Predictors of Print Knowledge in Children With Specific Language Impairment: Experiential and Developmental Factors

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Purpose: Many children with specific language impairment (SLI) demonstrate delays in print knowledge, yet the reasons for these delays are not well understood. The present study investigates the degree to which developmental risk factors and home literacy experiences predict the print knowledge of children with SLI.

Method: Direct child measures, maternal reports, and observations from 41 mothers and their preschool-aged children with SLI assessed child language and attentional difficulties, family socioeconomic status, the frequency and quality of home literacy, and children’s print knowledge.

Results: Hierarchical multiple regression analyses revealed that individual differences in children’s oral language abilities did not explain individual variability in print knowledge. The quality of home literacy was the only significant predictor of print knowledge, but its influence was moderated by children’s attentional difficulties.

Conclusions: Findings reveal that language difficulty is not an adequate explanation for the print knowledge delays of children with SLI and suggest that literacy experiences may play an important role in the print knowledge attainment of children with SLI. The quality of home literacy appears to foster print knowledge by compensating for attentional difficulties in children with SLI but is not sufficient to promote print knowledge in children with SLI without attentional difficulties.

KEY WORDS: language impairment, print knowledge, emergent literacy

Over one-half of young children with primary language difficulties, or specific language impairment (SLI), fail to achieve skilled reading (Catts, Fey, Tomblin, & Zhang, 2002; Catts, Fey, Zhang, & Tomblin, 1999). Often, children’s reading difficulties are foreshadowed by significant early delays in prereading development, referred to as emergent literacy (e.g., print knowledge and phonological awareness; Boudreau & Hedberg, 1999; Justice, Bowles, & Skibbe, 2006). One domain of emergent literacy development significantly and strongly associated with later reading skills and with which children with SLI have particular difficulty is print knowledge. Print knowledge is a multidimensional construct and encompasses children’s understanding of the forms of print (e.g., letters or words), features of print (e.g., directionality or organization of print on a page), and functions of print (e.g., that print symbolically represents speech and meaning) acquired prior to the advent of formal reading instruction. Print knowledge is commonly operationalized through multiple tasks, including measures of print concepts (Lomax & McGee, 1987; Storch & Whitehurst, 2002), alphabet knowledge (Lonigan...
their same-age peers on measures of print knowledge (see Justice et al., 2006). The reasons for this significant delay in print knowledge development in children with SLI are not well understood.

Currently, empirical findings of print knowledge development in sociodemographically at-risk and typically developing children indicate that print knowledge is multiply determined, predicted by children’s developmental characteristics (e.g., language ability, age, and behavior; see Crone & Whitehurst, 1999; Lonigan, et al., 1999; Storch & Whitehurst, 2002), home environment (e.g., socioeconomic status [SES], cultural background; see Vernon-Feagans, Hammer, Miccio, & Manlove, 2001), and literacy-related experiences (e.g., Purcell-Gates, 1996). Thus, study findings from at-risk and typically developing children suggest that ecological influences are important to understanding variability among children in print knowledge development. As such, an ecological developmental approach provides the conceptual rationale for the present study, which considers child developmental characteristics and home literacy experiences in relation to the print knowledge of children with SLI.

Bronfenbrenner and Morris (2006) indicate that an ecological developmental approach is best served by two propositions, namely that (a) experiences within a child’s immediate environment (i.e., proximal processes such as book reading) are the key mechanisms of development and (b) child characteristics (e.g., child competence) and environmental characteristics (e.g., economic resources in the home) may influence or moderate the association between a particular experience and a particular outcome (Bronfenbrenner, 1999; Bronfenbrenner & Morris, 2006). Although this study does not provide a comprehensive test of the ecological developmental model as posited by Bronfenbrenner and Morris (2006), their conceptual framework guides the aims of this study. In this study, we consider two developmental characteristics (i.e., language difficulties and attentional difficulties) and two home literacy experience factors (i.e., the frequency and quality of home literacy activities) in relation to the print knowledge of children with SLI. We focus on these factors because they are among the most consistently associated with print knowledge in young children but have not yet been considered collectively in relation to the print knowledge of children with SLI. Consistent with an ecological developmental approach, we also consider the interaction of these factors in relation to print knowledge in order to determine whether children’s developmental characteristics moderate home literacy effects.

### Developmental Risk Factors and Print Knowledge

Theoretically, the print knowledge difficulties of children with SLI may evolve from linguistic weaknesses upon which both oral language and written language depend (e.g., Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003; Tallal, Allard, Miller, & Curtis, 1997). Supporting this perspective are clear parallels between oral and written language difficulties demonstrated by children with SLI. Children with SLI demonstrate weak faculty with the forms, features, and functions of oral language (Rescorla & Lee, 2000). Children with SLI struggle with similar aspects of written language, including delayed acquisition of letter names and metalinguistic terms, slowed learning of the rules of print, difficulty using contextual knowledge to interpret written stimuli, and difficulty with early writing abilities (Boudreau & Hedberg, 1999; Cabell, Justice, Zucker, & McGinty, in press; Gillam & Johnston, 1985). Thus, the breadth and nature of written language difficulties in children with SLI may simply reflect linguistic weaknesses that manifest dually in oral and written language modalities.

Yet, not all children with SLI demonstrate print knowledge difficulties. Justice et al. (2006) studied the emergent literacy skills of 20 preschoolers with SLI, who as a group received a mean print knowledge score significantly lower than their nonimpaired peers (\(M = 94\) and \(M = 111\), respectively) when controlling for equivalence of children’s SES. However, the range of scores (74–111) indicated that some children with SLI performed within the normal range on early indicators of print knowledge, despite their oral language weaknesses (see also Boudreau & Hedberg, 1999). Such findings suggest that the relation between children’s language and print knowledge abilities may be inconsistent across children, despite moderate associations evident at the group level in studies of typically developing children (e.g., Dickinson et al., 2003; Storch & Whitehurst, 2002). This study explores variability in the relationship between language and print knowledge by investigating the degree to which the severity of language difficulties, in relation to other developmental factors and experiential factors, may explain the variability of print knowledge of children with SLI.

A developmental risk factor that frequently co-occurs with language difficulties and may be associated with print knowledge difficulties among children with SLI is attentional difficulties (e.g., Tomblin, Zhang, Buckwalter, & Catts, 2002). Theoretically, attentional difficulties arise from weaknesses in behavioral inhibition and executive functions and are thought to affect children’s ability to engage and persist in learning (Barkley, 1997; Blair, 2002). Experts have proposed that attentional difficulties...
can present a salient risk factor to children’s timely achievement of literacy skills (e.g., Lahey et al., 1998; Rabiner & Coie, 2000). Although the relations between attentional difficulties and emergent literacy deficits are unclear, attentional weaknesses may reduce the benefit that children receive from participation in key early literacy experiences (see Spira & Fischel, 2005) and thus could be a significant factor indirectly influencing the print knowledge of children with SLI.

