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Person-centered approach to examining emergent literacy risks in children with specific language impairment

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ABSTRACT

Children with specific language impairment (SLI) are at increased risk for reading difficulties, and some studies suggest that these problems are evident even with pre-reading skills, such as alphabet knowledge and phonological awareness. To date, most studies asserting these emergent literacy difficulties have relied on mean score differences between children with SLI and children who are typically developing. However, work concerning children with SLI also reports considerable heterogeneity, such that some children perform as well as typically developing peers. The present study utilizes a person-centered approach to examine whether the actual proportion of preschool children with SLI ($n = 62$) who might be identified as “at risk” on measures of emergent literacy differs significantly from the proportion of age-matched typically developing peers ($n = 40$), and whether a subset of children with concomitant speech impairment would exhibit greatest risk. Results showed that a significantly greater percentage of children with SLI were classified as at risk on all three emergent literacy measures, and the percentage of children at risk for each measure was similar. Children with concomitant speech and language impairment performed more poorly on the alphabet knowledge measure, as compared to those with LI-only, but had similar scores on the other two measures (rhyme awareness and print knowledge). Implications of these findings with respect to assessing emergent literacy in children with language disorders are discussed.

Keywords:

language impairment ■
emergent literacy ■
risks to literacy ■
concomitant speech and language impairment

INTRODUCTION

Children with specific language impairment (SLI) are best described as exhibiting language difficulties that are not attributable to abnormal hearing, cognitive, and/or neurological problems. The prevalence of SLI is estimated to be as high as 7.4% (Tomblin et al., 1997) among English-speaking children, who may exhibit difficulties in one or across several language domains, including morphology, semantics, syntax, and/or phonology. A growing body of evidence has further indicated that for many children with SLI, language deficits may also extend to reading difficulties (Simkin & Conti-Ramsden, 2006; Catts et al., 2002; Snowling, Bishop, & Stothard, 2000). For example, Catts et al. (2002) found that 42% of second-graders with SLI demonstrated reading problems (defined as scoring below 1 standard deviation on a measure of reading comprehension), compared to only 8% of their typically developing control group.

Importantly, the accumulated research suggests that for children with SLI, the difficulties associated with reading problems are often evident with the acquisition of *emergent literacy skills*, or the set of skills that contributes to the eventual acquisition of reading (Whitehurst & Lonigan, 1998). Emergent literacy theorists have suggested that reading achievement is contingent upon the development of at least two independent, yet interrelated skill sets: comprehension skills (e.g., vocabulary, print concept knowledge), and decoding skills (e.g., phonological awareness, alphabet knowledge) (Sénéchal, LeFevre, Smith-Chant, & Colton, 2001; Whitehurst & Lonigan, 1998). The present paper similarly centers on these skills, particularly alphabet knowledge, print concept knowledge, and rhyme awareness, which is often used as a measure of phonological awareness for preschool children (e.g. Boudreau & Hedberg, 1999).

Several studies have shown that compared to typically developing children, preschoolers with SLI demonstrate significantly poorer abilities on the emergent literacy skills that predict later reading ability, including alphabet knowledge, phonological awareness, and print knowledge (Boudreau & Hedberg, 1999; Gillam & Johnston, 1995; Magnusson & Nauclér, 1990; Torppa et al., 2010). Results showing mean score discrepancies between children with SLI and those who are typically developing have substantiated the need for the assessment of emergent literacy skills in preschool children, and the use of early interventions for those considered at risk for subsequent reading difficulties.

Heterogeneity Among Children with SLI

Studies that compare group average scores, however, largely ignore the fact that children with SLI are a heterogeneous population with varied strengths and weaknesses (Cabell et al., 2010; Conti-Ramsden, Crutchley & Botting, 1997; Vandewalle et al., 2012). Studies using person-centered approaches, such as cluster analysis, have shown that a group of children with SLI can be reliably subgrouped, according to either severity or language domains (e.g., Cabell et al., 2010; Conti-Ramsden et al., 1997). For example, Cabell et al. (2010) measured the

individual strengths and weaknesses of 59 preschoolers with SLI across four measures of emergent literacy and three measures of oral language. Their analyses identified three different emergent literacy profiles among this group of children with language disorders, including high, average, and low emergent literacy skills with unique strengths for the high and average groups.

