Article

Print-Focused Read-Alouds in Early Childhood Special Education Programs

Exceptional Children
2015, Vol. 81(3) 292–311

DOI: 10.1177/0014402914563693
ec.sagepub.com
SAGE

Laura M. Justice[1], Jessica A. R. Logan[1], Joan N. Kaderavek[2], and Jaclyn M. Dynia[1]

Abstract

The purpose of this study was to examine the impacts of print-focused read-alouds, implemented by early childhood special education (ECSE) teachers alone or in conjunction with caregivers, on the print knowledge of children with language impairment (LI). Using random assignment to conditions, children with LI were exposed, over an academic year of preschool, to one of three conditions specifying the way in which teachers and caregivers were to read storybooks with them. Based on a print-knowledge composite, children whose teachers used print-focused read-alouds had significantly better print knowledge (d = .21) in spring of the year compared to children whose teachers used their typical reading practices. When teachers and caregivers implemented print-focused read-alouds simultaneously, children's Spring print knowledge was modestly higher (d = .11) than that of children whose teachers and parents used their typical reading practices, but the effect was not statistically significant. Examination of intervention moderators showed that children with lower levels of nonverbal cognition benefited substantially from exposure to the intervention. Educational implications are discussed.

Language impairment (LI) is a high-incidence developmental disability that elevates a child's susceptibility to reading problems (Catts, Fey, Tomblin, & Zhang, 2002; Morgan, Farkas, & Wu, 2011; Skibbe et al., 2008). For many children with LI, this susceptibility may be signaled in the early childhood years through its correspondence with lags in the development of print knowledge (Boudreau & Hedberg, 1999; Cabell, Justice, Zucker, & McGinty, 2009; Justice, Bowles, & Skibbe, 2006). Print knowledge is an important precursor of reading skill that reflects young children's developing knowledge about the forms and functions of print (e.g., Storch & Whitehurst, 2002). It includes, for instance, children's alphabet knowledge, their early production of print via writing, and their understanding of various print concepts (e.g., Justice, Pullen, & Pence, 2008; Whitehurst & Lonigan, 1998). Early childhood special education (ECSE) programming, for which children with LI represent the preponderance of participants (Snyder, Dillow, & Hoffman, 2007), represents an important milieu for implementing interventions that may improve the print knowledge of children with LI and, in turn, potentially reduce their risks for future reading difficulties.

This article describes the results of a randomized controlled trial involving children in 83 ECSE classrooms in which teachers implemented a read-aloud program designed to improve the print knowledge of children with

[1]The Ohio State University
[2]University of Toledo

Corresponding Author:
Laura M. Justice, Crane Center for Early Childhood Research and Policy, The Ohio State University, Columbus, OH 43201, USA.
E-mail:justice.57@osu.edu

LI, including those for whom LI is the primary disability and those for whom LI occurs concomitantly with or secondary to other disabilities. The present work is situated within a broader body of work seeking to identify effective programs and practices for increasing the early literacy skills of children vulnerable for reading problems (see National Early Literacy Panel [NELP], 2008), with much of this work focused on children reared in poverty (e.g., Hamre et al., 2010; Justice, Kaderavek, Fan, Sofka, & Hunt, 2009; Landry, Swank, Smith, Assel, & Gunnewig, 2006). Recent meta-analyses indicate that interventions featuring adult–child interactive read-alouds represent a particularly viable route for improving young children's early literacy skills, with average impacts of about one third to one half of a standard deviation unit on measures of print knowledge (Mol, Bus, & de Jong, 2009; NELP, 2008). An *interactive read-aloud* refers to the sharing of a book (fiction or expository) between an adult and child or group of children. The adult reads the book aloud to the child or children and, in the case of interactive read-alouds, promotes children's engagement in the activity by inviting their verbal participation in discussions of the book.

One particular adult–child read-aloud intervention involves implementation of repeated reading sessions featuring print-salient storybooks during which adults use specific techniques, called *print referencing*, to engage children in explicit conversations about forms and features of print in the book (Justice & Ezell, 2004). *Print-salient storybooks* are those in which print is a prominent feature of the design; features that make print a salient aspect of the book include speech bubbles, large fonts, changing fonts, and print embedded within the illustrations. The intervention is based on experimental work showing that adults can evoke children to talk more about print (Ezell & Justice, 2000) and to look at it more often (Justice et al., 2008) by making verbal references to the print through questions and comments and also by reading storybooks in which print is a salient characteristic (Dynia, Justice, Pentimonti, Piasta, & Kaderavek, 2011; Zucker, Justice, & Piasta, 2009). When adults do so, it results in positive effects on young children's print knowledge in the short term (Justice & Ezell, 2000, 2002; Justice et al., 2009) and on their longer term reading achievement. A recent longitudinal study examined the literacy skills of first graders whose preschool teachers (2 years prior) had implemented print-focused read-alouds for a 30-week period (Piasta, Justice, McGinty, & Kaderavek, 2012). Compared to children in comparison classrooms, children exposed to print-focused read-alouds had better decoding, spelling, and comprehension skills at the end of first grade, with effects on the magnitude of about one third of a standard deviation (d = .26 to .31) on standardized measures.

Print-focused read-alouds represent a potentially scalable approach to early literacy intervention, as it can be implemented with high fidelity by teachers and caregivers (Justice & Ezell, 2002; Piasta et al., 2010), and it requires no specialized materials beyond commercial storybooks (Justice, McGinty, Piasta, Kaderavek, & Fan, 2010). It is therefore compelling to consider whether this intervention approach yields benefits for children with LI, about one half of whom exhibit significant lags in their development of print knowledge (Cabell et al., 2009). The high rates of reading disability among children with LI, with and without comorbidities, support the need to carefully investigate approaches that might minimize the impacts of this disability, potentially by reducing its severity through early intervention (Puranik, Petscher, Al Otaiba, Catts, & Lonigan, 2008; Wei, Blackorby, & Schiller, 2011).

To date, four studies of which we are aware have explored the impacts of this approach to early literacy intervention for children with LI (Ezell, Justice, & Parsons, 2000; Lovelace & Stewart, 2007; van Bysterveldt, Gillon, & Moran, 2006), three of which involved very small samples (fewer than seven children) and research designs (pretest-posttest trial with no control group) from which it is difficult to draw conclusions about the impacts of this intervention. For instance, van Bysterveldt and colleagues (2006) examined the effects of print-focused read-alouds as implemented by

parents for 6 weeks on the print knowledge of seven 4-year-olds with Down syndrome, all of whom exhibited LI. A no-contact control group of typically developing 4-year-olds also participated as a means to assess treatment effects. The children receiving the intervention made statistically significant gains from pre- to posttest on three of four early literacy measures, whereas those in the control group made significant gains on only one measure. The authors interpreted the intervention as being efficacious, based on this contrast; however, it does warrant note that the treatment and control groups were not equivalent on any measure at baseline, making it questionable whether the two groups could be compared for their gains from pre- to posttest.

Most recently, Justice and colleagues conducted an randomized controlled trial (RCT) with 62 4-year-olds with specific language impairment and their caregivers, who implemented 48 reading sessions in their homes over a 12-week period (Justice, Skibbe, McGinty, Piasta, & Petrill, 2011). Twenty-one parents completed print-focused read-alouds, whereas 41 were assigned to implement alternative read-aloud programs. Children whose parents read with a print-focused style outperformed those in the comparison groups on a measure of print-concept knowledge but not alphabet knowledge, with the former effects large in size. A limitation of this study, however, is that nearly one fourth of caregivers did not complete the home reading program, with extraneous factors (e.g., illness, job change) typically the cause of attrition. Such findings suggest the value of considering whether intervention exposure within ECSE classrooms may afford benefits for children with LI consistent with those observed for typically developing children in early childhood education (ECE) classrooms (Piasta et al., 2012). Thus, to extend this literature, the present research reports intervention impacts for 291 children with LI in 83 ECSE classrooms pursuant to two primary research aims.

