playing and Learning Strategies I and II (PALS I–II) coded as 1; Term = 0, 1. Pre = Preassessment; Post = Postassessment.

^a $df = 1, 150$, for all effects except time and interactions with time ($df = 2, 266$). ^b $df = 1, 151$, for all effects except time and interactions with time ($df = 2, 264$). ^c $df = 1, 154$, for all effects except time and interactions with time ($df = 2, 282$).

Table 4
Analyses for Maternal Behaviors: Two Aspects of Cognitive–Linguistic Support

Variable	Language facilitation ^a				General verbal supports ^b			
	Parameter		F	p	Parameter		F	p
	Estimate	SE			Estimate	SE		
Intercept	1.41	0.19			0.99	0.21		
Risk level	0.21	0.21	0.02	.881	0.13	0.22	0.04	.834
PALS I	−0.11	0.26	0.68	.412	−0.48	0.26	0.30	.585
PALS I × Risk Level	−0.48	0.30	0.17	.684	—	—	—	—
PALS II	−0.47	0.34	2.34	.128	−0.77	0.33	0.00	.960
PALS II × Risk Level	−0.36	0.34	0.02	.893	0.45	0.23	3.74	.055
PALS I × PALS II	0.10	0.43	5.11	.025	0.44	0.40	0.02	.892
PALS I × PALS II × Risk Level	0.77	0.45	2.92	.090	—	—	—	—
Time			12.15	<.001			1.08	.340
Pre to follow-up	−0.67	0.26			−0.58	0.32		
Post to follow-up	−0.33	0.24			−0.51	0.33		
Time × Risk Level			—	—			3.01	.051
Pre to Follow-Up × Risk Level	—	—			−0.29	0.29	−1.01	.314
Post to Follow-Up × Risk Level	—	—			−0.70	0.28	−2.44	.015
Time × PALS I			0.00	.999			1.92	.149
Pre to Follow-Up × PALS I	−0.38	0.40			−0.66	0.39	1.69	.092
Post to Follow-Up × PALS I	0.30	0.33			1.01	0.40	2.51	.013
Time × PALS I × Risk Level			—	—			—	—
Pre to Follow-Up × PALS I × Risk Level	—	—			—	—		
Post to Follow-Up × PALS I × Risk Level	—	—			—	—		
Time × PALS II			1.00	.370			2.39	.093
Pre to Follow-Up × PALS II	−0.08	0.49			0.57	0.46	1.24	.215
Post to Follow-Up × PALS II	0.64	0.39			1.15	0.44	2.58	.010
Time × PALS II × Risk Level			—	—			—	—
Pre to Follow-Up × PALS II × Risk Level	—	—			—	—		
Post to Follow-Up × PALS II × Risk Level	—	—			—	—		
Time × PALS I × PALS II			2.45	.089			1.68	.188
Pre to Follow-Up × PALS I × PALS II	0.77	0.63			−0.37	0.58	−0.64	.524
Post to Follow-Up × PALS I × PALS II	−0.59	0.51			−1.03	0.57	−1.81	.071
Time × PALS I × PALS II × Risk Level	—	—	—	—	—	—	—	—

Note. Dashes indicate parameter estimate not reported; variable not in final model. In all models, Developmental Assessment Sessions I and II coded as 0; Playing and Learning Strategies I and II (PALS I–II) coded as 1; Term = 0, 1. Pre = Preassessment; Post = Postassessment.

^a *df* = 1, 150, for all effects except time and interactions with time (*df* = 2, 266). ^b *df* = 1, 152, for all effects except time and interactions with time (*df* = 2, 264).

Hypothesis 1: Effects on Mothers’ Book Reading Behaviors

Mothers’ behaviors across the four study groups in two areas of support were examined for differences in the levels (i.e., posttest assessment) and change in behaviors over time (i.e., pre-, post-, follow-up assessments) across the toddler–preschool intervention period. Affective support included responsiveness and use of praise and encouragement. The cognitive–language support examined included five types of maternal verbal input during the activity. We also examined for differences in level and change in the percent of time mothers only read text.

Praise and encouragement. A significant PALS I × PALS II effect was found for the frequency with which mothers encouraged their children during the activity, $F(1, 150) = 3.76$, $p = .05$, $d = 0.34$. Mothers who participated in both PALS I and PALS II showed the highest levels of praise and encouragement at posttest as compared with those in other groups.

Language facilitation techniques. For all mothers, irrespective of their children’s risk level, who participated in both

PALS I and PALS II, at posttest they showed higher levels of strategies to promote child talk including expansions, lead-ins, and assists compared with those in all other groups, $F(1, 150) = 5.11$, $p = .025$, $d = 0.30$.