Even studies examining group mean differences report variable performances from children with SLI. For example, Catts (1993) found that nearly 50% of a sample of 56 children diagnosed with speech-language impairment performed as well as a group of children with typical language skills on first and second grade reading measures. Boudreau & Hedberg (1999) reported that although some children with SLI performed quite poorly, several children performed equal to or better than their typically developing peers. Magnusson and Nauclér (1990) noted that in up to nearly 33% of the matched pairs of children with language impairment (LI) and typical development (TD), the child with LI outperformed the TD child on at least one of the phonological awareness measures. Thus, studies that have further examined individual abilities among children with SLI report considerable variability with respect to emergent literacy skills and support the need for utilizing analyses that supplement group mean differences.

Children with Concomitant Speech and Language Impairment

Adding to the nature of heterogeneity is the possibility that a proportion of participants in a study of young children with language impairment will have concomitant speech difficulties. To date, very few studies have addressed whether the co-presence of a speech impairment poses additional risks for children with a primary language impairment (Scheule, 2004). Some studies (e.g. Catts, 1993), have noted that a percentage of children with SLI exhibit concomitant speech difficulties as well, but did not further evaluate possible differences; others (e.g. Boudreau & Hedberg, 1999) may not have assessed the articulation skills of their participants, particularly if the research focused on effects from language impairment. However, this question bears consideration because estimates from prevalence studies report percentages of children with overlapping disorders ranging from 4.6% (Beitchman et al., 1986) to 15% (Shriberg, Tomblin & McSweeney, 1999), and this information may contribute to understanding whether cumulative effects from concomitant deficits exist for this subgroup of children with SLI.

Person-Centered Approach to Identifying Risk

Variable-centered approaches to examining emergent literacy skills, such as those that compare mean scores, focus on describing relationships between constructs within any given sample, thereby assuming a homogeneous population. In contrast, person-centered approaches (Hoff, 2006) focus on describing how constructs differentially impact the selected individuals (Hoff, 2006; Laursen & Hoff, 2006). This approach assumes that the targeted population, such as children with SLI, is heterogeneous and exhibits different

patterns of development across study constructs (i.e., emergent literacy) thus allowing for further investigation of such variability (see Cabell et al., 2010). The present study contributes to the body of work aimed at identifying children who might be considered “at risk” for future reading difficulties, based on performance on emergent literacy skills. Previous work indicates that, as a group, children with SLI have on average poorer abilities on emergent literacy measures; using a person-centered approach, the present study accounts for the potential heterogeneity among children with SLI by ascertaining the specific proportion of children with who exhibit risk.

Purpose of the Present Study

In sum, numerous studies have identified significant differences on emergent literacy measures between groups of children with SLI and typically developing children. Many of these studies similarly report some degree of heterogeneity in any sample of children with SLI such that a percentage of participants perform as well as typically developing peers. The present study extends previous work by examining the percentages of children in three groups (SLI only, speech *and* language deficits, typically developing) who would be categorized as “at risk” on three separate emergent literacy measures. Two main hypotheses are examined in the present work. First, we hypothesize that across all three measures of emergent literacy, a greater proportion of children with SLI will exhibit “risk status”, as compared to typically developing children. Second, we hypothesize that the subgroup of children with concomitant difficulties (i.e., speech and language) will exhibit the greatest proportion of risk among all three groups. Exploratory questions will also consider the extent to which the proportion of children at risk is similar across all three measures, or whether children with SLI demonstrate particularly high levels of risk on specific measures or not. To test these hypotheses, the present study addresses the following research questions: (1) To what extent do children with SLI exhibit risk for lags in emergent literacy development, as compared to typically developing children? and (2) To what extent do children with concomitant speech and language impairments exhibit additional risk for lags in emergent literacy, as compared to children with SLI only?

METHODS

Participants

Participants included 102 four-year-old children, drawn from two larger studies of early literacy development in young children, as discussed in other publications (i.e., Cabell et al., 2009; Justice, Pullen & Pence, 2008). The data utilized for this secondary analysis was collected at a pre-intervention stage. Data from two groups of children were used for the present study: children with SLI ($n = 62$) and children with typical language skills (TD: $n = 40$). Demographic information for both groups is provided in Table 1.

