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Difficulties in emergent literacy skills in preschool children with specific language impairment. A systematic review
Dificultades en habilidades de alfabetización emergente en preescolares con trastorno específico del lenguaje. Revisión sistemática

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Abstract

Although research suggests that children with Specific Language Impairment (SLI) are at risk of suffering reading problems, there is shortage of research on emergent literacy development. Therefore, the objective is to systematically review emergent literacy research using this population. Search in databases between 1998 and 2018 yielded four articles that met the inclusion/exclusion criteria. The results suggested difficulties in emergent literacy skills among children with SLI. The findings highlight the need for more research, especially among Spanish-speaking children.

Resumen

Aunque la investigación sugiere que los niños con Trastorno Específico del Lenguaje (TEL) están en riesgo de problemas de lectura, la investigación sobre el desarrollo de la alfabetización emergente es limitada. Por lo tanto, el objetivo de este trabajo era revisar sistemáticamente la investigación de alfabetización emergente en esta población. La búsqueda en las bases de datos de 1998 a 2018 arrojaron cuatro artículos que cumplían los criterios de inclusión/exclusión. Los resultados sugirieron dificultades en las habilidades de alfabetización emergente en niños con TEL. Los hallazgos resaltan la necesidad de más investigación, especialmente en hispanohablantes.

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Introduction

In recent decades, learning to read and write has become a major milestone in children's development in cognitive, academic and socio-cultural terms.

Emergent Literacy (EL) refers to the precursor skills of written language (Clay, 1966; Teale & Sulzby, 1986; Whitehurst & Lonigan, 1998). EL theory suggests that children who fall behind in areas of oral language are at risk of suffering difficulties in learning written language in the future (Tracey & Morrow, 2006). These precursors are subsequently linked to decoding processes (e.g., alphabet knowledge and phonological awareness) and reading comprehension.

Difficulties in learning to read among children with SLI during the school age period have been widely described over the years (Adlof, 2017; Botting, Simkin & Conti-Ramsden, 2006; Isoaho, Kauppila & Launonen, 2016; Spanoudis, Papadopoulou & Spyrou, 2019). These difficulties crystallise in decoding and reading comprehension.

The purpose of this systematic review is to identify any potential weaknesses shown by children with SLI in the development of EL skills that are linked to text decoding and comprehension in the future. Findings are potentially intended to guide assessment and intervention, to inform future researchers and to bridge the information gap in Spanish about EL among children with SLI.

Introduction

Explanatory model of the reading process

Taking the conceptualisation of the Simple View of Reading (Hoover & Gough, 1990), it is possible to believe reading comprehension is the result of word recognition and oral language comprehension. Understanding texts involves recognising written words (decoding) and attrib-

uting a meaning to them thereafter. Research supports this theoretical model, as it has been proved that decoding and oral language comprehension contribute to explain about 80% of the total variance in reading comprehension (Catts, Hogan & Adlof, 2005; Catts, Hogan & Fey, 2003; Hoover & Gough, 1990). Despite this, it is important to consider that the contribution of both processes undergoes changes over time depending on the reader's expertise. For example, at the beginning of the literacy process, word recognition and oral language comprehension account for 27% and 9% of the total variance in reading comprehension, respectively. After eight years, word recognition accounts for only 1% of variance and oral language comprehension contributes 36% of variance (Catts *et al.*, 2005).

Three profiles of difficulties can be distinguished using this model: a) difficulties in decoding, b) difficulties in understanding oral language, and c) difficulties in decoding and understanding oral language (Catts *et al.*, 2003). For this reason, when conducting research on EL, it is important to determine which skills act as predictors of reading (Shanahan & Lonigan, 2013) and to establish how these skills relate to oral language's decoding and comprehension. In 2008, the National Emergent Literacy Panel (NELP) determined that EL skills with a strong-to-moderate positive correlation to subsequent learning-to-read are: Alphabet Knowledge (AK), Phonological Awareness (PA), and rapid automatic naming, *inter alia*. Skills that would have a moderate relationship with at least one measurement of subsequent achievement were also defined, where oral language and Print Knowledge (PK), *inter alia*, are grouped (NELP, 2008).