Researchers have shown there to be relationships between attentional abilities in preschool- and kindergarten-aged children and academic readiness skills (Lahey et al., 1998; Rabiner & Coie, 2000). Moreover, researchers have also shown that children who display attentional problems in preschool and early elementary school gain less from emergent literacy and early reading intervention programs than do other children (see Justice, Chow, Capellini, Flanigan, & Colton, 2003; Nelson, Benner, & Gonzalez, 2003; Rabiner & Malone, 2004). For example, in a 12-week emergent literacy intervention that involved 18 children exhibiting multiple risks (including SLI), Justice et al. (2003) found that measures of children’s attentiveness and engagement during literacy activities uniquely predicted 11% ($p < .05$) of the variance in children’s emergent literacy gains. The comorbidity of attentional problems and SLI, with an estimated 18% of second-grade children with SLI experiencing clinically significant problems (e.g., ADD/ADHD; Tomblin, et al., 2002), suggests that attentional difficulties warrant consideration in relation to the print knowledge of children with SLI.

**Home Literacy Experiences and Print Knowledge**

Some experts investigating the relative influence of genetic and experiential effects on print knowledge contend that print knowledge, more than other aspects of early literacy development, is particularly influenced by features of the children’s shared environment (Lemelin et al., 2007; Petrill et al., 2007). A recent study by Petrill and colleagues (2007) indicated that home literacy experiences accounted for an estimated 38% of the longitudinal stability of print knowledge outcomes in a sample of typically developing twins. Similar findings were repeated in a recent twin study identifying genetic and environmental mediators of letter knowledge in kindergarten-aged children (Lemelin et al., 2007).

For preschool-aged children with SLI, however, there is limited information on the contribution of home literacy experiences to children’s print knowledge. A substantial number of studies characterizing children’s home literacy experiences have focused on the linguistic behaviors of parents and children during book sharing, with only a few of these studies including children with SLI (e.g., Crain-Thoreson & Dale, 1999; Crowe, 2000; DeLoache & de Mendoza, 1987; De Temple, 2001; Evans & Schmidt, 1991; Hammett, van Kleeck, & Huberty, 2003; Hoff-Ginsberg, 1991; Justice & Kaderavek, 2003; Ninio & Bruner, 1978; Pellicrini, Perlmuter, Galda, & Brody, 1990; Rabidoux & MacDonald, 2000; Reece & Cox, 1999; van Kleeck & Beckley-McCall, 2002; van Kleeck, Gillam, Hamilton, & McGrath, 1997; Whitehurst et al., 1988). Further, research supports the importance of taking an extended view of home literacy when considering its relation to children’s emergent literacy learning (e.g., Burgess, Hecht, & Lonigan, 2002; Frijters, Barron, & Brunello, 2000; Roberts, Jergens, & Burchinal, 2005; Sénéchal, LeFevre, Thomas, & Daley, 1998; Sonnenschein & Munsterman, 2002). However, almost no studies have taken a broad view of home literacy when considered in relation to the print knowledge of children with SLI. Based on studies of emergent literacy development in typically developing and at-risk young children, this study considers two conceptually distinct facets of home literacy experiences that consistently relate to children’s outcomes. In particular, this study considers the frequency and quality of home literacy activities in relation to the print knowledge of children with SLI (see Leseman & DeJong, 1998; Sénéchal et al., 1998).

**Frequency of home literacy activities.** Children’s observations of literacy activities by others (e.g., observing parents reading a newspaper or writing a grocery list), personal exploration of literacy (e.g., pretending to read or write), and participation in adult-guided interactions with print (e.g., book reading, learning letter names) are believed to directly foster children’s print knowledge (Purcell-Gates, 1996; Sénéchal & LeFevre, 2002; Serpell, Sonnenschein, Baker, & Ganapathy, 2002; Sulzby, 1985). Research characterizing these features of the home literacy environments of children has shown there to be remarkable variation in both their breadth and frequency and that these differences are meaningful to children’s print knowledge outcomes (e.g., Ezell & Justice, 2000; Hammert et al., 2003; Hart & Risley, 1995; Teale, 1986). For example, Purcell-Gates’ (1996) study of home literacy activities in 20 homes revealed moderately high to high correlations between the frequency of reading and writing in the home (with or without the child’s involvement) and children’s emergent writing ability ($r = .88$) and print concepts knowledge ($r = .67$). In a sample of Canadian children ($n = 95$), Frijters and colleagues (2000) found that the amount of parent–child literacy activities (e.g., frequency of shared book reading, number of trips to the library) explained a significant 12% of the variance in children’s letter-name and letter-sound knowledge. These and other studies suggest that frequent opportunities to engage in or observe literacy-related activities in the home positively impact the print knowledge of...
Quality of home literacy experiences. Researchers have also shown that qualitative aspects of home literacy experiences, often measured during parent–child shared reading, independently contribute to children’s emergent literacy achievements (Bus & van IJzendoorn, 1988; Reece & Cox, 1999). Qualitative aspects of home literacy experiences of particular salience include instructional focus and socioemotional support. Concerning the former, shared book reading at home provides a familiar, repeatable context for which an adult can provide explicit support of children’s learning about print forms and functions as well as other related aspects of literacy (e.g., vocabulary words, phonological concepts; Bennett et al., 2002; Fielding-Barnsley & Purdie, 2003; Justice & Ezell, 2001; Reece & Cox, 1999). Sénéchal and LeFevre (2002) found that the extent to which parents reported use of explicit, print-focused instruction when reading with their children in kindergarten (n = 168) explained a significant 4% of the variance in children’s first-grade print knowledge, even when controlling for children’s print exposure, language and phonological awareness skills, and frequency of shared storybook reading.

Concerning the latter, the socioemotional climate of literacy interactions, defined largely by the level of adult sensitivity displayed, creates a “safe base” that encourages children’s learning. Longitudinal studies have shown a strong predictive relationship between maternal sensitivity and children’s language and literacy outcomes (Landry, Miller-Loncar, Smith, & Swank, 1997; Roberts et al., 2005). In shared book reading contexts specifically, there is considerable variability in parental display of sensitivity, and these differences impact children’s motivation toward and interest in print (Bus & van IJzendoorn, 1995; Sonnenschein & Munsterman, 2002). For example, Bus and van IJzendoorn (1997) illustrated that differences in mothers’ sensitivity when reading with their young children was associated with differences in children’s responsiveness to maternal teaching and eagerness displayed toward the book reading task. Thus, the sensitivity mothers display during book reading appears to be a potentially powerful influence on children’s emergent literacy learning.