The first aim was to determine the extent to which ECSE teachers' implementation of print-focused read-alouds over an academic year influenced the print knowledge of children with LI in their classrooms, relative to children whose teachers used their typical read-aloud style. A primary interest was determining the extent to which exposure to this intervention for children with LI might approximate similar print knowledge effects (d = .21) reported for typically developing children who received this intervention in their ECE classrooms (Justice et al., 2010). The second aim was to determine the extent to which implementation of print-focused read alouds by both ECSE teachers and children's caregivers affected the early literacy skills of children with LI, relative to implementation only by ECSE teachers. Three prior studies of print-focused read-alouds for children with LI involved implementation by children's caregivers (Ezell et al., 2000; Justice et al., 2011; van Bysterveldt et al., 2006), with all showing positive impacts on children's skills. Although the primary impetus for this study was examining effects for children with LI whose ECSE teachers implemented this intervention, we theorized that intervention benefits might be enhanced for children whose caregivers and teachers simultaneously implemented print-focused read-alouds. Simultaneous exposure to print-focused read-alouds at home and school provides children with additional intervention dosage, which may positively influence intervention effects (McGinty, Breit-Smith, Fan, Justice, & Kaderavek, 2011).

Method

Participants

The present study involved three cohorts of participants (teachers, children, and primary caregivers) drawn from ECSE programs in a single midwestern state over three consecutive academic school years (2008–2011). Each cohort represented a unique and nonoverlapping set of participants, who were involved in the study for a 1-year period. District administrators from across the state were contacted for potential participation if they provided ECSE classrooms. If the administrator agreed to participate, teachers in that district were then invited to information sessions

provided by one of two university sites involved in the study, during which they could choose to enroll in the study. Programs were approximately split across urban and suburban locations, with modest rural representation (about 10% of classrooms). More than 90% of the classrooms were half-day programs offering inclusive programming, serving children with disabilities as well as those without; state regulations advocate for a 6:6 model (six children with disabilities and six typically developing peers). For teachers who taught both morning and afternoon sections, only one section was involved in the study. The average class size was about 13 children (SD = 4, range 5–21).

Teachers. A total of 83 lead ECSE teachers participated; all self-selected into the study and agreed a priori to be randomly assigned to one of three conditions in the study. An additional teacher enrolled in the study but withdrew later in the year due to time concerns. Teachers were evenly distributed across the two university sites (41 and 42 per site), which paralleled study activities at the two sites. Each teacher's involvement spanned the length of an academic year, and the three cohorts of teachers were nonoverlapping. The majority of teachers were female (99%, n = 82) and White, non-Hispanic (94%, n = 78), with 2.5% African American (n = 2), 2.5% Native American (n = 2), and 1% Asian (n = 1) participants. The majority of teachers had a master's degree (73.5%, n = 61) and an average of 12 years' experience as a lead teacher (SD = 9.2 years). The high level of education reflects the education requirements for teaching in ECSE in the state of Ohio, which until recently (2010) required a master's degree for licensure renewal. Teachers were provided with incentives for their participation in the study, including occasional gift cards for completing project activities (e.g., $100 per workshop) and video cameras that they could keep after the study was over.

Children. The participating ECSE classrooms enrolled a heterogeneous population of students, including children with various types of disabilities, children who were English language learners (ELLs), and children enrolled as typical peers. Our interest in this study was to examine intervention effects for children with LI, either as a primary problem or concomitant with other conditions (e.g., intellectual disability, hearing loss). A priori power analyses established the goal of enrolling four children with LI per classroom, for a total desired sample size of about 330 children distributed across three conditions. The following procedures were followed to identify up to four children with LI from each of the 83 classrooms.

First, consent forms were sent to the primary caregiver of all children in each classroom. Response rates averaged about 85% across classrooms. Second, for each child for whom consent was received, teachers completed a screening questionnaire to help researchers to identify children who were receiving speech-language services or had lags in language development relative to other children, with or without accompanying etiologies, while excluding children who (a) were ELLs and spoke little English, (b) did not have any language or developmental concerns (based on teacher impressions or lack of services), or (c) had severe or profound disabilities that would likely limit the child's participation in behavioral assessments. Third, based on analysis of all screeners received from a given teacher, the research team purposively enrolled up to four children from each classroom into the study. Although all children in each classroom would receive the interventions as assigned, the enrolled children would participate in ongoing direct assessments to assess treatment impacts and are the focus of this study.

A total of 319 children were initially enrolled in this study, although 28 children withdrew from the study over the academic year. Five students moved to a different classroom within their school that was not involved in the study, 13 students left the school, five students were withdrawn by their caregivers (reasons for which are unknown), four students left because their teacher (n = 1) withdrew from the study, and one student declined

participation. Chi-square tests indicate that missingness was not dependent on gender, condition, year of study entry, or site where students were obtained (all p values > .10). The study thus involved a final sample of 291 children for whom the majority had an individualized education program (IEP; 97%, n = 281), 90% of whom specified receipt of speech-language services (n = 262). The few children in the study who did not have IEPs were all rated by their teachers as having developmental concerns (based on the screening questionnaire completed by teachers discussed previously) but had not yet been evaluated formally.

Of the 291 children, 24% (n = 70) had a reported diagnosis, including autism spectrum disorder (n = 31), cerebral palsy (n = 6), Down syndrome (n = 4), or attention deficit hyperactivity disorder (n = 2), as well as the following conditions each associated with one child in the study: amniotic band syndrome, epilepsy, fetal alcohol syndrome, Fragile X, hearing loss, low muscle tone, Prader-Willi syndrome, Stickler syndrome, traumatic brain injury, Tourette syndrome, Turner's syndrome, and William's syndrome. The majority of children were male (73%, n = 213) and White, non-Hispanic (71%, n = 207), with 12% African American (n = 36), 3% Latino (n = 10), 1% Asian (n = 4), and 0.3% Native American (n = 1) children (2% were identified as Other and information was unavailable for 9% of children). The children's average age was 52 months (SD = 7 months, range = 36 months to 69 months). Data on children's socioeconomic status (SES) were available based on maternal education, which was highly variable. In terms of highest level of education completed, 10% (n = 29) of maternal caregivers did not have a high school diploma, 41% (n = 120) had obtained a high school diploma, 4% (n = 12) had obtained a 2-year degree, 18% (n = 52) had obtained a bachelor's degree, 13% (n = 38) had obtained a master's degree, and 4% (n = 11) had obtained a doctoral degree (two maternal caregivers had responded with "other," and this information was unavailable for 9% of children). The majority of children spoke English at home (90%, n = 263).

Study Procedures

The present study received institutional review board approval for all procedures. The primary study procedures included (a) randomly assigning classrooms to one of three conditions, (b) training teachers and caregivers in how to implement their respective conditions, (c) monitoring implementation fidelity for teachers and caregivers, and (d) measuring effects associated with treatment.

Random Assignment. The three conditions were based on the type of read-aloud program to be implemented by the ECSE teachers and children's caregivers: (a) regular reading/regular reading (RR/RR, n = 28 classrooms, 101 children), (b) print-focused/regular reading (PF/RR, n = 27 classrooms, 91 children), or (c) print-focused/print-focused reading (PF/PF, n = 28 classrooms, 99 children). Within each of the two recruitment sites, classrooms were randomly assigned (via simple random assignment) to one of three planned variations in study conditions (Site 1 = 14 PF/PF, 13 PF/RR, 14 RR/RR; Site 2 = 14 PF/PF, 14 PF/RR, 14 RR/RR). As each cohort was nonoverlapping and comprised a unique set of participants, random assignment occurred for each cohort (Cohort 1 = 10 PF/PF, nine PF/RR, nine RR/RR; Cohort 2 = 10 PF/PF, seven PF/RR, 10 RR/RR; Cohort 3 = nine PF/PF, 10 PF/RR, nine RR/RR). Table 1 provides a summary of the three planned variations, and a comparison of children across the three conditions appears in Table 2. No significant differences were found among the three groups for child's gender, $\chi^2(247) = 2.58$, p = .28; ethnicity, $\chi^2(264) = 23.20$, p = .18; family income, $\chi^2(254) = 44.94$, p = .10; or maternal education, $\chi^2(264) = 24.07$, p = .24, as expected given use of random assignment. Loss of children through attrition following pretest was also similar among the conditions, $\chi^2 = 2.25$, p = .324.

Training Teachers and Caregivers. Research staff supplied all teachers and children's caregivers with a set of 30 commercial storybooks and instructed teachers and caregivers (all

Table 1. Children's Descriptive Characteristics Across Three Conditions.