EL skills related to decoding would be AK, PA and PK. Research has shown important links between AK and PA to perform decoding and has also shown how explicit PA training improves word recognition. In terms of oral language comprehension, its construction depends on the interrelationship of several factors, includ-

ing vocabulary, grammar and narrative skills (Catts, Hoogan & Fey, 2003; Lynch, Anderson, Anderson & Shapiro, 2008). Oral language difficulties can render recognition of written words difficult, and reading comprehension above all. This finding is the result of a large number of longitudinal and cross-sectional studies in children with and without SLI, which have shown how children with language difficulties at early ages are likely to experience difficulties in learning written language (Adlof, 2017; Botting, *et al.*, 2006; Catts, Bridges, Little & Tomblin, 2008; Coloma *et al.*, 2012; Isoaho *et al.*, 2016; Luque, Borday, Giménez, López-Zamora & Rosales, 2011; Spanoudis *et al.*, 2019).

Specific Language Impairment (SLI) and Reading

SLI is characterised by significant difficulties in language development, which are manifested with no obvious intellectual, sensory, motor, socio-emotional or neurological difficulties (Aguado *et al.*, 2015; Plante, 1998). It has been estimated that prevalence of SLI is around 7% at preschool age (Tomblin *et al.*, 1997). There is evidence suggesting that SLI persists into adulthood (Poll, Betz & Miller, 2010), resulting in a Neurodevelopmental Disorder. The cause of the disorder is still unknown and theories claim that it is multifactorial in origin, suggesting biological, cognitive, social and behavioural variables that may promote the development of the disorder (Bishop, 2006).

Learning to read difficulties associated with SLI among English-speaking children have been widely described over the years (Adlof, 2017; Botting, *et al.*, 2006; Isoaho *et al.*, 2016; Spanoudis *et al.*, 2019) and among Spanish-speaking children to a lesser extent (Coloma *et al.*, 2012; Luque *et al.*, 2011). The literature in this regard shows that reading difficulties become evident when decoding and understanding texts. However, the difficulties at a comprehensive level are those that are more easily perceived and to which greater significance is

attached (Bishop, McDonald, Bird & Hayiou-Thomas, 2009; Botting *et al.*, 2006).

Methodological Framework

Objective of the study

The objective of the review is to identify difficulties in the development of EL skills related to subsequent decoding and reading comprehension in children aged between 3 and 6 years old diagnosed with SLI, before starting formal education in written language.

Systematic search strategy

The review followed the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols* guidelines (PRISMA-P, Moher *et al.*, 2015). The search diagram is shown in figure 1.

Identification

The search was conducted in January-February 2019, and was limited to research in English and Spanish, published between 1998 and 2018. The search was carried out in the electronic databases: EBSCO, MEDES, MEDLINE, LILACS, PubMed, SciELO, Scopus, SpeechBITE and Web of Science.

The terms used were the following: “children” OR “preschoolers” AND/WITH, “Specific Language Impairment” OR “SLI” OR “Developmental Language Disorder” OR “DLD”, “Language disorder” OR “LD” and “Primary Language Disorder” OR “PLD”, combined with “emergent literacy skills”, OR “emergent literacy”, OR “emergent reading”. The search was also carried out using the following terms in Spanish: “niños” OR “preescolares” AND/WITH “Trastorno Específico del Lenguaje” OR “TEL” OR “Trastorno del Desarrollo del Lenguaje” OR “TDL”, “Trastorno del Lenguaje” OR “TL” and “Trastorno Primario del Lenguaje” OR “TPL”, combinados con los términos “habilidades de alfabetización emergente” OR “alfabetización emergente” OR “lectura emergente”.