General verbal supports. There was a PALS II × Risk effect, $F(1, 152) = 3.74$, $p = .054$, as well as a trend for a PALS II interaction, $F(2, 264) = 2.39$, $p = .093$. The effects of PALS II were greater for those born VLBW than full term ($d = 0.34$). In addition, mothers who received PALS I and II showed greater increases from post- to follow-up assessment in their use of general verbal support as compared with those who received PALS I and DAS II, $t(264) = 2.58$, $p = .016$, $d = 0.86$. Similarly, mothers who received PALS I and II showed greater gains across the same assessment points as compared with those who received DAS I and PALS II only, $t(264) = 2.51$, $p = .013$, $d = 0.76$.

Open prompts. Mothers who participated in both PALS I and PALS II as compared with mothers who had PALS I without PALS II more frequently asked questions that encouraged children to think more broadly about the story at posttest, and this was

Table 5
Analyses for Maternal Behaviors: Two Aspects of Cognitive–Linguistic Support

Variable	Open prompts ^a				Comments ^b			
	Parameter		<i>F</i>	<i>p</i>	Parameter		<i>F</i>	<i>p</i>
	Estimate	<i>SE</i>			Estimate	<i>SE</i>		
Intercept	0.82	0.24			−1.48	0.17		
Risk level	−0.05	0.14	0.11	.738	−2.68	0.13	0.70	.406
PALS I	0.02	0.31	0.03	.867	−0.23	0.21	0.43	.512
PALS I × Risk Level	—	—	—	—	—	—	—	—
PALS II	−0.53	0.41	1.21	.272	−0.24	0.26	0.00	.982
PALS II × Risk Level	—	—	—	—	0.38	0.18	4.33	.034
PALS I × PALS II	0.24	0.51	5.15	.025	−0.14	0.30	0.03	.870
PALS I × PALS II × Risk Level	—	—	—	—	—	—	—	—
Time			5.32	.005			3.66	.027
Pre to follow-up	−0.44	0.19			−0.43	0.22		
Post to follow-up	0.19	0.32			−0.37	0.21		
Time × Risk Level			—	—			—	—
Pre to Follow-Up × Risk Level	—	—			—	—		
Post to Follow-Up × Risk Level	—	—			—	—		
Time × PALS I			0.28	.752			2.12	.122
Pre to Follow-Up × PALS I	−0.84	0.55			0.20	0.29		
Post to Follow-Up × PALS I	−0.38	0.44			0.35	0.28		
Time × PALS I × Risk Level			—	—			—	—
Pre to Follow-Up × PALS I × Risk Level	—	—			—	—		
Post to Follow-Up × PALS I × Risk Level	—	—			—	—		
Time × PALS II			0.99	.374			0.74	.476
Pre to Follow-Up × PALS II	−0.00	0.65			0.00	0.33		
Post to Follow-Up × PALS II	−0.04	0.54			0.20	0.31		
Time × PALS II × Risk Level			—	—			—	—
Pre to Follow-Up × PALS II × Risk Level	—	—			—	—		
Post to Follow-Up × PALS II × Risk Level	—	—			—	—		
Time × PALS I × PALS II			0.96	.386			0.15	.865
Pre to Follow-Up × PALS I × PALS II	1.15	0.83			0.23	0.42		
Post to Follow-Up × PALS I × PALS II	0.33	0.79			0.10	0.40		
Time × PALS I × PALS II × Risk Level	—	—	—	—	—	—	—	—

Note. Dashes indicate parameter estimate not reported; variable not in final model. In all models, Developmental Assessment Sessions I and II coded as 0; Playing and Learning Strategies I and II (PALS I–II) coded as 1; Term = 0, 1. Pre = Preassessment; Post = Postassessment.

^a *df* = 1, 153, except time and interactions with time (*df* = 2, 266). ^b *df* = 1, 151, except time and interactions with time (*df* = 2, 264).

irrespective of their children's biological risk, $F(1, 153) = 5.15$, $p = .025$, $d = 0.38$.

Comments. A significant Risk × PALS II effect was found for mothers' use of comments during the book reading activity, $F(1, 180) = 4.33$, $p = .034$. Mothers parenting children born VLBW who had PALS II, irrespective of whether they had PALS I, showed more commenting at posttest than those who received DAS II, $t(180) = -2.08$, $p = .039$, $d = 0.43$.

Responsiveness rating. A significant PALS II × Time interaction was found for the maternal responsiveness global rating during the activity, $F(2, 282) = 3.98$, $p = .020$. Follow-up analyses revealed that when comparing change from baseline to posttest, $t(282) = 2.72$, $p = .007$, $d = 0.66$, and from baseline to follow-up, $t(285) = 1.97$, $p = .050$, $d = 0.49$, mothers who participated in PALS II showed greater increases on the responsiveness rating compared with those in the DAS II group, and this was true irrespective of their children's risk level.

Percent time reading text. A significant Time × Risk Level × PALS II interaction was found for the amount of time mothers spent reading only the book text, $F(2, 264) = 3.48$, $p = .032$. Follow-up analyses revealed that mothers of children born

VLBW who received PALS II showed a decrease in the time spent reading text from the baseline assessment to the follow-up assessment as compared with mothers of VLBW children in the DAS II group who actually increased in their text reading, $t(264) = 2.56$, $p = .011$, $d = 0.25$. A significant Risk Level × PALS I interaction at postassessment was also found, $F(1, 151) = 7.71$, $p = .006$. For mothers with VLBW children, those who participated in PALS I as compared with DAS I read text less ($d = 0.12$).