	Intervention condition		
Variable	RR/RR (*n* = 101)	PF/RR (*n* = 91)	PF/PF (*n* = 99)
Age in months			
M	52.38	50.91	51.3
SD	6.82	7.33	7.31
Female (%)	30	26	23
Speaking English as first language (%)	98	100	98
Race–ethnicity (%)			
White, non-Hispanic	74	68	75
African American	11	11	16
Other	8	7	8
Missing	7	14	6
Maternal education, highest degree attained (%)			
No high school diploma	8	13	7
High school diploma	15	12	16
Some college	29	17	28
Associate's degree	10	11	3
Bachelor's degree	13	20	22
Graduate degree	23	27	24
Family income (%)			
$0–$15,000	14	12	14
$15,001–$30,000	13	11	16
$30,001–$45,000	16	10	13
$45,001–$60,000	12	13	12
>$60,000	45	55	43
CELF Core Language			
M	75.03	78.10	75.24
SD	19.24	19.46	14.24
Nonverbal cognition			
M	82.16	82.35	83.17
SD	18.16	19.81	17.31
n	77	57	64

Note. RR/RR = teacher regular reading/caregiver regular reading; PF/RR = teacher print focus/caregiver regular reading; PF/PF = teacher print focus/caregiver print focus. CELF Core Language = Core Language Composite of the Clinical Evaluation of Language Fundamentals–Preschool (Wiig, Secord, & Semel, 2004). Nonverbal cognition = Matrices subtest of the Kaufmann Brief Intelligence Test (Kaufman & Kaufman, 1985). Note that data are missing for this variable as it was not administered to children under 4 years of age; thus exact *n* is provided per group.

conditions) to follow a prescribed schedule that involved reading one target book per week. Teachers read the target book four times per week, whereas caregivers read the target book twice per week. The way in which the storybooks were read by teachers and caregivers represented the planned variation of interest in this study, and there were no differences among conditions in the volume of reading that took place.

Teachers in all three conditions implemented a read-aloud program in which they were asked to read one of the storybooks four times a week for 30 weeks, corresponding to 120 reading sessions over the academic year. (The book list is available from the first

Table 2. Effect Sizes (*d*) for Differences Among Study Conditions for Teacher and Caregiver Scores on the Fidelity Coding Checklist (FCC).

	Intervention condition		
FCC category	PF/RR vs. RR/RR	PF/PF vs. RR/RR	PF/PF vs. PF/RR
Teachers			
Book/print organization	1.71	1.59	0.06
Print meaning	0.27	0.26	0.03
Letters	1.64	1.85	0.20
Words	2.38	2.42	0.07
Caregivers			
Book/print organization	0.23	0.70	0.38
Print meaning	0.07	0.11	0.05
Letters	0.26	0.60	0.51
Words	0.30	1.06	0.96

Note. Teachers' scores based on 1,192 videotaped read-alouds spanning the academic year for all 83 teachers; caregivers' scores based on 162 videotaped read-alouds collected at the end of the intervention year for a subset of all caregivers. To interpret the effect sizes, performance of second group subtracted from first group. RR/RR = teacher regular reading/caregiver regular reading; PF/RR = teacher print focus/caregiver regular reading; PF/PF = teacher print focus/caregiver print focus.

author.) This is the same volume of reading implemented by ECE teachers in prior reports of this intervention (Justice et al., 2010; Piasta et al., 2012). Teachers were provided media for recording two reading sessions per month to submit to research staff (video camera, recording media, stamped mailers). In addition, teachers were provided a reading log on which they recorded implementation of each reading session as well as any additional reading that took place in their classrooms. To orient teachers to the reading program, they participated in a professional development (PD) workshop prior to the start of the year (additional details on PD follow) and a half-day refresher session mid-year. They received incentives (gift cards) following participation in each.

Children's caregivers, irrespective of condition, also implemented a read-aloud program in which they were asked to read two times per week for 30 weeks, corresponding to 60 reading sessions over an academic year. The volume of reading was less than that of teachers, in an effort to reduce attrition due to perceived load of the intervention by caregivers (Justice et al., 2011). Caregivers received the same 30 titles as their children's teachers and followed the same schedule of reading to achieve synchrony between children's experiences in the classroom and at home. To promote implementation and retention, the caregivers received a refrigerator magnet with pull-off weekly stamped postcards (listing what book was to be read) that were to be returned regularly to project staff. In addition, each caregiver was asked to attend a one-on-one meeting in the fall of the year, received a home visit during the winter of the year, and was contacted by phone five times over the year by research staff querying about recent books read and troubleshooting any challenges. Caregivers also attended a final meeting in the spring, during which they were videotaped reading to their child and completed final caregiver-report measures. Out of a possible seven contacts desired for each caregiver, prior to the final meeting, the average percentage of successful contacts was high (79%) and similar across the three conditions (79%, 82%, and 76% for RR/RR, PF/RR, and PF/PF caregivers, respectively).

*RR/RR condition (*n *= 28 teachers, 101 children/caregivers)*. Teachers and caregivers assigned to the RR/RR condition read the program storybooks on the schedule provided (120 sessions for teachers, 60 for caregivers)

and were asked to read the storybooks using their normal reading style. RR/RR teachers received the same volume of PD as other teachers, but all was focused on neutral topics, such as strategies for increasing play in the classroom. To orient the caregivers to the reading program, they attended a group meeting on reading books to children in the beginning of the year and were told to read with their children using their typical reading style.

*PF/RR condition (*n = *27 teachers, 91 children/caregivers)*. In this condition, teachers read the program storybooks using a print-focused reading style, whereas caregivers read the storybooks using their normal reading style. The RR/RR and PF/RR conditions represent counterfactuals in terms of estimating impacts for the first research aim concerning the extent to which ECSE teachers' implementation of print-focused read-alouds influenced children's print knowledge, relative to children whose teachers used a typical read-aloud style.

PF/RR teachers followed an explicit scope and sequence to integrate discussion about specific print-related targets into their read-alouds, which addressed 15 specific objectives (e.g., to understand that letters are a symbol used in written language, to know that letters are different from words). The scope of instruction targeted children's print knowledge across four dimensions: book and print organization, print meaning, letters, and words. The overall scope as it corresponds to the 15 objectives appears in Appendix A. Teachers were instructed to read each storybook and naturally embed the print targets into the reading sessions. For each storybook, a two-page insert was included that provided examples of how to engage children in print-focused discussions specific to the objectives aligned to that book. Objectives were cycled over the 30-week reading period, so that each objective was targeted multiple times in the 120 read-alouds (see Appendix B).

Teachers' adherence to this scope and sequence, and their implementation of ongoing print-focused discussions during read-alouds, was promoted through three strategies: (a) Teachers participated in a 1-day PD workshop in the fall of the year, which provided the rationale behind the use of print-focused read-alouds as well as practice opportunities for all 15 objectives, and a 3-hr refresher training in the winter; (b) a two-page insert, referenced previously, was placed into each of the 30 program storybooks that provided a discussion guide as well as specific print-related targets to address during a given read-aloud; and (c) teachers received four feedback letters from research staff over the course of the year with implementation feedback based on ongoing assessment of fidelity (discussed shortly).

For teachers, the fall PD was an 8-hr all-day workshop. The PD included (a) an overview of children's early literacy development, (b) in-depth description and discussion of the four print domains and 15 print objectives with examples, and (c) guided practice of the print domains and dimensions. During the 3-hr refresher PD in the winter, all earlier content was reviewed and the teachers examined videos providing exemplars of the print-focused objectives.

Caregivers in the PF/RR condition participated in conditions identical to those caregivers in the RR/RR condition; thus, these caregivers read with their children using their typical reading style simultaneous to their children's teachers using a print-focused reading style.

*PF/PF condition (*n = *28 teachers, 99 children/caregivers)*. In this condition, both teachers and caregivers read the program storybooks using a print-focused reading style for the 30-week period. The PF/PF and PF/RR conditions represent counterfactuals in terms of estimating impacts for the second research aim concerning the extent to which print-focused reading-alouds implemented by both ECSE teachers and children's caregivers may influence the print knowledge of children with LI, relative to implementation only by ECSE teachers. In the PF/PF condition, teachers' implementation of the print-focused reading style mirrored that of the PF/RR condition. Caregivers in the PF/PF condition implemented a print-focused reading program that mirrored that of

their children's teachers in terms of the scope and sequence of print-focused instruction.