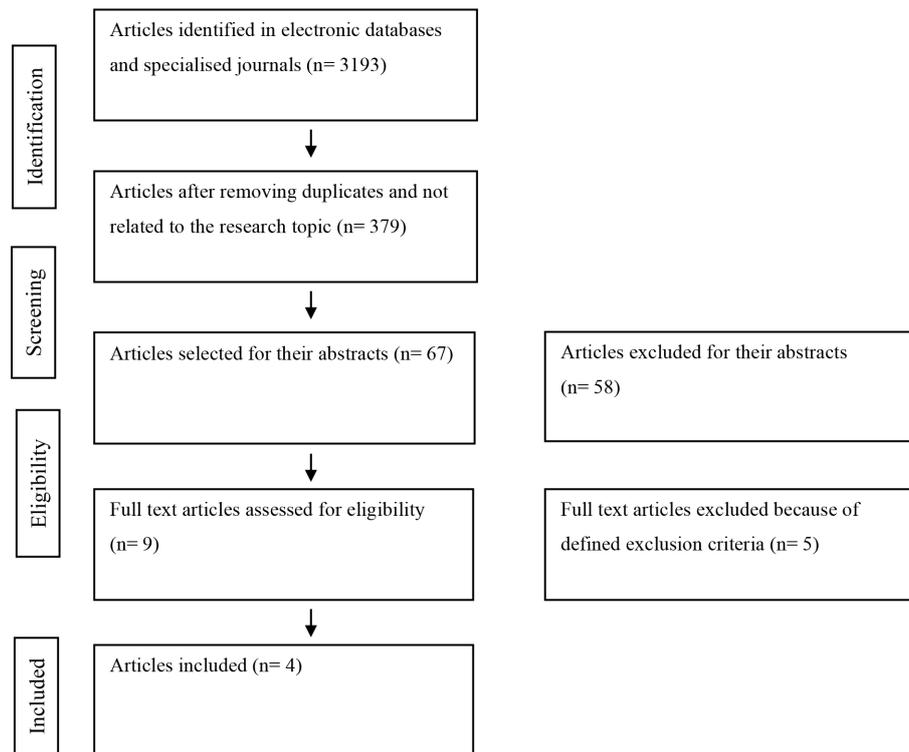


Figure 1. Flowchart of the search strategy according to PRISMA-P
Source: Moher et al. (2015).

During the identification of studies, a total of 3,193 cross-sectional matches were obtained from the electronic databases defined above.

Screening

References were exported to EndNote X8, duplicates were removed and screening was conducted to ensure that research included children with SLI using synonyms such as Developmental Language Disorder (DLD), Language Disorder (LD) and Primary Language Disorder (PLD). In conclusion, references were filtered by title, abstract and keywords, excluding documents involving other diagnosis in addition to SLI, such as: “Intellectual Disability (ID)”, “Genetic Syndromes”, “Autism Spectrum Disorder (ASD)”, *inter alia*. With regard to the articles selected, the titles and authors were searched again in all the databases and also in Google Scholar to ensure that all relevant studies were identified. We searched the references of the articles obtained

to find additional documents. The screening eliminated 3,185 articles, leaving nine to determine eligibility.

Eligibility

Having a hard copy of the research, it was subjected to the following individual inclusion/exclusion criteria:

Inclusion criteria

- Non-experimental design studies with a descriptive, classificatory, comparative, relational or explanatory scope.
- Participants have been diagnosed with SLI.
- The age of the participants must be between 3 and 6 years old inclusive.
- Studies characterise the participants’ performance in at least two EL skills linked to decoding or oral language comprehension.

Exclusion criteria

- Studies where participants manifest language disorders associated with other diagnoses (such as ASD or ID).
- Studies involving children with SLI who have other associated disorders (e.g., Speech Disorders).
- Studies not including quantitative measurements.
- Studies including participants who receive formal education in reading or writing

Finally, four articles were selected for review; those by Bondreau and Hedberg 1999; Cabell, Justice, Zucker and McGinty, 2009; Justice *et al.*, 2013; and Pavelko, Lieberman, Schwartz and Hahs-Vaughn, 2018.

Results

Data extraction

Data extracted from the studies included: a) research type and design, b) assessment of the transparency of scientific communication of the selected studies, c) characteristics of the participants and inclusion criteria and d) summary of the studies.

Research type and design

All four studies had a non-experimental design. Two of them had a descriptive scope (Bondreau & Hedberg 1999; Cabell *et al.*, 2009), one had a classificatory scope (Justice *et al.*, 2013) and the fourth one had a correlational scope (Pavelko *et al.*, 2018).

Assessment of the transparency of scientific communication of the selected studies

Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) (Elm *et al.*, 2014) was used as a guideline to assess the transparency of scientific communication of the selected studies. This instrument is made of 22 points to

be assessed, referring to title, summary, introduction, methods, results, discussion, other analysis and other information. The studies were awarded 16 points (Pavelko *et al.*, 2018), 17 points (Bondreau & Hedberg, 1999), 20 points (Justice *et al.*, 2013) and 21 points (Cabell *et al.*, 2009). Complete assessment is shown in Table 1.