Children with SLI were required to meet the following criteria: (1) no history of neurological, sensory, or physical impairments, (2) English as the primary language spoken at home, (3) normal hearing screening, (4) a nonverbal cognition standard score at or above 80 on the *Kaufman Brief Intelligence Test* (KBIT: Kaufman & Kaufman, 1990), and (5) performance below 10th percentile on two or more sub-tests and standard scores below 85 on the Spoken Language Quotient and/or Syntax Quotient on the *Test of Language Development-3: Primary* (TOLD-3: Newcomer & Hammill, 1997). Eligibility requirements for the TD group were the same as listed above, except that standard scores on the language measures had to be 86 or greater. Full description of both sets of participants can be found in earlier reports (for SLI group, see Cabell et al., 2009; for TD group, see Justice, et al., 2008). Mean scores on the standardized language assessment are presented in Table 1.

Table 1. Means (standard deviations) for demographic variables for both groups achieved on TOLD-3.

	TD	SLI
N	40	62
Age in Months	54.13 (3.55)	54.59 (3.42)
Language	112.83 (10.83)*	83.39 (5.89)
Ethnicity (% Caucasian)	77.5	75.8
Male (%)	47%	69%
Maternal Education (% some college)	97.5*	67.7

Note: TD=typically developing; SLI=specific language impaired; * TD vs. SLI group differences, $p < 0.001$.

To address the second research question, a subgroup of children with SLI who exhibited concomitant deficits in speech production was identified based on standard scores from the articulation assessment (*Goldman-Fristoe Test of Articulation - Second Edition*, 2000). Fourteen out of the 62 children with SLI did not have scores; eleven of the 48 children for which complete data was available scored less than 1 *SD* below the mean (i.e. had a standard score of 85 or less; $M = 71$, $SD = 9.8$) and were placed into the speech *and* language impaired group (S+L); 37 children remained in the SLI-only group, as their mean standard scores were above 85 ($M = 98.5$, $SD = 9.4$).

Measures and Procedures

Children were assessed on a battery of early literacy tests. Measures relevant to the present study included alphabet knowledge, print knowledge, and rhyme awareness.

Alphabet knowledge. Alphabet knowledge was assessed using the Upper-Case Alphabet Recognition task of the *Phonological Awareness Literacy Screening for Preschool* (PALS-PreK: Invernizzi, Sullivan & Meier, 2001). In this task, children are asked to identify the names of all 26 letters, which were presented in random order. The possible range

of scores attained is 0-26 (“1” if correct, “0” if incorrect). Interrater reliability for the individual assessments ranges from .96 to .99.

Print knowledge. Print knowledge was assessed with the *Preschool Words and Print Awareness* test (PWPA, Justice & Ezell, 2001). This test includes a series of tasks that are embedded into a storybook reading activity, in which children respond to questions assessing 14 different concepts of print (e.g., book title, uppercase vs.lowercase letters, reading from left to right). The range of possible scores is 0 – 17. The validity of this measure has been previously tested (Justice, Bowles & Skibbe, 2006), with interrater reliability reported at .94.

Rhyme awareness. Rhyme awareness was measured with the PALS-PreK Rhyme Awareness task (Invernizzi et al., 2001). In this 10-item task children were shown a target picture and three associated additional pictures. The examiner named all four pictures in each set and asked the child to indicate which of the three additional pictures rhymed with the target picture. The possible range of scores on this measure is 0-10.

Procedure for identifying risk

In order to assess the percentage of children at risk in each group, threshold scores for each measure were established and utilized as cut points, and those below the derived cut point were identified as “at risk”. Similar to procedures previously used for language measures such as MLU (Bishop & Edmundson, 1987; Sansavini et al., 2010), the threshold scores, or cut points, were obtained by taking -1SD of the mean scores of the TD group for each measure. The risk cut point for each measure is shown in Table 2. It should be noted, however, that we ran our analyses using - 1.5 SD below the mean as the cut point and yielded the same overall results.