Caregivers' implementation was facilitated in four ways. First, caregivers participated in a 2-hr workshop in the fall that included instruction on the use of print-focused read-alouds and study procedures. The research staff guided the caregivers through a discussion of how to engage their children in print-focused read-alouds using an illustrated manual (with illustrations and examples) and a DVD providing videos of implementation by parents. The DVD was sent home with the caregivers to review if needed. Second, a two-page insert was placed in each of the 30 storybooks with information on the print targets and specific examples that could be used during reading (these were caregiver-friendly versions of the teachers' inserts). Third, caregivers received a home visit in the winter of the year during which a reading session was observed and feedback was given on their implementation of print-focused read-alouds. Fourth, caregivers received five phone calls from research staff over the course of the year. During these calls, caregivers were asked to recall the print targets from the previous week. If caregivers were having difficulty reading or hitting the targets, research staff provided suggestions for implementation.

Monitoring Implementation Fidelity. Implementation fidelity was assessed in a variety of ways for teachers and caregivers. Fidelity data were used formatively during the study to promote teachers' and caregivers' adherence to the condition to which they were assigned.

Teachers. Teachers' implementation of the 120 read-aloud sessions required of all three conditions was monitored based on weekly submission of reading logs. Of a possible 2,490 logs requested from the 83 teachers (over 30 consecutive weeks), 2,432 logs corresponding to a 98% submission rate were received indicating that the target book was read as scheduled. Teachers in the two print-focused groups (PF/RR and PF/PF) also logged whether they addressed the assigned print-related objective for that day (which appeared on the insert provided for each book); the teachers reported hitting the target 93% of the time (92% and 93.5% for PF/RR and PF/PF, respectively).

In addition to examining teachers' reading logs, teachers also submitted a biweekly videotape of their read-aloud sessions. In total, teachers were asked to submit 15 videotapes over a 30-week period; of a possible 1,245 submissions, 1,192 (96%) were received. All of the teacher-submitted videos were coded as received using a Fidelity Coding Checklist (FCC), which is a hierarchical coding scheme that examines the volume of adults' verbal references to print across four categories: book and print organization, print meaning, letters, and words. The raw score represents the number of times a teacher referenced book and print organization, print meaning, letters, and words for the entire duration of a read-aloud. Research assistants completed coding only after successfully completing a comprehensive training program that involved training and practice sessions followed by a reliability test (in which they coded multiple sessions with >90% accuracy against gold-standard scores). In order to determine interrater reliability for the FCC, 10% of videos from the entre corpus of teacher-submitted videos ($n = 123$) were double coded; the intraclass correlation coefficient was .95, indicating a high level of reliability in coding.

Implementation fidelity based on FCC coding of 1,192 videotaped read-alouds (average of 14 per teacher) indicated a clear distinction between print-focused and regular-reading teachers for all four FCC categories (book and print organization, print meaning, letters, and words). Table 2 provides effect size contrasts corresponding to differences between the three intervention conditions; comparisons of teachers in the two print-focused conditions (PF/RR and PF/PF) with those in the comparison (RR/RR) condition demonstrated very large effects, with all *d*s > 1.5 except for the print-meaning contrast. As would be expected, teachers' volume of talk about print was similar for those in the PF/PF and PF/RR conditions, as teachers in both of

these two conditions implemented print-focused read-alouds.

Caregivers. Caregivers' implementation was monitored in two key ways. First, caregivers were asked to submit postcards on a weekly basis indicating whether they had completed the assigned read-aloud sessions and, for print-focused caregivers, had attended to print-related targets presented on book insert cards. Out of 30 possible postcard returns per caregiver, the average number received was 14 (47% receipt rate), and one fifth of caregivers ($n = 57$) did not return any postcards at all. There were only modest differences among caregivers in the three conditions, with an average of 15 ($SD = 11$) postcards returned for those in the RR/RR (comparison) group and 13 in the PF/RR and PF/PF groups ($SD = 10$). The return rate for caregiver logs was similar to that reported previously in a study involving home-based parent–child reading for a 6-week period for a low-SES sample (Lonigan & Whitehurst, 1998).

Second, caregivers were videotaped implementing a read-aloud in the spring of the year at a one-on-one meeting, conducted at the end of the intervention. Only a subset of caregivers elected to attend this session; thus data represent only 162 of 291 caregivers. During this session, each was recorded reading a non-intervention book to the child, thus representing transfer of the intervention to a novel book. To examine intervention fidelity, the FCC was coded for each videotaped session. These videos were coded by staff trained to a reliable criterion on the FCC, as described earlier with respect to coding of teachers' videos. Approximately 10% of the caregiver videos ($n = 19$) were double coded, and an intraclass correlation coefficient of .96 indicated a high level of reliability. The data in Table 2 provide effect sizes for differences in FCC scores across the four print-related categories for caregivers in the three groups. These effects were of a smaller magnitude than observed for teachers, but almost all were found to be practically significant and some were large effects.

Measuring Treatment Impacts. Effects on children's print knowledge was estimated based on pre- and posttest assessments collected in the fall and spring of the year, prior to and following receipt of the 30-week book-reading program. Children were individually assessed by trained field assessors using three measures of children's print knowledge to capture three interrelated constructs: print concept knowledge, upper- and lowercase alphabet knowledge, and name writing. To obtain an overall estimate of the effect of the intervention on students' print knowledge, a composite index of the three constructs (print concept knowledge, alphabet knowledge, and name writing) was created. The rationale for using a composite was twofold. First, the measures were highly correlated and conceptually represent a single underlying factor (McGinty & Justice, 2009). Second, use of the composite was calculated using the measures and methods identical to those of previous studies of this intervention (Justice et al., 2010). Using the composite scores allows for a direct comparison of the implementation of this intervention with a new population of students (those enrolled in ECSE classrooms).

For print-concept knowledge, the Preschool Word and Print Awareness (Justice & Ezell, 2001) was administered. In this criterion-referenced assessment, administrators read the child the book *Nine Ducks Nine* (Hayes, 1990) and embed within it a series of print-related tasks ("Where do I start to read?" "Show me just one word on this page.") The interrater reliability (point by point) is .94 and the partial credit model ranges from 0.7 to 1.3 (Justice et al., 2006). For alphabet knowledge, the Upper and Lower Case Letter Knowledge subtests of the Phonological Awareness Literacy Screening–PreK (PALS-PreK; Invernizzi, Sullivan, Meier, & Swank, 2004) were administered. For each, the child is shown a sheet with either all of the uppercase letters or all of the lowercase letters presented in random order. These measures show criterion-related validity with similar assessments (correlations of .61 and .71). For name writing, the Name Writing subtest of the PALS-PreK (score range 1–7) was administered. For this measure, a child is given a blank piece of paper and is instructed to draw a self-portrait with a signature. Internal consistency ranges from .77 to

.93, and interrater reliability is high (based on Pearson product–moment correlation coefficient of .99; Invernizzi et al., 2004).

The composite index of print knowledge at retest was derived in two stages, using identical methods to Justice et al. (2010). First, the pretest scores for each individual assessment were standardized, such that the mean of each assessment was subtracted from each child's score on that test and then divided by the standard deviation for that test. Second, scores on the three tests were summed to create a composite score. The same procedure was followed for the posttest score, with standardization again based on the pretest mean and standard deviation (the pretest mean of each assessment was subtracted from each child's posttest scores on that test and divided by the pretest standard deviation). Doing so provides a way to estimate the amount of gain observed in pretest standard deviation units.

Treatment Covariates and Moderators

Additional child- and classroom-level data were available for consideration as treatment covariates or moderators. Child-level data included children's gender, age, and SES, available from caregiver questionnaire (see Table 1), as well as nonverbal cognition and general language skills based on direct assessments conducted in the fall of the year. The former was assessed using the Matrices subtest of the Kaufman Brief Intelligence Test (KBIT Kaufman & Kaufman, 1985); the latter was assessed using the Clinical Evaluation of Language Fundamentals–Preschool (CELF: P-2; Wiig, Secord, & Semel, 2004). Standard scores for the KBIT were available for 197 children, as it was not administered to children under 4 years of age. The mean score for the sample was 82.5 (SD = 18.3), and about one half of the children had KBIT scores less than or equal to one standard deviation of the mean. For the CELF: P-2, three subtests are combined to derive a core language composite; the mean score was 75.4 (SD = 18.1).

