

# Early Language Intervention in School Settings: What Works for Whom?



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Early intervention has been widely proven to be socially and economically effective, with an estimated rate of return to investment in human capital of about 3\$ to 17\$ for each dollar invested (Heckman, 2006; Knudsen et al., 2006). There is less evidence, however, on which intervention programs work for whom. Addressing this question represents a crucial step in order to bridge scientific knowledge into health and education public policies.

This chapter considers language interventions that have been implemented in school settings in WEIRD (Western, educated, industrialized, rich, democratic) and non-WEIRD countries and explores if their success is associated with environmental factors, child characteristics, school features, or the nature of the intervention itself. Possible explanations and implications will be discussed.

## Language Development and Life Skills

It is well established in the scientific literature that oral language skills are associated with literacy development and academic achievement (Hoff, 2013; Lonigan & Shanahan, 2010; Schoon et al., 2010; Snow, 2016; Snowling & Hulme, 2021), having long-lasting consequences on social, emotional, and mental health (Hoff, 2006; Justice et al., 2018; Yew & O’Kearney, 2013). Based on these findings, researchers have argued that language skills constitute one of the solid foundation blocks for children’s development, especially in the early years (Law et al., 2017; Snowling & Hulme, 2011, 2021).

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Language skills are not only important for learning concepts and building strong social relations but are also considered a cornerstone for reading development. According to the Simple View of Reading,<sup>1</sup> the phonological component of language – especially phoneme awareness – is a strong predictor of learning to decode words, while vocabulary, grammar, and broader language abilities are the precursors of reading comprehension (Catts, 2018; Fricke et al., 2013). Each strand develops relatively independently (Lonigan, 2006), but both are required for proficient reading and should be fostered way before children enter school (Lonigan & Shanahan, 2010).

Unfortunately, although oral language and preliteracy skills are usually targeted in the school curricula since the early childhood education and care (ECEC), teachers are often not properly trained to deliver language activities using the most effective techniques (Lonigan, 2006). This is worrying given that a considerable number of children rely on highly structured and rich linguistic school environments to optimally develop their language skills. These are usually children living in socioeconomically and culturally disadvantaged conditions and/or children with learning language difficulties or language disorders.

Prevalence studies have consistently shown that around 7% of school-aged children have significant language disorders of unknown origin (i.e., developmental language disorder – DLD) (Norbury et al., 2016; Tomblin, Records, et al., 1997). This is a high rate even compared to other well-known neurodevelopmental disorders (McGregor et al., 2020). A smaller but still high prevalence has been found for dyslexia (around 5%), a neurodevelopmental condition that affects the development of decoding skills and can co-occur with DLD, among others (Scerri & Schulte-Körne, 2010).

A longitudinal study by Snowling et al. (2016) showed that children who presented poor oral language skills at age 5 (when entering compulsory education) had literacy and academic difficulties at age 8, showing that early oral language development influences later academic outcomes. Thus, to become a skilled reader, a number of developmental precursors are necessary, including language abilities that children may struggle with (Lonigan, 2006; Lundberg, 2009) for several reasons (from socioeconomic variables to language proficiency and emotional disposition).

We will next explore the wide variety of factors that influence oral language development, imposing different challenges and opportunities for children's language, literacy, and academic achievements. These factors may have a biological or environmental nature; some constitute risk factors for language and reading disorders, while others may influence the course of language development without necessarily imposing risks (Bishop et al., 2017; Choudhury & Benasich, 2003; Conti-Ramsden & Durkin, 2016; Eghbalzad et al., 2021; Lundberg, 2009; Rudolph, 2017).

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<sup>1</sup>The Simple View of Reading is a theoretical framework developed by Gough and Tunmer in 1986. It states that proficient reading depends on two basic components: decoding and language comprehension skills

### ***Biological Factors That Influence Language and Literacy Development***

Biological factors have been extensively studied and more is known today about what puts children at disadvantage for both oral language and literacy development (Rudolph, 2017). These factors include family history of neurodevelopmental disorders, sex differences, and pre-, peri-, or neonatal problems (Bishop et al., 2017; Conti-Ramsden & Durkin, 2016; Weindrich et al., 1998). There is strong evidence that genetics play an important role in language development as research shows that language and literacy disorders run in families (Bishop, 2002, 2006; Choudhury & Benasich, 2003; Tomblin, Smith, & Zhang, 1997). That means most children with language and literacy impairment are likely to have first-degree relatives affected as well.

The reputed prevalence of language impairment among boys, on the other hand, is controversial. Whereas some evidence shows that more boys are referred to specialized services (Conti-Ramsden & Botting, 1999), epidemiological studies found a more balanced proportion of language deficits for boys and girls (Tomblin, Smith, & Zhang, 1997). Such discrepancy may be rooted on behavioral problems being more common among boys, which usually puts them on the spotlight earlier (Yew & O’Kearney, 2013). Case in point, a meta-analysis showed that biological sex met the criteria for clinical significance as a risk factor for language impairment (Rudolph, 2017). The same study also showed the relevance of pre- and perinatal indicators (Apgar score and birth order) for language development. Other studies have also underscored premature birth (Brósch-Fohraheim et al., 2019) and neonatal complications (Whitehouse et al., 2014) as risk factors.