Table 2. Cut points used to determine risk for lags on emergent literacy measures

	TD means (standard deviations)	Cut-point
Alphabet knowledge	20.88 (8.08)	12.8
Print knowledge	11.05 (3.09)	7.96
Rhyme awareness	7.875 (2.3)	5.56

Note: TD mean=unadjusted mean score from typically developing children; Cut-point=derived by taking -1 SD from the mean score of TD children; Alphabet knowledge=Upper-Case Alphabet Recognition subtest of the *Phonological Awareness Literacy Screening for Preschool*; Print knowledge=*Preschool Words and Print Awareness*; Rhyme awareness=PALS-PreK, Rhyme Awareness subtest of the *Phonological Awareness Literacy Screening for Preschool*.

RESULTS

Preliminary Results

As a first step, it was of interest to evaluate the extent to

which the two groups of children (SLI and TD) were comparable across several demographic variables. An independent samples t-test indicated that the groups did not differ significantly on age ($t(100) = -.67, p = .99$) and Chi-square analyses showed that the two groups also did not differ regarding ethnicity [$\chi^2 (1, N=102) = .039, p = .844$], when comparing the percentages of children from Caucasian and non-Caucasian backgrounds. As expected, compared to children in the TD group, the children in the SLI group had significantly lower scores on the language measure ($t(96) = 17.33, p < .001$), and consisted of a significantly greater proportion of boys [$\chi^2 (1, N=102) = 4.87, p = .027$]. Additionally, a significantly greater number of children from the TD group had mothers with some college education as compared to children with SLI [$\chi^2 (1, N=102) = 13.17, p < .001$]. Because several studies have found that lower maternal education may be a risk factor for language difficulties (e.g., Dollaghan et al., 1999; Stanton-Chapman, et al., 2002), and may subsequently impact attainment of early literacy skills, this factor was included as a covariate in subsequent analyses.

Table 3. Means (standard deviation) for emergent literacy scores by group

	TD	SLI
N	39	59
Alphabet knowledge	20.88 (8.08)**	6.93 (1.20)
Print knowledge	11.05 (3.09)**	5.56 (.39)
Rhyme awareness	7.875 (2.3)**	3.80 (.31)

Note. TD=typically developing; SLI=specific language impaired; Alphabet knowledge=Upper-Case Alphabet Recognition subtest of the *Phonological Awareness Literacy Screening for Preschool*; Print knowledge=*Preschool Words and Print Awareness*; Rhyme awareness=PALS-PreK, Rhyme Awareness subtest of the *Phonological Awareness Literacy Screening for Preschool*. Data is only reported for children with complete data sets; 1 child in the TD group and 3 children in the SLI group had incomplete data on the measures reported here; **TD vs. SLI group differences significant at $p < .001$.

Research Aim 1: Emergent Literacy Risks in Children with SLI

Descriptive information concerning the scores achieved by children with SLI and those in the TD group for each of the three emergent literacy tests appears in Table 3. To account for significant differences between the two groups on maternal education, initial analyses used maternal education as a covariate. However, the estimated marginal means were not statistically different than the unadjusted mean scores, so to present the most parsimonious data, unadjusted mean scores were used to answer our research question. Group differences on the mean scores were significant for upper case alphabet knowledge ($F (1,100) = 60.36, p < .000$), the PWPA ($F (1, 99) = 101.58, p < .000$) and rhyme awareness ($F (1,97) = 86.43, p < .000$). Effect sizes were large for alphabet knowledge ($\eta^2 = .376$), PWPA ($\eta^2 = .506$), and rhyme awareness ($\eta^2 = .471$).

The primary goal of the present study, however, was to determine the extent to which children with SLI exhibited similar levels of risk for lags across each of these three measures of early literacy, as compared to children with

typical language abilities. We addressed this question by establishing cut points based on mean scores of the TD group, and then comparing the percentage of children in both groups (SLI and TD), who had scores below those cut points. On all three measures, a greater percentage of children with SLI scored below the risk cut points as compared to children within the TD group (see Figure 1). Chi-square tests confirmed these differences were significant for alphabet knowledge [$\chi^2(1, N=102) = 34.37, p < .001$], print knowledge [$\chi^2(1, N=101) = 10.22, p < .001$], and rhyme awareness [$\chi^2(1, N=99) = 23.26, p < .001$].