Study Purpose and Research Questions

The purpose of this study was to explore associations among print knowledge, language and attentional characteristics, and frequency and quality of home literacy activities for children with SLI. This study adds to an emerging but understudied area of research investigating the role that home literacy experiences may play in contributing to the print knowledge of children with SLI (e.g., Skibbe, Justice, Zucker, & McGinty, 2008). Conceptually motivated by an ecological developmental approach, we consider the associations among child developmental characteristics, experiential factors, and Child × Experience interactions in relation to children’s print knowledge outcomes. Our first research question asked: In a sample of children with SLI, what are the unique associations of developmental risk factors (language difficulties, attentional difficulties) and home literacy experiences (frequency and quality) to print knowledge? The second research question asked: Does the relation between home literacy experiences (frequency and quality) and print knowledge depend on the extent of children’s language and attentional difficulties?

Method

Participants

Forty-one mothers and their preschool-aged children with SLI participated in this study. The dyads were participants in a larger study investigating the effects of a home-based literacy intervention. Data for the present study were collected at an initial home visit that preceded any intervention implementation; the data represent the subset of dyads for whom all relevant study measures were available.

To participate in the larger study, children were required to meet a series of inclusionary and exclusionary criteria designed to identify SLI and rule out other developmental conditions that may result in depressed language ability. Specifically, they were required to exhibit clinically depressed language ability, pass a bilateral hearing screening using conventional procedures, receive a standard score of 80 or higher on the nonverbal subtest of the Kaufman Brief Intelligence Test–2 (KBIT-2; Kaufman & Kaufman, 1990), and have an unremarkable sensory, motor, and neurological history per parental report. Clinically depressed language ability was operationally defined as receiving a stanine score at or below 6 (10th percentile) on at least two subtests of the standardized Test of Language Development–3:Primary (TOLD-P:3; Newcomer & Hammill, 1997) and a composite standard score less than or equal to 85 on either the Spoken Language or Syntax Quotient. Children received a mean Spoken Language Quotient of 76.47 (SD = 28.39) and a mean Syntax Quotient of 76.38 (SD = 12.78). The mean KBIT-2 nonverbal score was 97.21 (SD = 12.90), with the majority of children (70%) demonstrating nonverbal IQ scores at or above a standard score of 91.

The children (30 boys, 11 girls) had an average age of 54 months (SD = 3.6 months, range 48 to 60 months) and were of Caucasian (78%; n = 32), African American (7.3%, n = 3), Hispanic/Latino (4.9%, n = 2), and multiracial (9.8%, n = 4) ethnicities. Mothers had an average maternal age of 34 years, reported a mean yearly household...
income of $50,673 ($SD = $33,106)1 and the majority (68.4%) had 1–2 years of college education, a college degree, or a graduate degree. The distribution of family income was wide and evenly distributed across income brackets, with 29.3% of families earning $25,000 or less per year, 34.1% of families earning between $26,000 and $50,000 per year, 19.5% earning between $51,000 and $75,000 per year, and 17.1% earning over $75,000 per year. Additionally, to participate in the larger intervention study, the children’s mothers were required to read at a fourth-grade level or above as measured by the Wide Range Achievement Test (WRAT; Wilkinson, 1993), although this criterion did not result in any mothers being excluded from the study.

**General Procedures**

Data were collected during a 120-min home visit conducted in each family’s home by trained research assistants. Children first completed eligibility assessments with the research assistant (e.g., cognitive screening, hearing screening, language assessment), followed by administration of several experimental measures of emergent literacy skill. While the examiner administered these direct child assessments, mothers completed a set of questionnaires about themselves, their families, and their children. When all child testing was completed and mothers had completed project questionnaires, mothers and their children were videotaped during a 20-min semistructured interaction that included reading the storybook Where’s Rusty (Cartwright, 2003), a 16-page lift-the-flap storybook. Mothers were instructed to read the book as they normally read to their children.

Three sets of measures are of relevance to this study: (a) measures of child developmental risk factors (language difficulties, attentional difficulties), (b) measures of family demographics (i.e., SES) and home literacy experiences (frequency and quality), and (c) outcome measures of children’s print knowledge.

**Measures of Child Developmental Risk Factors**

*Language difficulties.* The Spoken Language Quotient of the standardized and norm-referenced TOLD-P:3 (Newcomer & Hammill, 1997) assessed the degree of children’s language difficulty. The Spoken Language Quotient is based on a standard curve with a mean of 100 and a standard deviation of 15; higher scores indicate less language difficulty, as this is a test of normative language development. The Spoken Language Quotient includes six core subtests, which collectively measure children’s receptive and expressive abilities in the areas of vocabulary, semantics, syntax, and morphology. The subtests include Picture Vocabulary, Relational Vocabulary, Oral Vocabulary, Grammatic Understanding, Sentence Imitation, and Grammatic Completion. Each of the subtests demonstrates adequate reliability and validity as determined by measures of internal consistency, test-retest reliability, criterion-related validity, and construct validity (see Newcomer & Hammill, 1997).

*Attentional difficulties.* The Attention Problems scale of the parent-report version of the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2000) was used to measure children’s level of attentional difficulties. Mothers rated the presence and frequency of 100 child behaviors, nine of which contribute to the Attention Problems scale, based on their observations of their children in the past 2 months. Ratings were made according to a 3-point rating system (0 = not true at all, 1 = somewhat or sometimes true, 2 = very true or very often true). Example items for the Attentional Problems scale include “Can’t concentrate, can’t pay attention for long” and “Can’t stand waiting, wants everything now.” The nine items related to the Attentional Problems scale were summed to create a total score of attentional difficulties, with scores ranging from 0 to 18 and higher scores indicating more attentional difficulties. Test norms indicate that a raw score of 7 or higher is considered clinically significant. Validity and reliability of this measure have been widely established (see Achenbach & Rescorla, 2000).

**Measures of Family Demographics and Home Literacy Experiences**

*SES.* Maternal report of annual family income on a demographic questionnaire served as a measure of SES.