Hypothesis 2: Effects on Children's Book Reading Behaviors

As with the mother behaviors, the four study groups were compared on change in children's frequency and quality of behavioral and verbal responses to mother's requests regarding the book as well as initiating questions and making book-related comments. Children's ability to coordinate gestures combined with verbal behaviors and a rating of engagement in the book reading activity were also examined.

Behavioral and verbal responses. A Time × PALS I interaction for all children irrespective of birth status was found, $F(2,$

Table 6
Analyses for Child Behaviors: Responses to Maternal Request

Variable	Behavioral ^a				Verbal ^b			
	Parameter		F	p	Parameter		F	p
	Estimate	SE			Estimate	SE		
Intercept	-1.42	0.23			0.18	0.21		
Risk level	-0.04	0.27	0.09	.770	-0.02	0.26	1.61	.207
PALS I	-0.43	0.28	1.19	.277	-0.07	0.27	1.63	.203
PALS I × Risk Level	0.68	0.36	0.68	.412	0.26	0.33	0.15	.701
PALS II	-0.07	0.26	1.20	.275	-0.17	0.26	3.67	.057
PALS II × Risk Level	—	—	—	—	—	—	—	—
PALS I × PALS II	-0.26	0.36	0.02	.880	-0.04	0.33	0.46	.500
PALS I × PALS II × Risk Level	—	—	—	—	—	—	—	—
Time			8.67	.001			33.93	<.001
Pre to follow-up	-0.82	0.28			-0.78	0.24		
Post to follow-up	-0.15	0.27			-0.41	0.24		
Time × Risk Level			2.19	.114			0.32	.726
Pre to Follow-Up × Risk Level	0.05	0.35			0.12	0.30		
Post to Follow-Up × Risk Level	-0.10	0.35			0.54	0.30		
Time × PALS I			7.25	.001			0.72	.486
Pre to Follow-Up × PALS I	0.96	0.36			0.10	0.31		
Post to Follow-Up × PALS I	0.36	0.37			0.46	0.31		
Time × PALS I × Risk Level			1.77	.172			2.47	.086
Pre to Follow-Up × PALS I × Risk Level	-0.74	0.45			-0.23	0.38		
Post to Follow-Up × PALS I × Risk Level	-0.74	0.46			-0.82	0.38		
Time × PALS II			0.21	.811			0.17	.846
Pre to Follow-Up × PALS II	-0.12	0.35			-0.25	0.30		
Post to Follow-Up × PALS II	-0.08	0.35			-0.16	0.30		
Time × PALS II × Risk Level			—	—			—	—
Pre to Follow-Up × PALS II × Risk Level	—	—			—	—		
Post to Follow-Up × PALS II × Risk Level	—	—			—	—		
Time × PALS I × PALS II			0.64	.530			0.86	.423
Pre to Follow-Up × PALS I × PALS II	0.45	0.45			0.48	0.38		
Post to Follow-Up × PALS I × PALS II	0.45	0.46			0.13	0.38		
Time × PALS I × PALS II × Risk Level	—	—	—	—	—	—	—	—

Note. Dashes indicate parameter estimate not reported; variable not in final model. In all models, Developmental Assessment Sessions I and II coded as 0; Playing and Learning Strategies I and II (PALS I-II) coded as 1; Term = 0, 1. Pre = Preassessment; Post = Postassessment.

^a *df* = 1, 148, for all effects except time and interactions with time (*df* = 2, 274). ^b *df* = 1, 154, for all effects except time and interactions with time (*df* = 2, 284).

273) = 7.25, *p* = .001. Follow-up analyses revealed that children whose mothers were in the PALS I as compared with DAS I showed greater cooperation in behavioral responses at posttest compared with pretest, *t*(272) = 2.73, *p* = .007, *d* = 0.68, and follow-up compared with pretest, *t*(275) = 3.64, *p* = .001, *d* = 0.92. Posttest and follow-up frequencies of this behavior were comparable. In contrast, for children’s frequency of verbal responses to maternal requests, a PALS II effect for all children was found, *F*(1, 154) = 3.67, *p* = .057, *d* = 0.30. Children whose mothers received PALS II as compared with DAS II had more frequent verbal responses at posttest.

Questions and requests. A PALS II effect for all children was found for the frequency with which children asked questions and/or made requests of their mothers during the book reading task, *F*(1, 152) = 6.81, *p* = .010, *d* = 0.16. Children whose mothers had a least PALS II asked more questions and made more requests related to the book at posttest.

Comments. A Risk × PALS I × PALS II interaction was found for the frequency with which children made statements during the book reading task at posttest, *F*(1, 150) = 3.96, *p* = .048. Follow-up analyses revealed that term-born children whose mothers had PALS I had greater frequency of comments if their mothers also

received PALS II as compared with DAS II, *t*(150) = 2.20, *p* = .029, *d* = 0.23.