Characteristics of the participants and inclusion/exclusion criteria used in the studies

The studies involved the cross-participation of a total of 113 children with SLI (78 men and 35 women). SLI diagnosis and measurements of non-verbal cognition (NVC) were included within the inclusion/exclusion criteria of the studies. Both criteria were confirmed using standardised tests for the participating population. Table 2 includes a summary of such information.

SLI diagnosis

The SLI diagnosis criteria used in the studies were a) normal bilateral hearing results on an audiological test (30dB at 500, 1000, 2000 and 4000 Hz); b) developmental history without neurological, sensory or motor complications; c) standard score of 80 or above on a NVC assessment; d) living in a home where English is the primary language; and e) two subtest scores below the 10th percentile or standard scores below 85 on total test scores assessing receptive and/or expressive language.

Non-verbal cognition measurements.

NVC was measured in all four studies. Bondreau and Hedberg (1999) selected the *Wechsler Preschool and Primary Scale of Intelligence-Revised* (WPPSI-R, Wechsler, 1989). The studies by Cabell *et al.* (2009), Justice *et al.* (2013) and Pavelko *et al.* (2018), used the *Kaufman Brief Intelligence Test - Second Edition* (KBIT-2, Kaufman and Kaufman, 2004[]). All participants showed average range performance, with no significant differences between groups.

Table 1
Quality assessment of the studies included in the review

Study Name	Point	Boudreau & Hedberg (1999)	Cabell <i>et al.</i> (2009)	Justice <i>et al.</i> (2013)	Pavelko <i>et al.</i> (2018)
Title and abstract	1	0	1	1	1
Introduction Background/rationale	2	1	1	1	1
Objectives	3	1	1	1	0
Methods Study design	4	0	1	1	1
Background	5	1	1	1	0
Participants	6	1	1	1	1
Variables	7	1	1	1	1
Data sources/measurements	8	1	1	1	1
Biases	9	1	1	1	1
Sample size	10	0	0	0	0
Quantitative variables	11	1	1	1	1
Statistical methods	12	1	1	1	1
Results Participants	13	1	1	1	0
Descriptive data	14	1	1	1	1
Data of the result variables	15	1	1	1	1
Main results	16	1	1	1	1
Other analyses	17	1	1	1	1
Discussion Key results	18	1	1	1	1
Limitations	19	1	1	1	1
Interpretation	20	1	1	1	1
Generability	21	0	1	1	0
Other information Financing	22	1	1	0	0
TOTAL SCORE		18 points	21 points	20 points	16 points

Summary of the studies

Boudreau and Hedberg (1999) assessed 36 children (18 with SLI and 18 from a control group), aged 56 to 70 months old. The results showed that participants with SLI had significantly poorer performance than controls on measures such as AK, PA and PK. No significant differences between groups were found when measuring the grapheme-phoneme correspondence. This last result was striking because this skill is linked to phonological processing, which

is normally compromised in children with SLI. A more comprehensive analysis was therefore conducted, showing the few grapheme-phoneme associations made by both groups. Results in narrative skills showed that children with SLI performed less successfully than the control group on measuring the total number of words included, number of words changed, average sentence length, total events included, and information retrieved. Performance was similar

Table 2
 Overview of the studies included in the review

Study	Design	N		Age	Diagnosis	NVC	Oral language	EL measurements
		Masc/	Fem					
Bondreau and Hedberg (1999)	Non-experimental design of a descriptive scope	18 (16/2)		N = 63; SD = 3.75; range = 56-68.	Certified educational language therapist with standardised test (PLS-3) and classic inclusion/exclusion criteria	Exclusion: (WPPSI-R, including block design, image completion and geometric design. (Wechsler, 1989).	Exclusion (PLS-3 - compound): N = 86 SD = 7.5 range = 75-103	Procedures collected from other studies: Expressive and receptive rhyme, knowledge of letter name, knowledge of letter sound, PK Narrative skills: Frog, Where Are You?
Cabell et al. (2009)	Non-experimental design of a descriptive scope	23 (19/4)		N = 54.00 SD = 3.05 range = 48-60	Conducted by trained researcher (graduate students) with standardised test (TOLD-P:3) and classic inclusion and exclusion criteria.	Exclusion: (KBIT, score equal to or greater than 80).	Exclusion (TOLD-P:3): N = 82.39 SD = 9.24 range = 49-100	AK: (PALS-PreK): alphabet recognition in capital letters); PK: (PWPA); PK: (PALS-PreK): rhyme awareness task).
Justice et al. (2013)	Non-experimental design of a classificatory scope	50 (29/21)		N = 54.80 SD = 4.37	Conducted by trained researcher (graduate students) with standardised test (CELF-P) and classic inclusion and exclusion criteria.	Exclusion: (KBIT-2, matrix subtest)	Exclusion (CELF-P): N = 86; SD = 7.5; range = 75-103	AK: (PALS-PreK); PK: (PWPA); PA: (TOPEL)
Pavelko et al. (2018)	Non-experimental design of a relational scope	22 (14/8)		N = 52.27 SD = 3.93 range = 48-60	Conducted using a standardised test (ALL) and classic inclusion/exclusion criteria Does not report evaluator rating	Exclusion: (KBIT-2, matrix subtest)	Exclusion (ALL): N = 73.41 SD = 8.47 range = 50-83	AK; PA: (ALL)