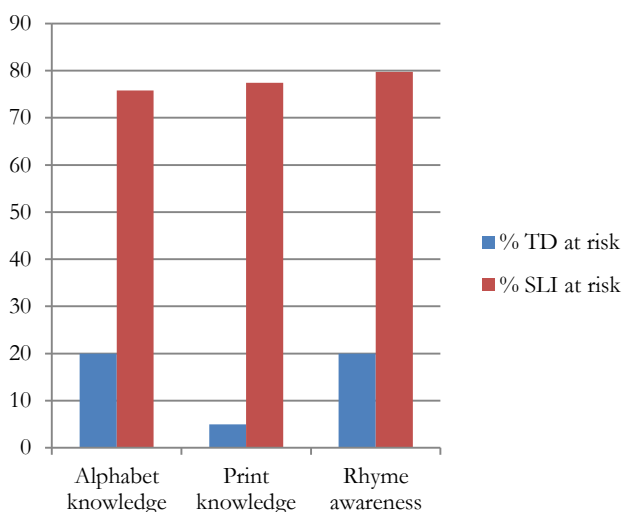


Figure 1. Percentages of children in each group (SLI and TD) at risk on each early literacy measure

Note: TD=typically developing; SLI=specific language impaired; Alphabet knowledge=Upper-Case Alphabet Recognition subtest of the *Phonological Awareness Literacy Screening for Preschool*; Print knowledge=*Preschool Words and Print Awareness*; Rhyme awareness=PALS-PreK, Rhyme Awareness subtest of the *Phonological Awareness Literacy Screening for Preschool*.

Research Aim 2: Emergent Literacy Risks in Children with Concomitant Speech Impairment

The second research question of the current study was to investigate whether children with concomitant difficulties (i.e. speech and language impairments) would perform differently than those with SLI only. Preliminary analyses comparing the two subgroups of children with SLI (e.g., SLI-only and S+L) showed that the subgroups did not differ significantly on age ($t(46) = -.39, p = .70$) or language scores ($t(46) = -.45, p = .66$). Chi-square tests revealed no subgroup differences for gender [$\chi^2(1, N=48) = 1.83, p = .176$] or ethnicity [$\chi^2(1, N=48) = 1.46, p = .22$]. The groups were significantly different regarding levels of maternal education [$\chi^2(1, N=48) = 4.76, p = .03$], such that a greater number of children in the SLI-only group had mothers with lower levels of education. The present analysis did not include this factor as a covariate because group differences on levels of maternal education would not contribute additional risk for children in the S+L group.

Mean scores on the three measures were compared to determine possible significant group differences between

those with and without concomitant speech impairment (see Table 4). The group difference between averaged scores on the alphabet knowledge measure was large, and a one-way ANOVA confirmed this difference between subgroups to be significant ($F(1, 46) = 4.577, p = .038, \eta^2 = .091$). However, group differences were not significant for print knowledge ($F(1, 46) = .505, p = .481$) nor for rhyme awareness ($F(1, 46) = .084, p = .773$).

Table 4. Means (standard deviation) for emergent literacy scores by subgroup (SLI-only and S+L)

	SLI-only	S+L
N	37	11
Alphabet knowledge	8.57 (8.64)	2.64 (5.57)*
Print knowledge	5.46 (2.54)	6.09 (2.74)
Rhyme awareness	4.03 (1.98)	3.81 (2.08)

Note. SLI-only=specific language impaired only; S+L=speech and language impaired; Alphabet knowledge=Upper-Case Alphabet Recognition subtest of the *Phonological Awareness Literacy Screening for Preschool*; Print knowledge=*Preschool Words and Print Awareness*; Rhyme awareness=PALS-PreK, Rhyme Awareness subtest of the *Phonological Awareness Literacy Screening for Preschool*; Of the 62 children with SLI in this study, GFTA scores were only available for 48; *SLI-only vs. S+L group differences significant at $p < 0.05$