Coordination of gestures with verbal behaviors. A significant Risk × PALS I × PALS II effect was found, *F*(1, 150) = 4.96, *p* = .028. Follow-up analyses showed that only children born VLBW, if their mothers had PALS II even if they had DAS I, *t*(150) = 3.37, *p* = .001, *d* = 0.20, displayed greater levels in the frequency of coordinating gestures with verbal behaviors.

Engagement in activity rating. The global rating of children’s engagement and enthusiasm in the book reading activity revealed a significant effect for PALS II, *F*(1, 154) = 4.19, *p* = .042, but this should be interpreted in light of a significant Risk × PALS I × PALS II interaction, *F*(1, 154) = 4.11, *p* = .044. Follow-up analyses revealed that children born term had higher ratings at posttest if their mothers had both PALS I and PALS II as compared with those whose mothers had only PALS I, *t*(154) = 2.19, *p* < .030, *d* = 0.65.

Hypothesis 3: Mediation Analysis

A final question to be answered is whether the effect of the PALS intervention on child outcomes occurred as a function of

Table 7
Analyses for Child Behaviors: Initiations to Mother

Variable	Questions and requests ^a				Comments ^b			
	Parameter		F	p	Parameter		F	p
	Estimate	SE			Estimate	SE		
Intercept	1.20	0.24			2.56	0.14		
Risk level	-0.12	0.28	14.36	.001	0.15	0.15	1.51	.220
PALS I	0.01	0.27	1.30	.257	-0.12	0.20	0.00	.966
PALS I × Risk Level	—	—	—	—	-0.07	0.20	2.33	.129
PALS II	-0.57	0.42	6.81	.010	0.12	0.22	2.74	.100
PALS II × Risk Level	0.84	0.44	1.20	.274	-0.35	0.23	0.11	.740
PALS I × PALS II	-0.34	0.42	0.79	.377	-0.30	0.30	.065	.420
PALS I × PALS II × Risk Level	—	—	—	—	0.60	0.30	3.96	.048
Time			3.04	.049			5.63	.004
Pre to follow-up	-0.72	0.38			-0.37	0.19		
Post to follow-up	0.11	0.32			0.00	0.18		
Time × Risk Level			1.29	.278			—	—
Pre to Follow-Up × Risk Level	1.07	0.41			—	—		
Post to Follow-Up × Risk Level	0.31	0.37			—	—		
Time × PALS I			1.55	.215			1.58	.208
Pre to Follow-Up × PALS I	-0.13	0.40			0.26	0.25		
Post to Follow-Up × PALS I	0.00	0.37			0.01	0.24		
Time × PALS I × Risk Level			—	—			—	—
Pre to Follow-Up × PALS I × Risk Level	—	—			—	—		
Post to Follow-Up × PALS I × Risk Level	—	—			—	—		
Time × PALS II			0.42	.655			0.21	.809
Pre to Follow-Up × PALS II	0.81	0.61			-0.19	0.30		
Post to Follow-Up × PALS II	-0.19	0.57			-0.20	0.27		
Time × PALS II × Risk Level			1.78	.170			—	—
Pre to Follow-Up × PALS II × Risk Level	-1.21	0.64			—	—		
Post to Follow-Up × PALS II × Risk Level	-0.50	0.59			—	—		
Time × PALS I × PALS II			0.91	.404			0.18	.834
Pre to Follow-Up × PALS I × PALS II	-0.19	0.61			0.16	0.38		
Post to Follow-Up × PALS I × PALS II	0.56	0.57			0.20	0.35		
Time × PALS I × PALS II × Risk Level	—	—	—	—	—	—	—	—

Note. Dashes indicate parameter estimate not reported; variable not in final model. In all models, Developmental Assessment Sessions I and II coded as 0; Playing and Learning Strategies I and II (PALS I-II) coded as 1; Term = 0, 1. Pre = Preassessment; Post = Postassessment.

^a $df = 1, 152$, except time and interactions with time ($df = 2, 264$). ^b $df = 1, 150$, except time and interactions with time ($df = 2, 268$).

the intervention's effect on the significant maternal variables. The complexity of the design ($2 \times 2 \times 2 \times 3$, with repeated measures on the outcome) makes this a difficult determination. With potential interactions, there are 12 parameters in each model that represent the effects of the PALS interventions. The traditional way of assessing mediation is by the product of the parameter estimates from a model representing the mediator as a function of the precursor and one representing the outcome as a function of the precursor and the mediator, as shown in Figure 1. The indirect effect is given by $a \times b$. However, when there are 12 potential values for a and another 12 for b , this method is cumbersome. Another way to estimate the indirect effect is to determine the direct effect of the precursor on the outcome in the absence of the mediator (c) and take the difference between that and the same parameter in the model including the mediator ($cp - c$). Using a bootstrap approach, we took 5,000 samples from the original sample with replacement and estimated the parameters using each model and then took the difference ($cp - c$) to estimate the indirect effect and its 95% confidence interval. If the confidence interval did not contain 0, then there was evidence of mediation. The original model was identical to that reported above for each child

outcome. The second model included one of the significant maternal variables as a time-varying covariate.