*Frequency of home literacy activities.* The Literacy Activities Scale (see Bennett et al., 2002) measured the frequency of parent-, family-, and child-initiated literacy activities that occur in the home. Mothers rated the occurrence of nine literacy-related activities along a 5-point Likert-type scale for which 1 = hardly ever, 2 = once or twice a month, 3 = once or twice a week, 4 = once a day, and 5 = two or more times a day. Examples of items include “How often do you or another family member go to the library with your child?” and “How often does your child look at books by himself/herself?” Previous research using the sample of children with SLI from which the present subsample was derived indicated that one item (“How often do you play with your child?”) showed poor internal consistency with the other items and was excluded from analyses in the present study (Skibbe et al., 2008). Reliability and internal consistency calculated on the present sample for the remaining eight items demonstrated an adequate Cronbach’s alpha value (α = .69). A total score representing frequency of literacy

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1The mean and standard deviation of family income for the TL group was calculated by excluding one outlier, whose income was four standard deviations above the mean.
activities was created by summing parental responses (rated on a scale of 1 to 5) to each of the eight questions, for a possible range of scores from 8 to 40, with higher scores indicating more frequent literacy experiences in the home.

Quality of home literacy experiences. Observational scales adapted from the Minnesota Teaching Task (MTT; Egeland et al., 1995) that examine maternal sensitivity and instructional quality during dyadic interactions were used to measure the quality of home literacy experiences, as demonstrated by mothers’ behaviors when reading the storybook, Where’s Rusty, with their children. The original MTT included 14 rating scales regarding mother-, child-, and dyadic interactional behaviors during a structured task, and two of these scales (Maternal Supportive Presence, Maternal Quality of Instruction) were adapted from the original MTT scales to make them more appropriate for examination of the book-reading context. For each of the two scales, ratings were made on a 7-point Likert-like continuum on which coders determined the degree to which the book-reading session reflected the constructs represented (1, 2 = low levels of the construct; 3, 4, 5 = moderate levels of the construct; 6, 7 = high levels of the construct).

The Maternal Supportive Presence scale measured the degree to which the mother provided an emotionally safe and supportive learning environment to the child during book reading. Specifically, this scale measured how consistently and genuinely the mother showed positive emotional regard for the child, how well-timed maternal support and encouragement was with respect to the child’s needs and frustrations, and how well the mother reassured the child when he/she encountered difficulty in the task. Scores on this scale range from 1 to 7, with 1 indicating that almost no maternal support was observed and 7 indicating that high and consistent maternal support was observed. The Maternal Quality of Instruction scale measured the degree of instructional support provided by the mother during the book reading. Specifically, this scale measured how well the mother structured the book activity, provided scaffolding and individualized help, and provided feedback and learning opportunities during the story. The scale provides a global measure of instructional quality and does not reflect instruction in print knowledge specifically. Scores on this scale range from 1 to 7, with 1 indicating that almost no instructional supports were observed and 7 indicating that well structured, consistent, and effective instructional supports were observed.

To determine reliability of the MTT scales as used in this study, 25% of the transcripts (n = 12) were independently coded by two trained observers. Reliability was calculated based on the procedures for calculating within-one interrater agreement for each scale (see NICHD Early Child Care Research Network, 2002). Interrater reliability across two independent raters was 92% for the Maternal Supportive Presence scale and 100% for the Quality of Instruction scale. Conferencing among the two coders was used to arrive at final scores when discrepancies occurred.

For the present study, a single standardized factor score was used to represent quality of home literacy experiences based on the MTT scores, derived from a principle components analysis (PCA). PCA using scores from Maternal Supportive Presence and Maternal Quality of Instruction yielded a single factor solution accounting for 87.9% of the variance and an Eigenvalue of 1.76. High positive loadings of each scale (.93 for each) and high communality values (.88 each) supported use of the single factor score as a measure of home literacy quality.

Outcome Measures

Print knowledge. A single measure of print knowledge was used to reflect children’s alphabet knowledge and understanding of print concepts. This measure used a composite score from the Upper-Case Alphabet Recognition subtest of the Phonological Awareness Literacy Screening for Preschool (PALS-PreK: UC; Invernizzi, Sullivan, Meier, & Swank, 2004) and the Preschool Word and Print Awareness Assessment (PWPA; Justice & Ezell, 2001). To create the print knowledge composite, raw scores from these two measures were converted to standardized Z scores and summed. Combining these measures was based on theoretical and empirical evidence that print-related skills as measured by these different tests represent a single underlying ability (Boudreau & Hedberg, 1999; Lomax & McGee, 1987). Details on the individual measures from which the composite was derived follow.

Alphabet knowledge. The PALS-PreK: UC task measured children’s ability to name the upper-case letters of the alphabet. Examiners asked children to name each of the 26 individual, upper-case letters that are presented in random order on a single printed sheet. One point was awarded for every letter correctly identified, for a total of 26 points. Interrater reliability of this measure is reported as .99 (Invernizzi et al., 2004).

Print concepts. The PWPA measured children’s ability to demonstrate knowledge of 14 print concepts (e.g., print directionality, print forms, meaning of print) in the context of a shared book reading interaction. Examiners embed a sequenced set of questions into the reading of 12 of the book’s pages. Examples of questions asked during the storybook reading include “Show me just one letter on this page” and “Where do I begin to read?” Correct responses receive either 1 or 2 points, with partial credit allowable on several questions, for a
possible raw score of 17 points. The PWPA demonstrates adequate interrater reliability (Justice & Ezell, 2001) and validity as established through item-response theory analyses (see Justice et al., 2006).

Results

Descriptive data and intercorrelations for measures of child developmental risk characteristics, family demographics, home literacy experience, and child outcomes are presented in Table 1. Children’s language abilities were not correlated with any of the study measures, nor was presence of attentional problems; however, these were negatively associated \((r = -.37)\). The two indicators of home literacy quality, maternal quality of instruction and maternal supportive presence, were highly intercorrelated \((r = .76, p < .01)\), as expected. Maternal supportive presence was also positively associated with children’s alphabet knowledge \((r = .33, p < .05)\). The absence of significant intercorrelations among most study variables suggests that each represented a distinct construct.

The first research question sought to determine the unique contributions of child developmental risk factors and home literacy experiences to children’s print knowledge. A series of four hierarchically ordered regression models were created by sequentially adding (a) SES, (b) child developmental risk factors (i.e., language difficulties, attentional difficulties), (c) frequency of home literacy activities, and (d) quality of home literacy activities. Thus, each regression model built upon previous models, allowing for an iterative evaluation of the association among predictors and children’s print knowledge, given newly added predictors to the model. Table 2 presents the standardized associations of the predictors to print knowledge in each of the four models.