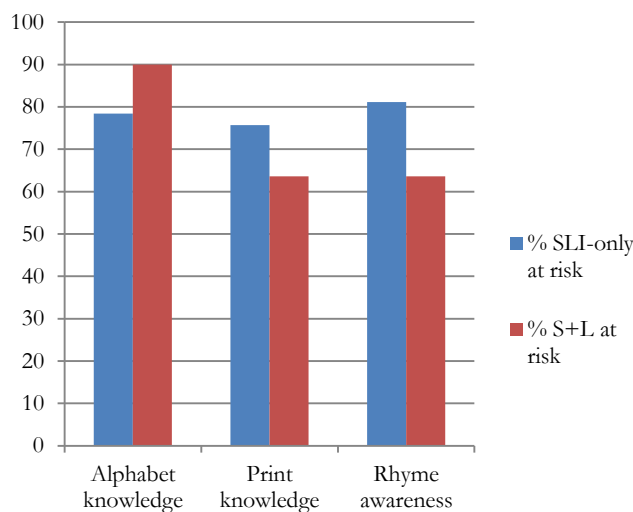


Figure 2. Percentages of children in each subgroup (SLI-only and S+L) at risk on each early literacy measure.

Note: SLI-only=specific language impaired only; S+L=speech and language impaired; Alphabet knowledge=Upper-Case Alphabet Recognition subtest of the *Phonological Awareness Literacy Screening for Preschool*; Print knowledge=*Preschool Words and Print Awareness*; Rhyme awareness=PALS-PreK, Rhyme Awareness subtest of the *Phonological Awareness Literacy Screening for Preschool*

Similar to the first research question, the primary purpose was to examine the extent to which children with concomitant deficits exhibit additional risk for lags on measures of alphabet knowledge, print knowledge and rhyme awareness as compared to children with SLI only. As

shown in Figure 2, a slightly greater number of children in the S+L subgroup were considered at risk on the upper case alphabet knowledge measure as compared to those in the SLI-only subgroup. For both print knowledge and rhyme awareness, a greater number of children in the SLI-only group were considered at risk as compared to children in the S+L subgroup. However, chi-square tests determined these differences were not significant for alphabet knowledge [$\chi^2(1, N=48) = 1.54, p = .214$], print knowledge [$\chi^2(1, N=48) = .622, p = .430$], nor for rhyme awareness [$\chi^2(1, N=48) = 1.46, p = .227$].

DISCUSSION

The present study utilized a person-centered approach to determine whether the proportion of children with SLI considered at risk on three separate emergent literacy skills differed significantly from that of typically developing children, and the extent to which children with concomitant speech impairment exhibited even greater risk. Our analyses yielded two important findings. First, results showed that children with SLI indeed exhibited elevated rates of risk, compared to age-matched typically developing peers and that the rates of risk were similar across emergent literacy measures for children with SLI. Third, children with both speech and language impairment did not exhibit accumulated risk, although mean score differences were evident. These findings are further discussed below.

Emergent Literacy Risks in Children with SLI

In accordance with existing literature (e.g., Boudreau & Hedberg, 1999; Gillam & Johnston, 1985), our results showed that four-year-old children with SLI had significantly poorer outcomes on three important predictors of literacy development as compared to typically developing children. The present study extends previous work by showing that differences were also significant when comparing the percentages of children exhibiting risk for lags in developing alphabet knowledge, print knowledge, and rhyme awareness. Although several earlier studies have suggested that children with SLI represent a heterogeneous population (Conti-Ramsden & Botting, 1999; van Weerdenburg, Verhoeven, & van Balkom, 2006), the present results did not show that one specific emergent literacy skill was particularly weak for this group of children with SLI; rather, the percentage of children at risk on measures of alphabet knowledge, print concept knowledge, and rhyme awareness was similar.

Given the results of other comparable studies, the high percentage of children with SLI exhibiting risk was not unexpected. Previous research has shown poorer outcomes for children with SLI in several areas of literacy (Catts et al., 2001; Catts et al., 2002; Zourou, Ecalle, Magnan, & Sanchez, 2010), and longitudinal work has found that many children with SLI continue to exhibit a greater degree of difficulties compared to their typically developing peers in literacy achievement, even into the high school years (Conti-Ramsden & Durkin, 2007; Snowling et al., 2000). Our findings suggest that this achievement gap in literacy

development is evident from a very young age. Differences in mean scores and risk percentages were significant for these four-year-old children even when accounting for differences in socioeconomic status, underscoring a robust association between early language impairment and weak emergent literacy skills. As such, these findings provide strong support for the idea that clinicians should assess a range of language and emergent literacy skills in young children with language difficulties (Justice, Invernizzi & Meier, 2002).