This procedure was followed with the six child outcomes that were significant and the seven maternal variables that were significant. Evidence of mediation was found for five of the six child behaviors (behavioral responses variable was the exception) through one- and two-tailed tests of significance, given our specific hypotheses.

Child verbal responses. The effect of PALS II on children's verbal responses was mediated by the mother's use of language facilitation techniques ($p < .05$, two-tailed). The mediator was positively related to verbal responses, $F(1, 427) = 20.60$, $p < .001$, and the direct effect of PALS II was reduced and no longer significant.

Child questions and requests. The effect of PALS II on children's questions and requests showed evidence of mediation for mother's percent time reading text ($p < .05$, one-tailed). Percent time reading text was inversely related to the child's use of questions and requests, $F(1, 263) = 16.05$, $p < .001$, and the difference between PALS II and DAS II was reduced when this variable was included in the model. However, mediation was partial given that the direct effect of PALS II was still significant.

Table 8
Child Book Reading Behaviors: Coordination of Gestures or Verbalizations and Engagement

Variable	Coordination of language and gestures ^a				Engagement in activity ^b			
	Parameter		F	p	Parameter		F	p
	Estimate	SE			Estimate	SE		
Intercept	3.52	0.17			9.15	0.62		
Risk level	0.03	0.17	0.78	.378	0.90	0.80	4.34	.034
PALS I	0.01	0.22	0.00	.949	0.43	0.80	0.06	.804
PALS I × Risk Level	-0.16	0.23	1.78	.184	-1.19	0.94	0.07	.786
PALS II	-0.14	0.27	8.96	.003	0.08	0.94	4.19	.042
PALS II × Risk Level	-0.14	0.27	2.04	.156	-1.49	1.04	0.03	.859
PALS I × PALS II	-0.42	0.35	0.45	.504	-1.68	1.20	0.23	.630
PALS I × PALS II × Risk Level	0.78	0.35	4.96	.028	2.74	1.35	4.11	.044
Time			0.53	.588			14.40	<.001
Pre to follow-up	-0.03	0.21			-1.76	0.68		
Post to follow-up	-0.12	0.21			-0.58	0.69		
Time × Risk Level							1.95	.145
Pre to Follow-Up × Risk Level	—	—			0.25	0.60		
Post to Follow-Up × Risk Level	—	—			1.14	0.61		
Time × PALS I			3.62	.028			0.21	.808
Pre to Follow-Up × PALS I	-0.18	0.28			-0.24	0.84		
Post to Follow-Up × PALS I	0.21	0.28			-0.02	0.85		
Time × PALS I × Risk Level								
Pre to Follow-Up × PALS I × Risk Level	—	—			—	—		
Post to Follow-Up × PALS I × Risk Level	—	—			—	—		
Time × PALS II			0.51	.602			0.87	.418
Pre to Follow-Up × PALS II	0.03	0.32			-0.00	0.95		
Post to Follow-Up × PALS II	-0.35	0.34			-0.57	0.94		
Time × PALS II × Risk Level								
Pre to Follow-Up × PALS II × Risk Level	—	—			—	—		
Post to Follow-Up × PALS II × Risk Level	—	—			—	—		
Time × PALS I × PALS II			0.50	.604			0.46	.632
Pre to Follow-Up × PALS I × PALS II	0.05	0.42			1.16	1.22		
Post to Follow-Up × PALS I × PALS II	0.40	0.43			0.75	1.23		
Time × PALS I × PALS II × Risk Level	—	—			—	—		

Note. Dashes indicate parameter estimate not reported; variable not in final model. In all models, Developmental Assessment Sessions I and II coded as 0; Playing and Learning Strategies I and II (PALS I-II) coded as 1; Term = 0, 1. Pre = Preassessment; Post = Postassessment.
^a *df* = 1, 150, except time and interactions with time (*df* = 2, 267). ^b *df* = 1, 154, except time and interactions with time (*df* = 2, 282).

Child comments. The effect of the PALS I × PALS II × Risk interaction on child comments showed evidence of mediation by mother’s use of praise and encouragement (*p* < .05, one-tailed). The direct effect was smaller with the maternal mediator in the model, and the mediator was significantly positively related to the outcome, *F*(1, 265) = 30.87, *p* < .001.

Child coordination of gestures with verbalizations. The effect of PALS II on the children’s coordination of gestures with verbal behaviors was mediated by the mother’s general verbal support (*p* < .05, one-tailed), and the effect of the Risk × PALS I × PALS II interaction on this child behavior was mediated by the mother’s praise and encouragement (*p* < .05, one-tailed). Mother’s praise and encouragement was positively related to her child’s coordination of gestures with verbalizations, *F*(1, 265) = 76.52, *p* < .001, and the direct effect of risk by PALS I by PALS II was reduced and no longer significant when the mediator was in the model.