It is important to note that the hierarchical analytical approach of this study allowed for a strict evaluation of home literacy effects on the print knowledge of children with SLI. Importantly, the influences of SES and child developmental risk factors were already taken into account when evaluating the influence of home literacy experiences on children’s print knowledge. It is also important to note that we controlled for SES using the measure of family income only. Family income demonstrated significant variability in this sample (see Table 1), and research has suggested that general family resources (such as family income) are important to children’s early literacy achievements (e.g., Lee & Burkam, 2002). However, maternal education is also considered an important indicator of SES that is influential to children’s literacy development (see Curenton, 2008). In this study, the zero-order association between maternal education and print knowledge was extremely limited (see Table 1), perhaps as a function of the sampling frame used in this sample and limited range for this variable. Therefore, given our small sample size and the need to minimize the ratio of predictors to participants for unbiased variance estimates (see Yin & Fan, 2001), we did not include maternal education in our models as a control for the home literacy environment.

### Table 1. Descriptive data and intercorrelations among measures of child developmental characteristics, home literacy experience factors, and print knowledge.

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<tr>
<th>Measure/scale</th>
<th>M</th>
<th>SD</th>
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<th>6</th>
<th>7</th>
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<th>9</th>
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<tbody>
<tr>
<td>1. Nonverbal IQ</td>
<td>—</td>
<td>.58*</td>
<td>-.24</td>
<td>-.01</td>
<td>.04</td>
<td>-.10</td>
<td>-.10</td>
<td>.14</td>
<td>.12</td>
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<td>2. Language</td>
<td>76.47</td>
<td>28.39</td>
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<td>-.37*</td>
<td>.04</td>
<td>.10</td>
<td>.08</td>
<td>.08</td>
<td>.11</td>
<td>.30</td>
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<td>3. Attentional difficulties</td>
<td>3.21</td>
<td>2.44</td>
<td>—</td>
<td>-.20</td>
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<td>.02</td>
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<td>.00</td>
<td>-.17</td>
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<td>4. Quality of home literacy</td>
<td>3.60</td>
<td>0.72</td>
<td>—</td>
<td>-.29</td>
<td>.41**</td>
<td>.01</td>
<td>.13</td>
<td>.28</td>
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<td>5. Frequency of home literacy</td>
<td>25.52</td>
<td>4.35</td>
<td>—</td>
<td>.08</td>
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<td>.14</td>
<td>.01</td>
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<td>7. Print concepts</td>
<td>5.95</td>
<td>2.57</td>
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<td>8. SES/Family income</td>
<td>50K</td>
<td>33K</td>
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<td>9. Maternal education</td>
<td>12.15</td>
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Note. Nonverbal IQ measured by the Matrices subtest of the Kaufman Brief Intelligence Test–2 based on \(M = 100, SD = 15\). Language measured by the Spoken Language Quotient of the Test of Language Development–3: Primary based on \(M = 100, SD = 15\). Attentional difficulties measured by the Attention Problems subscale of the Child Behavior Checklist with a score range of 1–18, with 7 being clinically significant. Quality of home literacy measured by the Minnesota Teaching Task rated on a scale of 1 to 7, with 1, 2 being low; 3, 4, 5 being moderate; and 6, 7 being high. Frequency of home literacy measured by the Literacy Activities Scale with a score range of 8–40. Letter knowledge measured by the Phonological Awareness Literacy Screening for Preschool: Upper-Case Alphabet Recognition subtest with a score range of 0–26. Print concepts measured by the Preschool Word and Print Awareness Assessment with a score range of 0–17. SES reflects annual family income. Maternal education reflects years of education with a range of 8–18 or higher.

\(*p < .05, **p < .01.\)
The first regression model demonstrated that when SES was considered alone, it was a significant predictor of children's print knowledge, $\beta = .31$, $t(39) = 2.04$, $p = .05$, and accounted for approximately 10% ($R^2 = .097$) of the variance in children's skills. The second model added language difficulties and attentional difficulties (i.e., child developmental risk factors) to the model. The results demonstrated that SES continued to be the only significant predictor of children's skills, $\beta = .32$, $p = .05$, with language difficulties and attentional difficulties demonstrating weak, nonsignificant associations with children's print knowledge, $\beta = .12$, $\beta = .11$, respectively, $p > .10$. Language difficulties and attentional difficulties uniquely explained only 2% of the variance in children's print knowledge, $\Delta R^2 = .02$, $p > .10$, in a model that did not achieve statistical significance, $R^2 = .12$, $F(3, 39) = 1.73$, $p = .18$. The results of the third regression model demonstrated that the frequency of home literacy uniquely explained less than 1% of the variance in children's print knowledge, $\Delta R^2 = .01$, $p > .10$, above that accounted for by SES and child developmental risk factors; thus, it did not significantly improve the predictive power of the overall model. Individual predictor coefficients continued to demonstrate that SES was the only variable significantly associated with children's print knowledge (see Table 2 for specific coefficients).

The fourth and final model tested the unique contribution of the quality of home literacy experiences over-and-above SES, child developmental risk factors, and the frequency of home literacy to predict children's print knowledge. Collectively, this model explained 22% of the variance in children's skills, $R^2 = .22$, $F(5, 35) = 1.94$, $p = .113$, with the quality of home literacy uniquely explaining a significant 9% of the variance in children's print knowledge, $\Delta F(1, 35) = 4.15$, $p = .05$, above all other predictors. Individual predictor coefficients from this full model indicated that SES was no longer significantly associated with children's print knowledge, $\beta = .25$, $p > .10$, whereas the quality of shared storybook reading had a relatively strong and statistically significant association, $\beta = .35$, $p = .05$. No other predictors were significantly associated with print knowledge. Note that in this final model, the strong and significant association of SES to print knowledge was reduced to a nonsignificant level when quality of home literacy experiences was added (from $\beta = .32$, $p = .05$, to $\beta = .24$, $p > .10$), consistent with a mediation model (see Baron & Kenny, 1986). Given that SES was fully meditated by the quality of home literacy, SES was eliminated from future analyses for the sake of parsimony.

Table 2. Summary of hierarchical regression model predicting print knowledge for children with SLI.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\beta$</td>
<td>$t(1, 39)$</td>
<td>$\beta$</td>
<td>$t(1, 39)$</td>
</tr>
<tr>
<td>SES</td>
<td>.31*</td>
<td>2.04</td>
<td>.32*</td>
<td>2.07</td>
</tr>
<tr>
<td>Language</td>
<td>.12</td>
<td>0.77</td>
<td>.11</td>
<td>0.66</td>
</tr>
<tr>
<td>Attentional difficulties</td>
<td>.11</td>
<td>0.66</td>
<td>.10</td>
<td>0.62</td>
</tr>
<tr>
<td>Frequency of home literacy</td>
<td>.08</td>
<td>0.52</td>
<td>.08</td>
<td>0.52</td>
</tr>
<tr>
<td>Quality of home literacy</td>
<td>.35*</td>
<td>2.04</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p $\leq .05$.