Emergent Literacy Risks in Children with Concomitant Speech Impairment

Second, an exploratory analysis of the subgroup of children with concomitant speech and language impairments revealed significantly lower mean scores on alphabet knowledge as compared to those with SLI only. This was a somewhat surprising outcome, considering the body of research suggesting that children with speech difficulties may be particularly vulnerable to weaknesses in phonological awareness (e.g., Rvachew et al., 2003; Sices et al., 2007). Thus, a more likely outcome might have been significant group differences in the rhyme awareness measure, rather than in alphabet knowledge.

One possible explanation for the difference in mean scores for this measure is that remembering and naming letters of the alphabet is remarkably more difficult for children with concomitant deficits, due to the greater phonological memory load required. It has been suggested that children with SLI have weaker phonological memory capacity as compared to typically developing children (Conti-Ramsden & Durkin, 2007; Montgomery, 1995). Poor phonological memory has also been noted in several subtypes of speech disorders (Lewis et al., 2011). Additionally, Carroll and Snowling (2004) compared a group of children with a familial risk of dyslexia to a group of children with speech impairment. The children at risk for dyslexia performed poorer than the children with speech disorders on all measures of phonological processing, but children with speech impairment performed poorer on a measure of letter knowledge (Carroll & Snowling, 2004). The authors contributed this deficit to weak phonological representations, or deficit phonological memory. Therefore, of the three tasks assessed in this study, alphabet letter naming – not rhyme awareness – likely had the highest demand for phonological access and retrieval from memory storage, and may have highlighted a skill most heavily impacted by multiple deficits.

Summary

Two main hypotheses were tested in the present study. First, we hypothesized that a greater proportion of children with SLI would exhibit risk on three measures of emergent literacy, as compared to a group of age-matched typically developing children. Our results confirmed this hypothesis. Second, we hypothesized that children with speech and language difficulties would exhibit greater levels of risk than children with only SLI. We suspected that children having multiple deficits would experience greater difficulty in

acquiring these three emergent literacy skills, compared to children with only one impairment. Our results only partially confirmed our hypothesis, however. When examining differences between those with SLI only and those with concomitant speech and language impairments, a comparison of mean scores determined significant differences between the subgroups on alphabet knowledge; however, the percentage of children exhibiting risk was not found to be any greater for those with concomitant deficits. As such, results from the present study substantiated the utility of person-centered approaches for broadening our identifying children at risk for emergent literacy skills. Examining the percentages of children in each group who exhibited risk provided an alternative viewpoint for interpreting these differences. As such, clinicians and educators should not assume that children with both speech and language impairments necessarily are at additional risk than those with language difficulties only, but should individually evaluate children with language and/or speech problems on critical emergent literacy skills to determine their levels of knowledge and ability.

Limitations and Future Research

There are some limitations of the current study that should be addressed by future work. First, the subgroup of children with concomitant deficits was representative of the percentage of children who exhibit multiple deficits, but was quite small ($n=11$), thus effect sizes and power limited the generalizability of the present results. Future studies should either include equal sized groups for comparison, or report data from an overall larger number of participants. Second, although emergent literacy is a multi-dimensional construct that incorporates a variety of skills and abilities, the present work was limited in that only three components were included (i.e., alphabet knowledge, print concept knowledge, rhyme awareness). Furthermore, it has been argued by some that rhyme awareness is not as directly related to eventual reading ability as is phoneme awareness (Muter, Hulme, & Snowling, 1998). Thus, future work should include a wider range of emergent literacy skills, as well as multiple measures of phonological awareness. Finally, although this study extended previous work by incorporating a unique perspective for interpreting group differences, and understanding the extent to which children with SLI exhibit risk for lags in emergent literacy, the lack of available standardized criteria to measure risk prevent the current results from being widely applicable. Though internally consistent, the cut points for establishing risk were determined solely by the participants of this study. Thus, future research should work towards developing standards of risk assessment that can be widely utilized by both clinicians and researchers.

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