There was also a significant effect of PALS I by time on the child’s coordination of gestures with verbal behaviors that appeared to be mediated by the mother’s language facilitation techniques (*p* < .05, one-tailed). Changes in the child’s coordination of gestures with verbal behaviors between pretest and follow-up were smaller when the mother’s use of language facilitation techniques was entered into the model (*p* < .05, one-tailed) and the mediator was significantly and positively related to the child variable, *F*(1, 265) = 6.72, *p* = .010. In addition, changes in the children’s coordination of gestures with verbal responses from pretest to follow-up were mediated by the

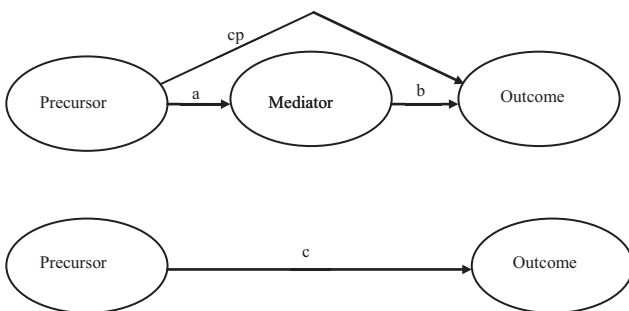


Figure 1. Model for assessing mediation.

mothers' time reading text ($p < .05$, two-tailed). The mediator was significantly inversely related to this outcome, $F(1, 266) = 62.37, p < .001$.

Child engagement. The effect of the Risk \times PALS I \times PALS II interaction on the child's engagement in activity showed evidence of being mediated by maternal language facilitation techniques ($p < .05$, one-tailed) and use of praise and encouragement ($p < .05$, two-tailed). The direct effect was reduced below significance in both cases, and the language facilitation techniques, $F(1, 390) = 31.10, p < .001$, and use of praise and encouragement, $F(1, 416) = 83.37, p < .001$, were significantly positively related to the child's engagement.

Discussion

The occurrence of shared book reading between a parent and young child is particularly important for the development of early language and literacy skills (Bus et al., 1995; Mol et al., 2008; NELP, 2008; Scarborough & Dobrich, 1994). For this activity to effectively support learning, a parent needs not only to read the text but also to make reading interactive by asking questions and scaffolding the child's ability to engage in the activity with gestures and language. Engagement of this nature is especially important for children at higher risk for later academic problems because of low-income backgrounds and/or biological risks such as prematurity and VLBW. Outside of interventions specifically targeting shared book reading that have been extensively studied (e.g., Mol et al., 2008), less is known about other types of interventions that facilitate parents' use of responsive parenting strategies that can promote language and literacy development. The present study involved a responsive parenting intervention, PALS, which focused on parenting techniques with mothers of children born term or at VLBW.

Improvements in Mothers' Book Reading Behaviors

The results showed that most maternal shared book reading behaviors significantly improved with the PALS intervention and that the timing of the intervention (i.e., infancy, toddler-preschool, or both) was also important in understanding these changes. We found that gains in maternal behaviors were seen for mothers of children born term as well as for those born VLBW and that when there was a difference, the mothers of children born VLBW showed more positive changes in response to the intervention. For example, greater decreases in the percent of time mothers spent only reading the text, rather than making the activity interactive with extratextual talk, were seen specifically for mothers of children born VLBW ($d = 0.25$) as well as greater increases in mothers making book-related comments ($d = 0.43$). Thus, in spite of the higher risk behaviors of children born VLBW that are reported to make it more difficult for mothers to respond (Aaron, 1998), PALS facilitated these mothers to use effective shared reading behaviors known to support increases in children's language skills.

Whether mothers received PALS I or II or both determined whether certain types of shared reading behaviors showed positive gains. However, the need to have both PALS I and PALS II in order to see significant gains in positive shared reading practices was striking and included the majority of language-based maternal

behaviors. For example, in contrast to our hypothesis, increases in mothers' praise and encouragement ($d = 0.34$) were greatest when mothers had both PALS I and PALS II interventions. Most interestingly, a number of the verbal support and evocative behaviors required that mothers receive the intervention during infancy as well as the toddler-preschool period, including open-ended prompts ($d = 0.38$), language facilitation techniques (e.g., assists, lead-ins, expansions; $d = 0.30$), and general verbal supports that encourage or demonstrate problem-solving skills ($d = 0.86$). This was different from previous findings examining PALS effects on mothers' verbal input during everyday activities (Landry et al., 2008). The maternal verbal behaviors in our previous findings were qualitatively different from the broader range of verbal behaviors coded during shared book reading (e.g., lead-ins, expansions), as we previously targeted verbal behaviors that did not have to be directly linked to the child's behavior. Thus, the finding that the specific verbal techniques used to engage children in shared book reading required PALS at both the early and later developmental periods is interesting for what type of support it suggests a mother needs in order to be facilitated to effectively implement these techniques in situations not directly targeted in the intervention.