The second research question sought to determine whether the relationship between home literacy experience (frequency and quality) and children's print knowledge depended upon children's developmental risk factors (i.e., language difficulties and attentional difficulties). For hypothesis testing, four interaction terms were studied: (a) language difficulties and frequency of home literacy experiences ($\text{Language} \times \text{Frequency}$), (b) language difficulties and quality of home literacy experiences ($\text{Language} \times \text{Quality}$), (c) attentional difficulties and frequency of home literacy experiences ($\text{Attention} \times \text{Frequency}$), and (d) attentional difficulties and quality of home literacy experiences ($\text{Attention} \times \text{Quality}$). Four hierarchical regression models were run in which each interaction term was individually assessed in a model that also considered the main effects of child developmental risk characteristics (language difficulties, attentional difficulties) and home literacy experience factors (i.e., frequency of home literacy experiences, quality of home literacy experiences). Table 3 presents analytical results for each of these models.

Results from the first model investigating the $\text{Language} \times \text{Frequency}$ interaction term on children's print knowledge indicated that the unique contribution of the $\text{Language} \times \text{Frequency}$ interaction above main effects of home literacy experiences and child developmental risk factors was not significant, $\Delta R^2 = .03$, $\Delta F(1, 35) = 1.30$, $p = .26$. The second and third models, for which the $\text{Language} \times \text{Frequency}$ interaction term was replaced with the $\text{Language} \times \text{Quality}$ and $\text{Attention} \times \text{Frequency}$ interaction terms, respectively, also failed to achieve statistical significance (see Table 3). The final model,
regressing the Attention × Quality interaction on print knowledge after controlling for the effects of the frequency and quality of home literacy experiences and child developmental risk characteristics, showed that the Attention × Quality interaction uniquely explained 11% of the variance in children’s skills, \( DF(1, 35) = 5.31, p = .03 \).

To further explore the significant interaction between attentional difficulties and quality of home literacy experiences, the sample was divided into children with relatively high and relatively low levels of attentional difficulties using a median split procedure. Children whose levels of attentional difficulties were at or below this sample’s median score (3.0) comprised the low attentional difficulties group (low; \( n = 24 \)) and those whose scores were above the median score comprised the high attentional difficulties group (high; \( n = 17 \)). Mean scores on the attentional measures were statistically different, \( F(1, 39) = 5.42, p = .03 \), for the low (\( M = 1.58, SD = 1.06 \)) and high (\( M = 5.71, SD = 1.69 \)) groups, although the mean quality of home literacy was not statistically different, \( F(1, 39) = 0.003, p = .96 \), for the low (\( M = 4.79 \)) and high (\( M = 4.4 \)) groups.

The quality of home literacy experience was regressed on children’s print knowledge for each of the two attention groupings (low and high). For the children in the low attentional difficulties group, the quality of home literacy experiences explained less than 1% of the variance in children’s print skills, \( R^2 = .02, DF(1, 24) = 0.29, p = .66 \). In contrast, for children in the high attentional difficulties group, the quality of home literacy experiences significantly explained 38% of the variance in children’s print knowledge, \( R^2 = .38, DF(1, 15) = 9.34, p = .01 \). Figure 1 illustrates the nature of this interaction, showing the print knowledge scores for each group (low attentional problems/high attentional problems) when the quality of home literacy activities was low and high. Children in the low attentional difficulties group demonstrated minimal increase in print knowledge scores as a function of increasing quality of home literacy (approximately 0.15 \( SD \) increase in print knowledge for every 1 \( SD \) increase in quality). In contrast, children in the high attentional difficulties group demonstrated a dependency on the quality of home literacy experiences for development of print knowledge. That is, children in the high attentional difficulties group demonstrated low print knowledge scores (close to \(-1 SD\)) when the quality of home literacy was low and high print knowledge scores when the quality of home literacy was high.

### Table 3. Summary of regression models investigating main and interaction effects of child developmental risk factors and home literacy experiences on print knowledge.

<table>
<thead>
<tr>
<th>Model</th>
<th>( R^2 )</th>
<th>( \Delta R^2 )</th>
<th>( DF )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Child characteristics (language, attention difficulties)</td>
<td>.02</td>
<td>.02</td>
<td>0.29</td>
</tr>
<tr>
<td>2. Frequency of home literacy</td>
<td>.02</td>
<td>.01</td>
<td>0.29</td>
</tr>
<tr>
<td>3. Quality of home literacy</td>
<td>.16</td>
<td>.14*</td>
<td>5.82*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Language × Frequency of Home Literacy</td>
<td>.19</td>
<td>.03</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Language × Quality of Home Literacy</td>
<td>.21</td>
<td>.05</td>
<td>2.04</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Attention × Frequency of Home Literacy</td>
<td>.18</td>
<td>.03</td>
<td>1.12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Attention × Quality of Home Literacy</td>
<td>.27</td>
<td>.11*</td>
<td>5.31*</td>
</tr>
</tbody>
</table>

*\( p < .05 \).
literacy was low (−1 SD) and demonstrated an increase of approximately one half of a standard deviation unit in print knowledge for every one standard deviation unit increase in the quality of home literacy experiences.

Discussion

The purpose of this research was to investigate the relations among child developmental risk factors, home literacy experiences, and individual differences in the print knowledge of children with SLI. Nearly 50% of children with SLI demonstrate reading difficulties by second grade (Catts et al., 2002), and for many these difficulties are foreshadowed in preschool and kindergarten with early delays in print knowledge development (National Early Literacy Panel, 2004). Research indicating that early literacy difficulties more often than not will persist over time (Cunningham & Stanovich, 1997; Juel, 1988) suggests the importance of taking a preventative approach to addressing early and later reading difficulties in high-risk populations, such as children with SLI. This research informs the prevention of reading difficulties in children with SLI in two ways. First, findings highlight the complex relationship between language impairment and reading difficulties (Bishop & Snowling, 2004; Catts, Adlof, Hogan, & Weismer, 2005) by suggesting factors that may directly influence emergent literacy abilities in children with SLI. Second, findings inform the design of emergent literacy programs seeking to prevent reading difficulties in children with language disabilities by identifying factors that may serve as protective factors to the attainment of print knowledge in children with SLI.