Note. *Preschool Language Scale - 3* (Zimmerman, Steinger & Pond, 1992 [PALS-3]); *Test of Language Development Primary, Third Edition* (Newcomer & Hammill, 1997 [TOLD-P:3].); *Comprehensive Evaluation of Language Fundamentals-Preschool* (Wiig, Secord & Semel, 2004[CELF-P]); *Assessment of Literacy and Language* (Lombardino, Lieberman Brown, 2005 [ALL]); *Wechsler Preschool and Primary Scale of Intelligence-Revised* (Wechsler, 1989 [WPPSI-R]); *Kaufman Brief Intelligence Test - Second Edition* (Kaufman & Kaufman, 2004 [KBIT-2]); *Phonological Awareness Literacy Screening for Preschool* (Invernizzi, Sullivan & Meier, 2001 [PALS-PreK]); *Preschool Word and Print Awareness test* (Justice & Ezell, 2001 [PWPA]); *The Phonological Awareness subtest of the Test of Preschool Early Literacy* (Lonigan, Wagner, Torgesen & Rashotte, 2007 [TOPEL]); AK=Alphabet Knowledge; PA=Phonological Awareness; PA=Printed Knowledge.

across groups when including key events in history and issuing total statements (table 3)

Research by Cabell *et al.* (2009) aimed at correlating EL skills performance with written representations of one's name. Among the results, significant differences between groups were reported referring to measures of AK, PA and PK, with the control group performing best. In conclusion, the authors determined that children with TLD create more advanced name writing representations than children with SLI. These results showed a positive association between oral language skills, EL skills and level of written representations of one's name.

In their study, Justice *et al.* (2013) included children with language disorders associated with different diagnoses, in order to establish performance profiles in EL skills. The range of participants included a group of 50 preschoolers with SLI ($N = 54.80$; $SD = 4.37$). The measurements of interest included were AK, PA and PK, where children with SLI scored below average. When comparing performance between groups, children with SLI scored better compared to children with language disorders associated with other diagnoses (such as Down Syndrome and ASD) on oral language and EL measures (see Table 3).

Thanks to their study, Pavelko *et al.* (2018) identified the link between the ability to write one's own name and other EL skills, specifically AK and PA. The study included 65 children (22 with SLI and 43 of control groups) with an average age of 53 months. On analysing the results, the below-expected performance of children with SLI compared to children from control groups on measures of EL, AK, PA, and letter writing, was particularly shocking. These results led the authors to conclude that PA and AK, in conjunction with letter writing, can account for the link between oral language level and writing of one's name (Table 3).

Discussion

The purpose of the research is to identify any potential difficulties that preschoolers with SLI may have in EL skills related to word recognition and oral language comprehension prior to explicit written language education. The search yielded four matches for the inclusion/exclusion criteria defined in the methods (Bondreau & Hedberg 1999; Cabell *et al.*, 2009; Justice *et al.*, 2013; Pavelko *et al.*, 2018). All the studies were conducted with English-speaking children, and revealed the limited research linked to EL among preschoolers with SLI whose primary language is Spanish. Despite the small number of studies obtained, they provide important data for practice and research.