Classroom-level data available included the general quality of children's classroom, derived from the Instructional Support (IS) subscale of the Classroom Assessment Scoring System (CLASS; Pianta, La Paro, & Hamre, 2005). The CLASS is a systematic observational tool used to rate the quality of classrooms across multiple dimensions. The IS subscale represents a composite of codes capturing three classroom-level characteristics: concept development, quality of feedback, and language modeling. CLASS was coded in the fall of the year from 90-min videotaped classroom observations by reliable coders.

Results

Table 3 provides descriptives that detail children's fall and spring performance on the three print knowledge indices (z-scored means), as well as the composite, for the total sample as well as the three treatment groups. These data show that children's performance on all three indices and the composite increased over the academic year; with respect to the composite, children showed a gain of about two thirds of a standard deviation unit, with substantial variability around the mean (SD = 2.51). As can be seen, posttest print knowledge composite scores differed across the three conditions: 1.41 (SD = 2.4) for the RR/RR condition, 2.08 (SD = 2.73) for the PF/RR condition, and 1.74 (SD = 1.73) for the PF/PF condition. The differences among these three conditions look very small in the context of the standard deviations; however, the outcome of interest in this study is determining whether differential gain was made during the year for the three groups. By controlling for each child's pretest score when predicting their posttest score, we control for some of that variability and allow for the examination of change. In addition, some of the variance in children's scores is attributable to the teacher. In modeling treatment effects, hierarchical linear modeling (HLM) was used to account for random assignment at the classroom level as well as any variance in child outcomes attributable to the classroom or teacher (intraclass correlation). In an initial phase of analysis using unconditional models, results indicated that 34% of the variance in posttest score was attributable to the classroom or teacher, thus indicating sufficient nested variance to require use of HLM analyses. The

Table 3. *Z*-Scored Means of Fall and Spring Print Knowledge Assessments by Condition.

		Pretest		Posttest	
Variable	*n*	*M*	*SD*	*M*	*SD*
Regular reading/regular reading					
	90	0.01	0.98	0.40	1.04
Letter knowledge	99	−0.03	1.02	0.55	1.28
Name writing	100	−0.04	1.00	0.46	0.68
Print knowledge composite	89	−0.17	2.30	1.41	2.40
Print focus/regular reading					
	92	0.07	1.02	0.64	1.13
Letter knowledge	91	0.04	1.05	1.03	1.43
Name writing	92	0.07	1.06	0.41	0.71
Print knowledge composite	91	0.21	2.47	2.08	2.73
Print focus/print focus					
Print-concept knowledge	98	−0.05	1.02	0.45	1.08
Letter knowledge	98	−0.02	0.94	0.83	1.27
Name writing	98	0.00	0.96	0.46	0.59
Print knowledge composite	98	−0.07	2.30	1.74	2.36
Full sample					
	280	0.01	1.01	0.49	1.08
Letter knowledge	288	0.00	1.00	0.80	1.34
Name writing	290	0.01	1.00	0.45	0.66
Print knowledge composite	278	−0.01	2.36	1.73	2.51

Note. print-concept knowledge = Preschool Word and Print Awareness (Justice & Ezell, 2001); letter knowledge = Upper and Lower Case Letter Knowledge subtests of the Phonological Awareness Literacy Screening–PreK (PALS-PreK; Invernizzi, Sullivan, & Meier, 2004); name writing = Name Writing subtest of the PALS-PreK; print knowledge composite = standardized composite index of print knowledge based on the three assessments.

remaining 66% of the variance in student scores was attributable to other factors, warranting further modeling of the data.

To review the main study aims, the first aim was to determine the extent to which ECSE teachers' implementation of print-focused read-alouds over an academic year influenced the print knowledge of children with LI in their classrooms, relative to children whose teachers used their typical read-aloud style. The contrasts of interest for this aim were the RR/RR and PF/RR conditions: Children in PF/RR classrooms were exposed to print-focused read-alouds in their classrooms but not at home, whereas those in RR/RR classrooms were exposed to print-focused read-alouds in neither context. The second aim was to determine the extent to which implementation of print-focused reading-alouds by both ECSE teachers and children's caregivers affected the early literacy skills of children with LI, relative to implementation only by ECSE teachers. The contrasts of interest for this aim were the PF/RR and PF/PF conditions: children in PF/PF classrooms were exposed to print-focused read-alouds at school and home, whereas those in PF/RR classrooms experienced these only at school.

To test these aims, a conditional HLM was fit to the data, predicting children's print knowledge composite scores at posttest from intervention condition (coded as a categorical predictor), while controlling for students' pretest score and SES (based on maternal education). Bonferroni-corrected post hoc contrasts were conducted to examine differences among study conditions. Contrasts between the fitted mean estimates of the three conditions are presented in Table 4, two of which reflected contrasts of primary interest in this study: the PF/RR and RR/RR contrasts (Research Aim 1) and the PF/PF and PF/RR contrasts (Research Aim 2). Results showed a statistically significant difference in children's outcomes when

Table 4. Contrasts Among Intervention Conditions for Children's Spring Print Knowledge Posttest, Controlling for Pretest and Socioeconomic Status.

Condition	Coefficient	*t*	*df*	*p*	Effect size
PF/RR vs. RR/RR	.53	2.17	76	.03	.21
PF/PF vs. PF/RR	−.25	−1.1	76	.29	.10
PF/PF vs. RR/RR	.27	1.17	76	.25	.11

Note. RR/RR = teacher regular reading/caregiver regular reading; PF/RR = teacher print focus/caregiver regular reading; PF/PF = teacher print focus/caregiver print focus.

comparing the PF/RR and RR/RR conditions ($p < .05$) but no difference for the PF/PF and PF/RR conditions. (For the sake of thoroughness, Table 4 provides results for the PF/PF and RR/RR contrasts from the HLMs; no significant difference was observed.) The effect size estimate (d =.21) for the PF/RR and RR/RR contrast is identical to that observed when contrasting teacher-implemented print-focused read-alouds in ECE classrooms with teacher-implemented typical read-alouds for typically developing children (d = .21; Justice et al., 2010).

In a second phase of analysis, three potential moderators of intervention impacts were examined individually: (a) classroom quality, as assessed by the CLASS Instructional Support; (b) children's language skill, as assessed using the CELF: P-2 core language composite; and (c) children's nonverbal cognition, as assessed using the KBIT Matrices subtest. For the latter, it is important to note that standard scores were available only for a subset of the full sample (n = 198); therefore, the moderation analyses involving nonverbal cognition included 68% of the children in the study. To assess whether moderation occurred, each predictor was added to the regression equation and was allowed to interact with condition. Significance tests of the interaction coefficient indicated whether moderation occurred.

The first examined potential moderator was classroom quality, which was a significant predictor of children's print knowledge outcome (b = 26.60, p = .001). However, moderation was not significant (b = .06, p = .93), and no differences in the between-condition contrasts were observed. The second examined potential moderator was children's language ability, which demonstrated no significant relations with children's print knowledge outcome after controlling for pretest score and SES (b = 0.00, p = .98), nor was the moderation effect significant (b = 1.35, p = .26). The third examined potential moderator was children's nonverbal cognition, which demonstrated a significant relation with the print knowledge outcome (b = 5.51, p = .02), and the moderation effect was also significant (b = 3.69, p = .03). This suggests that the print knowledge gains made in each condition were dependent upon children's nonverbal cognition scores.

A graph depicting the moderation effect is presented in Figure 1, which demonstrates that at lower levels of nonverbal cognition (e.g., standard score of 70), there is a large difference between predicted end-of-preschool print knowledge skills as a function of children's intervention condition. In general, at lower levels of nonverbal cognition, there was a significant difference among the three study conditions observed with respect to children's spring print knowledge outcomes, with children in the PF/PF condition exhibiting higher spring scores compared to those in the two other conditions, particularly, those in the RR/RR condition. Specifically, at lower levels of nonverbal cognition, children in the PF/PF condition demonstrated the largest benefit from the intervention, with a predicted spring composite score of about 2.0, compared to those in the PF/RR (~1.2) and RR/RR (~0.4) conditions. An alternative way to interpret these data is that there is a weaker relation between nonverbal cognition and predicted spring print knowledge scores for those children in the PF/PF condition compared to those in the RR/RR condition.