Language and Print Knowledge

Our first finding, that individual differences in children’s oral language abilities did not explain individual variability in print knowledge, suggests that early written language difficulties in children with SLI are not simply an extension of their oral language difficulties (for a discussion of this topic, see Dickinson et al., 2003; Dickinson & Snow, 1987). This finding builds upon research demonstrating that language difficulty does not preclude attainment of print knowledge in all children with SLI (Boudreau & Hedberg, 1999; Cabell, Justice, Konold, & McGinty, 2008; Justice et al., 2006) and that some children with SLI, for reasons largely unknown, achieve literacy in a typical and timely fashion. Although many studies find a moderate and positive association between language and print knowledge in typically developing children (e.g., Dickinson et al., 2003; Storch & Whitehurst, 2002), our data suggest this relationship is not absolute and does not necessarily extrapolate to children with clinically depressed language abilities. Instead, consideration of the relationship between developmental skills in atypically developing children provides a “natural experiment,” allowing dependencies among developmental areas to be better understood (Tager-Flusberg, 1994). Our findings would suggest that language and print knowledge are not inextricably linked and that language difficulty is not a comprehensive explanation for the print knowledge delays experienced by many children with SLI (Justice et al., 2006). It is important to note that although this was a study of children with SLI, there was wide variability in children’s composite level language skills (see Table 1). Thus, the lack of association between language and print knowledge in this study is not attributable to constrained variability and, instead, reveals the complex relationship between language and print knowledge.

Theoretically, the lack of dependence upon language for children’s print knowledge is consistent with the perspective that print knowledge reflects children’s growing understanding of the symbolic nature of print, a largely cognitive development occurring through children’s experiences with print (Bialystok, 1995; Bialystok & Reese, 1996). Symbolic understanding is reflected in a person’s ability to consider a symbol as an object itself and also a representation of something else (DeLoache, 2002). Print knowledge reflects children’s understanding that print has a dual function: as an object of interest (e.g., children’s ability to identify print forms such as letters, words, and letter names) and as a representation of oral language (e.g., children’s understanding that the beginning of a line of print signals the beginning of reading or speaking, that print can represent characters’ speech). From this perspective, print knowledge reflects children’s ability to consider that print is symbolic of language, which in turn facilitates children’s discovery of how print is symbolic, with letters corresponding to phonemes of speech (Bialystok, 1995).

Clinically, consideration of the distinctness of language and print knowledge raises the possibility that deficits of print knowledge in children with SLI are largely experientially based and that instruction may be a key to promoting this facet of emergent literacy in children with language difficulties. This possibility is supported by research that children with language difficulty have less frequent and less positive home literacy interactions and also demonstrate less interest and engagement in literacy activities, when compared with typically developing peers (Kaderavek & Sulzby, 1998; Marvin & Wright, 1997). It is also supported by genetically sensitive research designs showing that print knowledge is largely influenced by environmental features (e.g., Petrill et al., 2007). An important avenue for future research is to consider whether children with language impairment are generally responsive to preschool literacy programs that provide an emphasis on print knowledge, which would
support a strong experiential basis to the print knowledge delays in children with SLI (for a discussion of this topic as related to literacy difficulties, see Vellutino et al., 1996). Exploration of the efficacy and influence of print knowledge intervention on emergent and early literacy abilities of children with SLI is an important direction for future research and informs the design of programs meant to foster emergent literacy in young children with language disabilities.

**Home Literacy and Print Knowledge**

Our second finding was that the quality of home literacy was the only significant predictor of individual variability in children’s print knowledge when controlling for SES, child developmental characteristics, and the frequency of home literacy, but its effects were moderated by children’s attentional difficulties. We found that the quality of home literacy substantially influenced the print knowledge of children who concomitantly displayed language and even subtle (i.e., subclinical) attentional difficulties but minimally influenced the print knowledge of children with language difficulties having low or no attentional difficulties. Specifically, when the quality of home literacy was low, the print knowledge of children who concomitantly displayed language and attentional difficulties was almost one standard deviation below that of children having language difficulties only. When the quality of home literacy was high, however, the print knowledge of the two groups was relatively similar (see Figure 1).

There are two potential interpretations of our finding that children with attentional and language difficulties were more dependent upon high-quality adult-child interactions for their print knowledge than children with SLI and minimal attentional difficulties. The first interpretation suggests that attentional difficulties independently pose an additive risk to the print knowledge development of children with SLI. Thus, the risks that attentional difficulties pose to print knowledge development are layered upon the risk already existing as a result of language difficulties. From this view, our findings could suggest that high quality adult-child interactions may primarily address these attentionally based learning needs of children with SLI but do not address other learning challenges of children with SLI (e.g., for a discussion of learning difficulties associated with SLI, see Miller, Kail, Leonard, & Tomblin, 2001; Leonard, 1998). In fact, some research suggests that high-quality parent-child interactions are best suited to meet attentionally based learning needs of children. Study findings suggest that high-quality adult-child relationships only indirectly influenced children’s learning, operating on children’s engagement and self-regulation during learning activities (Ponitz, Rimm-Kaufman, Grimm, & Curby, 2007). In typically developing children, high-quality adult-child interactions emerge as one of the strongest predictors of children’s literacy development (e.g., Aram & Levin, 2004; Reece & Cox, 1999; Roberts et al., 2005), suggesting that experiential conditions that foster children’s engagement and attention may be sufficient for fostering their emergent literacy knowledge. However, our findings suggest that the learning needs of children with SLI may be more complex and that high-quality adult-child interactions may be more limited in their impact on the print knowledge of children with SLI.

A second possibility, however, is that children with SLI who have attentional difficulties may be qualitatively different than children with SLI who do not have attentional difficulties. Research demonstrates that children with SLI show a complex developmental intertwining of language, attention, and nonverbal skills (e.g., Kovac, Garabedian, Du Souich, & Palmour, 2001; Redmond & Rice, 1998; Rescorla, Ross, & McClure, 2007; Shafer, Ponton, Datta, Morr, & Schwartz, 2007; Spaulding, Plante, & Vance, 2008; Zubrick, Taylor, Rice, & Slegers, 2007). Further, there is theoretical support against the perspective that language difficulties stem from a singular or domain-specific deficit (e.g., Bates, 1999; Karmiloff-Smith, 1998; Miller et al., 2001). Thus, there is not clear support for the perspective that attentional difficulties may independently pose an additive risk to the language-based emergent literacy vulnerabilities in children with SLI. Instead, high-quality adult-child interactions may foster print knowledge in one group and not the other because children with SLI who do and do not have comorbid attentional difficulties may be dynamically different and, thus, may depend upon different mechanisms for attaining print knowledge (for a discussion of dynamics systems as related to SLI, see van Geert, 2004). Indirect support for this perspective is offered by research suggesting SLI is not a singular disorder (Conti-Ramsden & Botting, 1999) and by the inability of any one theory to fully explain the nature and cause of SLI (Bishop, Bright, Bishop, James, & Van Der Lely, 2000; Gillam & Hoffman, 2004; Hayiou-Thomas, Bishop, & Plunkett, 2004; Leonard, 1998; Miller et al., 2001). Understanding language and emergent literacy development in children with SLI who do and do not have attentional difficulties reflects an important direction of research and could further the field’s understanding of the variable nature of SLI and the complex relationship between SLI and literacy development.