In relation to this, the one maternal behavior in our previous report that needed PALS I and II to show greater gains was contingent responsiveness, which required mothers to notice a child's signal and respond to it promptly and sensitively in a way that was directly linked (i.e., contingent) to the child's signal. It was speculated that the reason contingent responsiveness required the intervention across both age periods was because to use this behavior consistently and at high levels, a caregiver needs to be able to appreciate the child as an individual with interests that may be different from that of the caregiver. Although participation in PALS I supported mothers' warmth and pleasure in their child (Landry et al., 2008), we expected that the demands for more independence and autonomy associated with the toddler-preschool period would make it more difficult for mothers to be consistent in responding contingently. However, the addition of PALS II was expected to allow mothers to make the shift with the child from infancy into toddlerhood and adapt to the child's changing needs rather than see their toddler as demanding. Thus, in the present study, the need for mothers' participation in both PALS interventions to use the verbal strategies during shared reading that were closely linked to children's behavior may be due to the greater understanding and appreciation mothers gain about their children's behavior including a willingness to support their interests.

Although the rating of mothers' responsiveness during shared book reading was also hypothesized to require PALS at both time points, participation in at least PALS II resulted in the greatest gain in this measure in this study ($d = 0.66$ at posttest, $d = 0.49$ at follow-up). This may be explained, in part, by the fact that the measure was changed from the definition used for the contingent responsiveness rating in the previous evaluation (Landry et al., 2008) to include as well mothers' efforts to make the activity fun through voice intonation and positive talking about the book and, thus, was not as tightly linked to understanding a child's changing signals. Making general comments about the text also showed a different pattern of results for children born VLBW from other verbal support behaviors, as it only required PALS II. The need for only PALS II ($d = 0.43$ for mothers of children born VLBW) may

be understood in light of how mothers used commenting, as it was usually used to provide information that expanded the story and was not required to build on the child's interest or responses.

Improvements in Children's Responses to Book Reading

The support the PALS intervention provided for mothers to become more effective in their shared reading behaviors also influenced greater gains in children's shared reading skills. Most of the child behaviors that showed gains required their mothers' participation in PALS II or both PALS I and PALS II. The exception was children's behavioral responses to mothers' book-related requests, which showed large positive effects ($d = 0.92$) if mothers, at least, had PALS I. Behavioral responses, in some ways, represent a child's willingness to cooperate and work with the mother, even if the child does not know how to organize a verbal response. Findings in the previous report (Landry et al., 2008) of the effect of PALS showed that many maternal behaviors associated with an affective–emotional domain (maintaining interests, warm sensitivity) were best supported by PALS I and maternal behaviors related to rich verbal input in this previous report were best supported by PALS II. Greater gains in behavioral responses during shared reading may, therefore, be due to the support provided by the increased affective behaviors that we decided not to code for in the shared reading context but that we did observe in everyday activities. This is supported, in part, by the finding that the affective behaviors also supported faster increases in social engagement during nonbook-related activities (Landry et al., 2008).

In contrast to the impact of the timing of PALS for children's behavioral responses during shared reading, verbal responses to mothers' requests ($d = 0.30$) required children's mothers to have at least PALS II, and other child behaviors showed greater gains only if their mothers had both PALS I and PALS II. As mothers' participation in PALS II was necessary in order to see greater gains in children showing a verbal response to mothers' requests, it was also necessary for gains in children asking questions ($d = 0.16$), and for children born VLBW in coordinating their use of gestures with verbal behaviors ($d = 0.20$). Previously, Landry et al. (2008) reported greater increases in verbal behaviors (i.e., word use), and vocabulary skills (i.e., receptive vocabulary scores) were also best supported by mothers' participation in at least PALS II. These child results suggest that in order to see greater gains in children's language skills, an intervention that occurs for caregivers when their children are toddlers or young preschoolers is more effective than one that occurs only during the 1st year of the child's life.

Two child behaviors, (i.e., comments, $d = 0.23$; engagement in the activity, $d = 0.65$) showed significant gains only when children's mothers participated in both PALS I and PALS II. Children's comments involved levels that were scaled into one score. Higher level comments included describing a story element or picture (Level 2) or making connections involving thematic elements of the story or between a story element to something that occurred outside the book (Level 3). Significantly greater gains were seen for commenting with PALS I and II but only for children born term. Thus, only the nonbiologically at-risk children were able to show these gains and only those children whose mothers were in the condition that received PALS at both devel-

opmental periods. This suggests that for facilitating complex language skills, more intensity in intervention support is required, and even then, children need to be developmentally ready to be supported by their mothers' language input.

For children born VLBW, a unique, albeit small, benefit of their mothers' participation in PALS II was found in their greater ability to coordinate use of gestures with verbal behaviors in the context of book reading ($d = 0.20$). The difficulty in coordinating motor and verbal behaviors for children at higher biological risk was evident in comparing VLBW and term-born children's skill when their mothers received no PALS intervention. The frequency of this behavior was about 60% greater for those born term as compared with those born VLBW. In our previous studies, children born term whose mothers had PALS I and/or II showed higher levels and/or greater increases in children's coordination of attention and verbalizations, whereas there was no effect for those born VLBW.