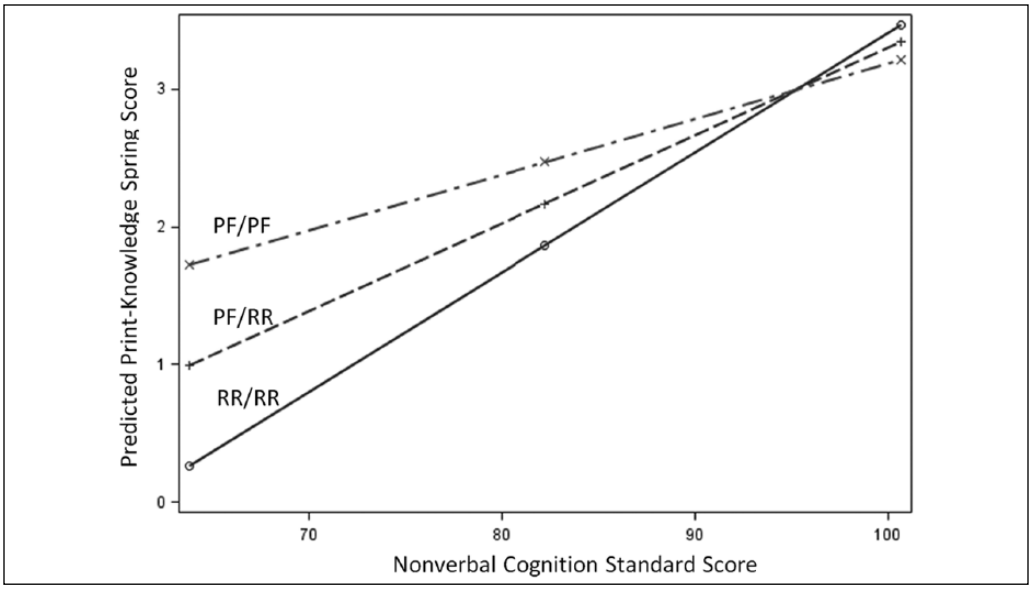

Figure 1. Moderation effect of children's nonverbal cognition (*x*-axis) on predicted spring print knowledge outcome (*y*-axis) for given intervention condition (lines).
Note. RR/RR = teacher regular reading/caregiver regular reading; PF/RR = teacher print focus/caregiver regular reading; PF/PF = teacher print focus/caregiver print focus.

Discussion

Effectiveness of Print-Focused Read-Alouds

This study involved assessing effects of print-focused read-alouds implemented by ECSE teachers relative to ECSE teachers' use of their typical reading style (PF/RR and RR/RR contrast) and effects of print-focused read-alouds when implemented by both teachers and caregivers relative to only teachers (PF/PF and PF/RR contrast). The results of the present study, coupled with prior investigations of print-focused read-alouds in ECE classrooms (Justice et al., 2010; Piasta et al., 2012) and effects of this intervention on children with LI (e.g., Lovelace & Stewart, 2007), support the use of this practice as a possible means to improve the early literacy skills of children with LI and, in turn, to potentially reduce their future risks for reading difficulties.

PF/RR and RR/RR Contrast. Prior research has shown that ECE teachers' use of the 30-week print-focused intervention employed in the present study had net positive effects ($d = 0.21$) on the print knowledge of typically developing children participating in preschool programs serving children at risk (Justice et al., 2009, 2010). These positive effects were maintained to first grade, such that children who were exposed to print-focused read-alouds during prekindergarten were better readers and spellers than children whose teachers employed their normal reading style, with effect size comparisons of .26 to .31 on standardized reading measures (Piasta et al., 2012). Although this effect size would be considered small in size with respect to general social science standards (e.g., Cohen, 1988), when considered in context they are comparable to the average effect sizes (.23–.27) seen in rigorously conducted educational interventions (Hill, Bloom, Black, & Lipsey, 2007) and are observed when researchers employed a strong counterfactual rather than a true control condition. Other recent studies of early literacy interventions, largely focused on impacts for children from low-SES backgrounds, have reported similarly sized effects (Bierman et al., 2008; Landry et al., 2006; Powell, Diamond, Burchinal, & Koehler, 2010). For instance, when implementing a PD course plus coaching program focused

on improving language and literacy skills with Head Start teachers, Powell and colleagues (2010) reported effect size estimates of .20 and .22 for children's print awareness and alphabet knowledge, respectively.

Results of this study suggest that ECSE teachers should employ print-focused read-alouds in their classrooms as a means to improving children's early literacy skills and perhaps reducing their future risks for reading problems.

The PF/RR and RR/RR contrast in the present study, which provides a direct comparison of children's print knowledge gains when teachers did and did not employ print-focused read-alouds (with caregivers in both conditions using their normal reading style at home), yielded benefits to children identical to those in prior reports employing print-focused read-alouds (Cohen's $d = 0.21$; Justice et al., 2010) and comparable interventions (e.g., Bierman et al., 2008; Landry et al., 2006; Powell et al., 2010). Regarding the former, the present report provides a replication of prior investigations of this early literacy intervention, which is important for establishing this intervention as effective (Flay et al., 2005). It also provides an extension to that work by examining impacts for children with LI, the focal participants in several prior smaller-scale studies of print-focused read-alouds (Lovelace & Stewart, 2007; van Bysterveldt et al., 2006). Theoretically and practically, it is tenable to anticipate that children who arrive to beginning reading instruction with enhanced knowledge about print will be better able to benefit from and respond to that instruction than children with little understanding of print (Storch & Whitehurst, 2002). For children with LI, this may be especially important given that their reading trajectories from kindergarten forward seem particularly affected by presence of limited literacy skills at school entry (Morgan et al., 2011; Skibbe et al., 2008). Results of this study suggest that ECSE teachers should employ printfocused read-alouds in their classrooms as a means to improving children's early literacy skills and perhaps reducing their future risks for reading problems.

PF/PF and PF/RR Contrast. In a priori conceptualization of this study, the involvement of caregivers in implementing print-focused read-alouds with their children simultaneous to children's ECSE teachers was seen as a way to increase the dosage of the intervention and also to promote caregivers' involvement in their children's early literacy development. Three prior studies have involved caregivers in delivering this intervention to their children with LI, although two of the studies involved very small samples (Ezell et al., 2000; van Bysterveldt et al., 2006) and one study reported relatively high levels of caregiver attrition (Justice et al., 2011). In light of the results reported here, in which children's print knowledge outcomes associated with dual implementation of print-focused read-alouds by teachers and caregivers were no different from outcomes associated with only teacher implementation, we speculate that the overall lack of effects of the PF/PF versus PF/RR contrast could be attributable to limited implementation by some of the caregivers. In fact, of caregivers in the PF/PF group, nearly one half of caregivers submitted no postcards to log their home reading sessions, a similar rate of nonresponsiveness reported in one prior study involving implementation of a shared reading program for children in low-SES homes (Lonigan & Whitehurst, 1998). That study also showed that children's outcomes targeted in the home reading program did not differ when comparing the home-plus-school reading program and a school-only reading program implemented by teachers. Those authors suspected that limited implementation by caregivers contributed to their findings, which may help to interpret the findings of the present work.

Specifically, it was unanticipated that the PF/PF condition would result in larger gains in print knowledge for children relative to the PF/RR condition, as in the former, both teachers and caregivers implemented print-focused read-alouds simultaneously. Contrary to what was expected, children in the PF/RR condition had similar outcomes to those in the PF/PF outcomes (there was no significant difference in print knowledge between the two groups), with

the effect size ($d = .10$) indicating higher scores for those in the PF/RR condition. One prior study involving read-alouds implementing at school, home, or school and home for children from low-income households, in which the targeted child outcomes were language skills, also found that school-and-home implementation generally offered no benefit over school-only implementation (Lonigan & Whitehurst, 1998).

These findings show that ECSE teachers and caregivers of children with LI exhibiting relatively low nonverbal cognition can play an important role in facilitating their early literacy growth.