**Family Income and Home Literacy**

The third major finding was that home literacy quality appeared to mediate the relationship between family income and print knowledge. This finding is consistent with previous research by Justice and colleagues (2006).
that showed there to be no significant differences in the print knowledge scores of children with LI from low-(n = 14) and middle-SES (n = 20) backgrounds. Implied in their finding is the suggestion that the mechanism impacting print knowledge difficulties for children with language impairment and children with sociodemographic risk was shared and, thus, not compounded when children had both risk factors. This study complements those findings by suggesting that the quality of home literacy is the key variable impacting print knowledge variability in children with SLI and that these experiences varied systemically by SES, accounting for a large portion of the effects that SES had on children’s skills.

A point of caution regarding this finding should be noted, however. On average, our sample was educated and middle-class, so severe systemic challenges that accompany families and communities in poverty were not well captured in this sample. In fact, 63% of our mothers had college degrees, and research has suggested that maternal education is an important proximal measure of the quality of the general home environment as related to literacy (Curenton, 2008). Thus, our findings should be interpreted very conservatively and should not be extrapolated to suggest that the effects of poverty on children’s early literacy are solely due to reduced maternal or parental support for children’s learning. In fact, the influences of poverty are thought to be of increasing importance when families are also part of neighborhoods and communities plagued by poverty (e.g., Adams, 1990). Understanding how these systemic challenges interact with more proximal environmental factors and developmental factors on children’s literacy outcomes is an important area of research, though beyond the current focus of this study.

Limitations and Future Directions

A number of limitations and areas for continued investigation in future research warrant note. The first limitation is the relatively small sample size and, consequently, the limited generalizations we can make to the more general population of children with SLI who exhibit substantial heterogeneity in their linguistic and attentional profiles (Conti-Ramsden & Botting, 1999; Resscorla & Lee, 2000). Replication of our findings with a larger sample of children with SLI is an important need in future research. Nonetheless, the results of this study suggest that a nuanced approach to understanding the effects that experiences can have on the emergent literacy skills of children with SLI must consider different facets of experience (such as quantity and quality) and different profiles of children’s developmental risk. Our findings highlight the diverse and multifaceted learning needs of children with SLI and emphasize the importance of considering how the “assets” of a particular experience are suited to the varying needs and profiles of children with SLI (Connor, Morrison, Fishman, Schatschneider, & Underwood, 2007; Hamre & Pianta, 2005).

A second limitation is the fact that our measure of the quality of home literacy is based on a global quality rating and does not provide specific guidance on maternal behaviors that are most facilitative of the print knowledge skills of children with SLI. As stated by Sénéchal, “the need for a precise understanding of the role of home literacy on a variety of skills…will provide valuable information necessary to the elaboration of evidence-based interventions” (2006, p. 62). This research expands that view and suggests that the role that home literacy has on children’s emergent literacy skills, such as print knowledge, will also differ based on the characteristics of the child. Research that seeks to understand the optimal approach to facilitating emergent literacy and print knowledge in children with SLI will need to continue to consider individual variability in the responsiveness of these youngsters to different types of emergent literacy experiences. An important direction for literacy-related prevention work is to consider facets of early literacy experiences that collectively address the multiple needs of diverse groups of children, such as those with SLI. For example, in addition to warm and supportive adult–child interactions, it is possible that other aspects of the home literacy environment may be important to some, or all, children with SLI. One possibility to explore is the degree to which literacy activities that include explicit, systematic exposure to print concepts facilitate the print knowledge of children with SLI. Evidence from natural observations of instruction in preschool classrooms and from intervention studies (with teachers and parents) show that at-risk children, including children with low vocabulary skills, benefit more from explicit rather than implicit instruction during book reading (Connor, Morrison, & Slominski, 2006; Justice et al., 2003; Lovelace & Stewart, 2007). Examining the potential trade-offs adults may make to provide warm, supportive adult–child interactions versus explicit print knowledge teaching are considerations for future research and are issues important to the design of early literacy programs for children with SLI.

A third limitation is that this study was not a longitudinal design and so could only suggest that the effects observed may also be developmentally important to print knowledge growth in children with SLI. Further, the degree to which these factors not only predict growth but predict overall level of functioning is an important consideration when investigating an at-risk population (Al Otaiba & Fuchs, 2002). As a group, children with SLI have significant difficulties attaining the levels of emergent literacy skill demonstrated by typically developing peers. This study identified factors that predicted higher print knowledge functioning in children with SLI, but
the higher level of functioning is likely still below normative levels of performance for many of the children in our sample. Predicting children’s attainment of emergent literacy abilities prior to kindergarten, which would suggest a positive trajectory of reading attainment during their school years, is an important question for future research.

In summary, our findings are consistent with an ecological perspective of development by suggesting that home literacy experiences are important to the print knowledge of children with SLI but that home literacy effects vary by the developmental profile of the child. This study is consistent with a view that reading problems are a unique combination of a child’s natural abilities and the quality and frequency of his or her literacy experiences (Vellutino, Scanlon, & Zhang, 2007). This study encouragingly suggests that experiences can be a powerful force in the emergent literacy development of young children with SLI. However, our findings also suggest that one-size-fits-all solutions to literacy learning difficulties are not likely to be adequate in diverse, heterogeneous groups, such as children with SLI. As efforts are made towards the prevention of reading difficulties in children with SLI, it is essential to explore how aspects of early literacy experiences and early literacy learning environments differentially influence children of varied developmental profiles. Such a line of inquiry is still largely unexplored and, yet, provides the basis to developing a nuanced approach to emergent literacy instruction and intervention for young, at-risk children, including children with SLI.

Acknowledgments

We acknowledge the support provided by Grant DC04933 from the National Institute on Deafness and Other Communication Disorders and support to the first author from the University of Virginia Interdisciplinary Doctoral Training Grant from the Institute of Education Sciences, U.S. Department of Education Award #R305B040049. We thank the families, children, and research staff who made this work possible. Lori Skibbe deserves a special note of gratitude for her involvement in data collection activities.

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