Links Between Changes in Mothers' Behaviors With Changes in Child Behaviors

Findings from mediation analyses provide support for our hypothesis that facilitation of maternal responsiveness generalizes to situations not directly targeted in the intervention and explains children's ability to become more engaged and use more complex language during shared book reading activities. Five of the six child shared reading behaviors showed evidence of mediation by mothers' supportive behaviors. Most of the child behaviors that showed significant effects in relation to the PALS intervention could be explained, at least in part, by positive changes in a number of the maternal shared book reading behaviors across the affective–emotional and cognitive–linguistic domains. For example, increases in children's engagement in the activity was concomitant with increases in mothers' praise and encouragement as well as their use of language facilitation techniques (lead-ins, expansions, assists) that were directly linked to the child's response. Also, decreasing the proportion of time mothers spent just reading the text appears to be important for understanding increases in children making requests and asking questions about the book, allowing for greater opportunities for children to learn from these book-sharing interactions. Increases in children's use of language and language coordinated with gestures were also explainable by increases in mothers' verbal techniques used to support their children's abilities to learn from the shared book reading activity.

Summary, Limitations, and Implications

The PALS intervention targeted mothers from low-income backgrounds, with many parenting a child born VLBW at high biological risk. The families included in this study are representative of the families reported to be least likely to read to their children (Federal Interagency Forum on Child and Family Statistics, 2009), especially in warm and cognitively enriched ways (Snow et al., 1998). It is, therefore, noteworthy that an intervention that did not directly target facilitating the use of shared book reading behaviors was effective in changing maternal and child behaviors in this important activity. Thus, the findings demonstrate that the effects of a broad responsive parenting intervention gen-

eralize to different activities and to the use of behaviors not directly facilitated. All of the observed maternal behaviors were supported by PALS to show significantly stronger gains than for mothers participating in the attention control condition (DAS) across both developmental periods. However, many of the verbal scaffolding behaviors required both PALS I and PALS II to show greater gains. Also, as predicted, PALS facilitated shared reading practices for mothers of children born term as well as VLBW, and when there was a difference, it favored the mothers of children born VLBW. An important outcome of this study is that the children of mothers participating in PALS showed greater gains in their verbal responses and verbal initiative related to the book and interaction with their mothers in sharing interest in the book. PALS II or PALS I with PALS II provided the best support for children to show increases in their book-related verbalizations. Again, overall, the children born VLBW benefited as much as those born term from their mothers' participation in PALS. This provides strong support for the hypothesized mechanism by which responsive parenting supports children's development. By providing specialized support for children's individual needs, which may vary by biological risk, children internalize what is learned from these positive experiences and use their enhanced skills in different situations.

For other researchers studying or attempting to intervene in the book reading context, the findings of this study demonstrate the importance of examining adult and child behaviors in tandem to fully understand the qualities of extratextual interactions during shared reading. Many researchers have called for this methodological shift in studying book reading (e.g., Hammett et al., 2003), and this study represents an effort to do so within a unique sample that includes both term-born and VLBW children. The effect sizes reported for mother behaviors were generally moderate to large in size, whereas two large effects were observed for children's behavioral responses and overall engagement, but other child effects were smaller.

Limitations of the study include the lack of information concerning whether the effects sustain to later developmental periods or whether additional booster sessions would be required at later time points to support caregivers to adapt to children's changing developmental picture. The findings show that the magnitude of some effects changed over time from posttest to follow-up observations, with some behaviors increasing at follow-up (i.e., children's behavioral responses) and others decreasing slightly at follow-up (i.e., mother's responsiveness rating). This demonstrates the necessity of examining the book reading context at multiple time points to understand behaviors that demonstrate more or less stability over time, perhaps requiring booster sessions to maintain after the intervention has concluded. Other limitations include the use of a very short session of book reading and also the possibility of reciprocal effects between the child and mother that were not tested. Also, mothers were free to choose among a small selection of books of different genres rather than required to read the same books. As there is some evidence that the book's genre (Anderson, Anderson, Lynch, & Shapiro, 2004) relates to the nature of the shared reading interaction, this could have an impact on the findings. Finally, although the findings demonstrate PALS effectiveness for children at high environmental and biological risk for developmental problems, it is not clear whether effects would generalize to other groups of children with risks for developmental

disorders (e.g., spina bifida, Down's syndrome) as well as to families from a broader range of socioeconomic backgrounds.

The findings have important policy implications concerning when a responsive parenting intervention should be implemented. As many of the shared book reading techniques known to support children's language skills and ability to engage in the activity required PALS during infancy and the toddler-preschool period, parenting programs will need to be adequately funded to span multiple developmental periods in order to maximize the likelihood of effectiveness.

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