We propose two possible explanations for this pattern of findings. First, implementation of print-focused read-alouds by caregivers may have been low. Fewer than one half of caregivers reliably submitted postcards to log their reading sessions, similar to log return rates reported by Lonigan and Whitehurst (1998). If caregivers were not regularly employing the intervention practices as prescribed, this would likely result in limited benefits to their children, contributing to equivocal differences between the PF/PF and PF/RR conditions, as seen here. Second, it is also possible that caregivers' print-focused read-alouds were of lower quality than their reading sessions featuring a normal reading style. It is possible that asking caregivers to read in a way that differs from their customary style results in reading interactions in which caregivers are less sensitive to their children's skills and in which children are less engaged. Such qualitative aspects of shared reading interactions affect the contribution of this activity to children's literacy growth over time (Scarborough & Dobrich, 1994). If this were the case, it would help to explain why the PF/RR condition appeared to make greater, albeit not statistically significant, contributions to children's print knowledge ($d = .10$) compared to the PF/PF condition.

Nonverbal Cognition as Intervention Moderator. Although there was no main effect specific to the PF/PF condition as compared to the PF/RR or RR/RR condition, it is important to note that children's nonverbal cognition significantly moderated effects of the intervention on children's print knowledge outcomes. In the present study, children varied substantially in their nonverbal cognition (51 to 124 on the KBIT), with 51% of children receiving scores more than one standard deviation below the mean. Children with general developmental delay, in which language skills are affected as well as other aspects of development (e.g., motor skills, social competence), have strong participation rates in ECSE programming. For these youngsters, we found that exposure to print-focused read-alouds, as implemented by both teachers and caregivers simultaneously (PF/PF) or only by their classroom teachers (PF/RR), contributed to elevated print knowledge in spring of the year compared to children whose teachers and caregivers read typically (RR/RR). These findings show that ECSE teachers and caregivers of children with LI exhibiting relatively low nonverbal cognition can play an important role in facilitating their early literacy growth.

Print-focused read-alouds may differentially benefit children as a function of their nonverbal cognition because teachers and caregivers, when implementing the intervention, may tailor their discussions about print to children with lower levels of cognition. Put differently, teachers and caregivers may provide more differential supports, or scaffolds, to children with lower levels of cognitive ability to ensure that they can participate in and benefit from the read-aloud sessions. Children's nonverbal cognitive scores and print knowledge scores were significantly correlated (rs ~.4–.5); thus, it may be that teachers and caregivers are providing specialized supports to children who have the least knowledge about print. If this were the case, it might elevate the learning opportunities for some children but not all. Future research can explore this conjecture explicitly, by examining how teachers and caregivers individualize print-focused read-alouds for different children and if this varies as a function of such child-level characteristics.

Limitations

There are several limitations worth noting in considering the conclusions we have drawn about this study and its impacts. First, the results of this study do not represent children's long-term reading outcomes. The extent to which short-term improvements in print knowledge may contribute to longer-term enhancements in reading skill is not known. Second, teachers self-selected into this study. Teachers who seek out research opportunities may be qualitatively different from teachers who do not seek out research opportunities. Thus, we cannot ensure that the same level of implementation fidelity would be seen among a more general population of teachers. Further, the generally high level of education among this sample of teachers could affect generalizability to results to teachers with less education. Third, caregivers in this study may not have implemented intervention conditions as intended, due to limited direct assessment of their read-aloud practices over the academic year. Results may have varied if more direct and formative assessments of caregiver implementation had occurred.

To this end, print-focused read-alouds represent an empirically supported technique that can be easily incorporated by ECSE teachers into their regular instructional practices.

Despite these limitations, the study findings suggest that the early literacy skills of children with LI can be improved through minimal changes to ECSE teachers' read-aloud behaviors. To this end, print-focused read-alouds represent an empirically supported technique that can be easily incorporated by ECSE teachers into their regular instructional practices.

Caregivers can also employ print-focused read-alouds in the home environment, and these appear especially advantageous for children with disabilities with intellectual disabilities. ECSE teachers should work closely with caregivers to ensure that print-focused read-alouds are implemented in a quality and consistent manner.

References

Bierman, K. L., Domitrovich, C. E., Nix, R. L., Gest, S. D., Welsh, J. A., Greenberg, M. T., . . . Gill, S. (2008). Promoting academic and social-emotional school readiness: The Head Start REDI Program. *Child Development*, *79*, 1802–1817. doi:10.1111/j.1467-8624.2008.01227.x

Boudreau, D. M., & Hedberg, N. L. (1999). A comparison of early literacy skills in children with specific language impairment and their typically developing peers. *American Journal of Speech-Language Pathology*, *8*, 249–260.

Cabell, S. Q., Justice, L. M., Zucker, T. A., & McGinty, A. S. (2009). Emergent name-writing abilities of preschool-age children with language impairment. *Language, Speech, and Hearing Services in Schools*, *40*, 53–66. doi:10.1044/0161-1461(2008/07-0052)

Catts, H. W., Fey, M. E., Tomblin, J. B., & Zhang, X. (2002). A longitudinal investigation of reading outcomes in children with language impairments. *Journal of Speech, Language and Hearing Research*, *45*, 1142–1157. doi:10.1044/1092-4388(2002/093)

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Mahwah, NJ: Lawrence Erlbaum.

Dynia, J. M., Justice, L. M., Pentimonti, J. M., Piasta, S. B., & Kaderavek, J. N. (2013). Text features and preschool teachers' use of print referencing. *Journal of Research in Reading*, *36*, 261–279. doi:10.1111/j.1467-9817.2011.01502.x

Ezell, H. K., & Justice, L. M. (2000). Increasing the print focus of adult-child shared book reading through observational learning. *American Journal of Speech-Language Pathology*, *9*, 36–47.

Ezell, H. K., Justice, L. M., & Parsons, D. (2000). Enhancing the emergent literacy skills of pre-schoolers with communication disorders: A pilot investigation. *Child Language Teaching and Therapy*, *16*, 121–140. doi:10.1177/026565900001600202

Flay, B. R., Biglan, A., Boruch, R. F., Castro, F. G., Gottfredson, D., Kellam, S., . . . Ji, P. (2005). Standards of evidence: Criteria for efficacy, effectiveness and dissemination. *Prevention Science*, *6*, 151–175. doi:10.1007/s11121-005-5553-y

Hamre, B. K., Justice, L. M., Pianta, R. C., Kilday, C., Sweeney, B., Downer, J. T., & Leach, A. (2010). Implementation fidelity of MyTeachingPartner literacy and language activities: Association with preschoolers' language and literacy growth. *Early Childhood Research Quarterly*, *25*, 329–347. doi:10.1016/j.ecresq.2009.07.002

Hayes, S. (1990). *Nine ducks nine*. New York, NY: Lothrop, Lee and Shepard Books.

Hill, C. J., Bloom, H. S., Black, A. R., & Lipsey, M. W. (2007). *Empirical benchmarks for interpreting effect sizes in research*. New York, NY: MDRC.

Invernizzi, M. A., Sullivan, A., Meier, J. D., & Swank, L. (2004). *Phonological awareness literacy screening for preschool: Teacher's manual*. Charlottesville: University of Virginia.

Justice, L. M., Bowles, R. P., & Skibbe, L. E. (2006). Measuring preschool attainment of print-concept knowledge: A study of typical at-risk 3- to 5-year-old children using item response theory. *Language, Speech, and Hearing Services in Schools*, *37*, 224–235. doi:10.1044/0161-1461(2006/024)

Justice, L. M., & Ezell, H. K. (2000). Enhancing children's print and word awareness through home-based parent intervention. *American Journal of Speech-Language Pathology*, *9*, 257–269.