The review focused on the potential difficulties in EL tasks related to decoding and understanding spoken language in children diagnosed with SLI prior to formal written language education. Through the selected studies (Bondreau & Hedberg 1999; Cabell *et al.*, 2009; Justice *et al.*, 2013; Pavelko *et al.*, 2018), the review shows that children with SLI underperform on the different EL measurements that affect word recognition (e.g., AK, PA, and PK) and text comprehension (oral language and narrative skills).

In view of the results presented here, and according to the theory of the Simple View of Reading and the theory of EL, it is possible to link oral language difficulties to difficulties in the development of EL skills and subsequent learning to read.

Therefore, research to date suggests difficulties in both EL skills related to decoding, namely AK, PA and PK. Difficulties in EL skills related to reading comprehension, such as oral language skills and narrative skills, are also added..

Table 3
 Summary of results obtained in EL tasks

Study	Component	
	Skills linked to decoding	Skills linked to oral language comprehension
Bondreau and Hedberg (1999)	AK: N = 10.94; SD = 9.08 PA: Expressive rhyme: N = 2.22; SD = 4.28 Receptive rhyme: N = 6.39; SD = 2.52 Grapheme-phoneme correspondence: N = 2.67; SD = 5.65 PK: N = 7.5; SD = 3.3	Language: N = 86; SD = 7.5; range = 75-103 Narrative: Total words: N = 124.65; SD = 37.95 Words changed: N = 58.12; SD = 11.27 Average sentence length: Total events included: N = 12; SD = 3.22 Information retrieved: N = 36.74; SD = 11.66 Key events: N = 4.65; SD = 1.27
Cabell et al. (2009)	AK: N = 6.78; SD = 8.80 PA (Rhyme awareness): N = 3.27; SD = 2.43 PK: N = 93.43; SD = 12.68	Language: N = 82.39; SD = 9.24; range = 49-100
Justice et al. (2013)	AK (n: 49): N = 12.37; SD = 12.84 AK (n: 49): N = 8.92; SD = 5.01 PK (n: 50): N = 5.00; SD = 2.83	Language: Expressive: N = 76.44; SD = 11.43 Receptive: N = 77.96; SD = 12.78 Definitional vocabulary: N = 84.94; SD = 12.36
Pavelko et al. (2018)	AK: N = 7,955; SD = 2.8027; range = 3.0-12.0 PA: N = 7,364; SD = 1.8138; range = 4.0-12.0	Language: N = 73.41; SD = 8.47; range = 50-83

Note. AK=Alphabet Knowledge; PA=Phonological Awareness; PK=Printed Knowledge.

Addressing current limitations in future research

As mentioned above, the review did not only reveal the small amount of research and lack of studies on Spanish-speaking children, but it also highlighted aspects for improvement in future research.

Small sample sizes and non-inclusion of larger age ranges prevent generalisation of results. In view of the high cost and difficulty of conducting longitudinal studies, future researchers may consider conducting cross-sectional studies

including different age ranges and conducting sophisticated statistical analyses such as Trajectory Analysis (Nagin, 2005; Thomas *et al.*, 2009).

Finally, and picking up on potential studies on Spanish-speaking children, conducting research similar to that of Justice *et al.* (2013) on children with SLI would positively contribute to the identification of more specific difficulties than those discussed here regarding the development of EL. This would lead to more effective educational and therapeutic processes. It would

be prudent to review the methods for measuring PA, because the assessment between an opaque language (English) and a transparent language (Spanish) differs in several aspects, particularly the grapheme-phoneme correspondence.

Conclusion

To recapitulate, there is a limited amount of research regarding the difficulties in developing EL in this population. In contrast, considerable research has been published to date indicating that school-age children with SLI tend to manifest problems in learning to read (Botting *et al.*, 2006). Therefore, this review suggests that weaknesses in the development of specific EL skills (AK, PA, PK, oral language and narrative skills) are involved in decoding and reading comprehension deficits of this school-age population.

It is important to remember that written language acquisition begins in early childhood and is linked to academic performance and access to cognitive and cultural capital. Therefore, EL should be a priority in early intervention and special education programmes for children with SLI. Research on EL is vital to provide an empirical basis, which paves the way for the establishment of early detection and intervention strategies aimed at improving the initial literacy process. This is especially important, since these skills must be integrated during the educational and therapeutic process, using a cross-sectional approach with developmentally focused activities for children with SLI. This would support their participation in the community and provide better opportunities for access and inclusion for these children in the long term.

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