Justice, L. M., & Ezell, H. K. (2001). Word and print awareness in 4-year-old children. *Child Language Teaching and Therapy*, *17*, 207-225. doi:10.1177/026565900101700303

Justice, L. M., & Ezell, H. K. (2002). Use of storybook reading to increase print awareness in at-risk children. *American Journal of Speech-Language Pathology*, *11*, 17–29. doi:10.1044/1058-0360(2002/003)

Justice, L. M., & Ezell, H. K. (2004). Print referencing: An emergent literacy enhancement strategy and its clinical applications. *Language, Speech, and Hearing Services in Schools*, *35*, 185–193. doi:10.1044/0161-1461(2004/018)

Justice, L. M., Kaderavek, J. N., Fan, X., Sofka, A. E., & Hunt, A. (2009). Accelerating preschoolers' early literacy development through classroom-based teacher-child storybook reading and explicit print referencing. *Language, Speech, and Hearing Services in Schools*, *40*, 67–85. doi:10.1044/0161-1461(2008/07-0098)

Justice, L. M., McGinty, A. S., Piasta, S. B., Kaderavek, J. N., & Fan, X. (2010). Print-focused read-alouds in preschool classrooms: Intervention effectiveness and moderators of child outcomes. *Language, Speech and Hearing Services in the Schools*, *41*, 504–520. doi:10.1044/0161-1461(2010/09-0056)

Justice, L. M., Pullen, P. C., & Pence, K. L. (2008). Influence of verbal and nonverbal references to print on preschoolers' visual attention to print during storybook reading. *Developmental Psychology*, *44*, 855–866. doi:10.1037/0012-1649.44.3.855

Justice, L. M., Skibbe, L. E., McGinty, A. S., Piasta, S. B., & Petrill, S. A. (2011). Feasibility, efficacy, and social validity of home-based storybook reading intervention for children with language impairment. *Journal of Speech, Language and Hearing Research*, *54*, 523–538. doi:10.1044/1092-4388(2010/09-0151)

Kaufman, A. S., & Kaufman, N. L. (1985). *Kaufman test of educational achievement*. Circle Pines, MN: American Guidance Service.

Landry, S. H., Swank, P. R., Smith, K. E., Assel, M. A., & Gunnewig, S. B. (2006). Enhancing early literacy skills for preschool children: Bringing a professional development model to scale. *Journal of Learning Disabilities*, *39*, 306–324.

Lonigan, C. J., & Whitehurst, G. J. (1998). Relative efficacy of parent and teacher involvement in a shared-reading intervention for preschool children from low-income backgrounds. *Early Childhood Research Quarterly*, *13*, 263–290. doi:10.1111/j.1467-8624.1998.tb06247.x

Lovelace, S., & Stewart, S. R. (2007). Increasing print awareness in preschoolers with language impairment using non-evocative print referencing. *Language, Speech, and Hearing Services in Schools*, *38*, 16–30. doi:10.1044/0161-1461(2007/003)

McGinty, A. S., Breit-Smith, A., Fan, X., Justice, L. M., & Kaderavek, J. N. (2011). Does dosage matter? Preschoolers' emergent literacy growth in high- and low-dosage classroom-based intervention. *Early Childhood Research Quarterly*, *26*, 255–267. doi:10.1016/j.ecresq.2011.02.002

McGinty, A. S., & Justice, L. M. (2009). Predictors of print knowledge in children with specific language impairment: Experiential and developmental factors. *Journal of Speech, Language and Hearing Research*, *52*, 81–97. doi:10.1044/1092-4388(2008/07-0279)

Mol, S. E., Bus, A. G., & de Jong, M. T. (2009). Interactive book reading in early education: A tool to stimulate print knowledge as well as oral

language. *Review of Educational Research*, *79*, 979–1007. doi:10.3102/0034654309332561

Morgan, P. L., Farkas, G., & Wu, Q. (2011). Kindergarten children's growth trajectories in reading and mathematics: Who falls increasingly behind? *Journal of Learning Disabilities*, *44*, 472–488. doi:10.1177/0022219411414010

National Early Literacy Panel. (2008). *Developing early literacy*. Washington, DC: National Institute for Literacy.

Pianta, R., La Paro, K. M., & Hamre, B. K. (2005). Classroom assessment scoring system: Pre-K. Charlottesville, VA: Center for Advanced Study of Teaching and Learning.

Piasta, S. B., Dynia, J. M., Justice, L. M., Pentimonti, J. M., Kaderavek, J. N., & Schatschneider, C. (2010). Impact of professional development on preschool teachers' print references during shared read alouds: A latent growth curve analysis. *Journal of Research on Educational Effectiveness*, *3*, 343–380. doi:10.1080/19345747.2010.482177

Piasta, S. B., Justice, L. M., McGinty, A. S., & Kaderavek, J. N. (2012). Increasing young children's contact with print during shared reading: Longitudinal effects on literacy achievement. *Child Development*, *83*, 810–820. doi:10.1111/j.1467-8624.2012.01754.x

Powell, D. R., Diamond, K. E., Burchinal, M. R., & Koehler, M. J. (2010). Effects of an early literacy professional development intervention on head start teachers and children. *Journal of Educational Psychology, 102(2), 299–312*. doi:10.1037/a0017763

Puranik, C. S., Petscher, Y., Al Otaiba, S., Catts, H. W., & Lonigan, C. J. (2008). Development of oral reading fluency in children with speech or language impairments: A growth curve analysis. *Journal of Learning Disabilities*, *41*, 545–560.

Scarborough, H. S., & Dobrich, W. (1994). On the efficacy of reading to preschoolers. *Developmental Review*, *14*, 245–302.

Skibbe, L. E., Grimm, K. J., Stanton-Chapman, T. L., Justice, L. M., Pence, K. L., & Bowles, R. P. (2008). Reading trajectories of children with language difficulties from preschool through fifth grade. *Language, Speech, and Hearing Services in Schools*, *39*, 475–486. doi:10.1044/0161-1461(2008/07-0016)

Snyder, T. D., Dillow, S. A., & Hoffman, C. M. (2007). *Digest of education statistics 2006*. Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Storch, S. A., & Whitehurst, G. J. (2002). Oral language and code-related precursors to reading: Evidence from a longitudinal structural model. *Developmental Psychology*, *38*, 934–947. doi:10.1037/0012-1649.38.6.934

van Bysterveldt, A. K., Gillon, G. T., & Moran, C. (2006). Enhancing phonological awareness and letter knowledge in preschool children with down syndrome. *International Journal of Disability, Development and Education*, *53*, 301–329. doi:10.1080/10349120600847706

Wei, X., Blackorby, J., & Schiller, E. (2011). Growth in reading achievement of students with disabilities, ages 7 to 17. *Exceptional Children*, *78*, 89–106.

Whitehurst, G. J., & Lonigan, C. J. (1998). Child development and emergent literacy. *Child Development*, *69*, 848-872. doi:10.1111/j.1467-8624.1998.tb06247.x

Wiig, E. H., Secord, W. A., & Semel, E. (2004). *Clinical evaluation of language fundamentals preschool* (2nd ed.). San Antonio, TX: Harcourt Assessment.

Zucker, T. A., Justice, L. M., & Piasta, S. B. (2009). Prekindergarten teachers' verbal references to print during classroom-based, large-group shared reading. *Language, Speech, and Hearing Services in Schools*, *40*, 376–392. doi:10.1044/0161-1461(2009/08-0059)

Appendix A

Print Domains and Corresponding Objectives.

Print domain (scope of instruction)	Objectives
Book and print organization	Page order
	Author
	Top and bottom of the page
	Title of book
	Print direction
Print meaning	Print function
	Environmental print
	Concept of reading
Words	Word identification
	Short vs. long words
	Letters vs. words
	Concept of word in print
Letters	Upper- and lowercase letters
	Names of letters
	Concept of letter

Appendix B

Sequence of Objectives Over 30 Weeks of Instruction.

Week	Objectives targeted
1	Environmental print
	Concept of reading
2	Print direction
	Concept of word in print
3	Author of book
	Function of print
4	Upper- and lowercase forms
	Page organization
5	Title of book
	Word identification
6	Concept of letter
	Page organization
7	Page order
	Letter names
8	Word identification
	Concept of letter
9	Author of Book
	Letters and words
10	Short words and long words
	Function of print
11	Concept of letter
	Environmental print
12	Upper- and lowercase forms
	Page order
13	Title of book
	Function of print
14	Page organization
	Short words and long words
15	Letter names
	Concept of reading
16	Concept of letter
	Page order
17	Letters and words
	Letter names
18	Upper- and lowercase forms
	Concept of word in print
19	Short words and long words
	Print direction
20	Page organization
	Concept of reading
21	Word identification
	Print direction
22	Title of Book
	Upper- and lowercase forms
23	Environmental print
	Page order
24	Concept of print in word
	Print direction
25	Letter names
	Concept of reading
26	Letters and words
	Function of print
27	Title of book
	Word identification
28	Author of book
	Environmental print
29	Short words and long words
	Author of book
30	Concept of word in print
	Letters and words

Authors' Note

The research was supported by U.S. Department of Education, Institute of Education Sciences Grant R324A080037.

Manuscript received January 2013; accepted January 2014.