### ***Environmental Factors That Influence Language Development***

There are a great number of environmental factors relevant to language development and literacy. The most consistently investigated are parental educational level, socioeconomic status (SES), and multilingual contexts (Bishop et al., 2016; Conti-Ramsden & Durkin, 2016; Dicaldo et al., 2020; Eghbalzad et al., 2021). Recently, the COVID-19 pandemic has evidenced the effects of such environmental factors, with implications for early language as well as academic development (Charney et al., 2021).

Environmental variables may tip the scales for language and academic achievements. Parental educational level and socioeconomic status (SES) are some of the factors that bear on the quality of the linguistic stimuli children are being provided with (Eghbalzad et al., 2021; Justice et al., 2020; Kucirkova et al., 2016; Pace et al., 2017; Puglisi et al., 2017). As reported, less educated parents and impoverished families would usually provide less quantity as well as lower quality of linguistic input, thus impacting children’s language development with rippling effects on

literacy and academic performances (Dollaghan et al., 1999; Hirsh-Pasek et al., 2015; Hoff & Tian, 2005; Law et al., 2011; Spencer et al., 2017).

Research on multilingual environments shows they may pose an initial disadvantage for children's language and literacy development when compared to monolingual children, especially when the language spoken at home is different from the language used in the school setting (Hoff, 2013, 2021; Hoff & Elledge, 2005). Although multilingualism per se is not a risk factor for language impairment, studies show it may influence the quality of the linguistic input children receive in the language spoken at school (for a review, see Hoff, 2021). Hence, multilingualism does provide a different context for language learning, posing important variations in opportunities and experiences, amount and proportion of exposure, and environmental support. Such variations may affect the course of language development and academic achievement (Chan & Sylva, 2015; Hoff, 2013, 2021; Sorenson Duncan & Paradis, 2018).

### ***Protective Factors for Language and Literacy Development: Early Language Intervention***

Inasmuch as roadblocks to language development may vary, experimental and clinical evidence converge on how protective factors may upend children's developmental course improving their language outcomes (Catts, 2017; Conti-Ramsden & Durkin, 2016). Prosociality and sociability<sup>2</sup> have been recently studied as potential protective factors (Conti-Ramsden & Durkin, 2016; Toseeb et al., 2017). The benefits and effects of early interventions have also been extensively researched and recognized as a way to fill in the gaps (Catts, 2017; Collisson et al., 2016; Dobinson & Dockrell, 2021; Fricke et al., 2013; Greenwood et al., 2020). In this matter, early high-quality education bears strong evidence for positive impact on the development of all children but especially those from disadvantaged backgrounds (for a review, see Sylva, 2014). Hence, over the past decade, emphasis on the use of evidence-based programs to promote children's development and prevent disorders is of note.

Whereas research on the effectiveness of some interventions for oral language and literacy skills improvement is mounting (Dobinson & Dockrell, 2021; Greenwood et al., 2020; Snowling & Hulme, 2011), wide is the range of targets and implementation variables that may account for differences in their specific outcomes (for a review, see Williams & Beidas, 2019). Some programs may focus on foundation skills, such as phonological awareness, vocabulary, and narrative, while others emphasize preliteracy and reading skills. Some interventions are conducted individually or in small groups, and others promote whole-class activities; some are

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<sup>2</sup>Prosociality refers to behaviors that are intended to benefit others, caring for their needs and welfare. Sociability is defined as the quality of being sociable, i.e., being friendly

conducted by teachers and/or assistants or speech and language pathologists in the school setting, while others are delivered by parents or caregivers at home. The method and amount of training for program delivery also vary, as well as the amount and intensity of the intervention.

Overall, early intervention programs are recognized and validated as a way to foster children's language and literacy skills, but scientific evidence on what works for whom is still lacking, especially in school settings and, particularly, in low- and middle-income countries.

Therefore, here we scrutinize the available scientific evidence on the success of early language interventions in school settings. Specifically, we explore the variables and characteristics of programs implemented in various countries (both WEIRD and non-WEIRD) to identify contextual differences accounting for effective interventions, i.e., those that foster children's language development and literacy readiness, especially in disadvantaged environments.

## **Review Methods**

This chapter aims to provide a comprehensive review of contextual factors that may be related to the success of language interventions in school settings. We used PICOS search strategy to retrieve studies of interest based on the following question: how and to what extent is the success of educational language interventions associated to contextual factors?

### ***Data Sources***

We conducted a formal literature search using PICOS criteria, as presented in Table 1. The terms used in each search were differently combined, so that strategies were appropriate for each database.

The search was performed at the following databases: Cochrane, JSTOR, PUBMED, SciELO, ERIC, SpringerLink, and SAGE Journals. Because we were especially interested in obtaining studies conducted with non-WEIRD populations, we also checked the reference lists of the studies retrieved from the databases that could meet our criteria.

### ***Study Selection and Inclusion and Exclusion Criteria***

We started by analyzing the titles and abstracts of all articles identified by the search to remove clearly irrelevant papers to the purpose of this review. To be included, papers should have tested the effects of language interventions delivered in school

**Table 1** Terms used for PICOS strategy search

P	Population	(infant OR child OR child* OR “child, preschool” OR students OR school OR “early childhood education” OR “early childhood education center” OR “elementary school” OR “early education” OR “elementary education” OR preschool) NOT (“language disord*” OR autism OR “hearing loss” OR adolescent OR math* OR mathematics OR arithmetic OR bullying OR “sexual abuse” OR social OR emotion* OR attention OR physical OR anxiety OR perception)
I	Intervention	“Early intervention, educational” OR “school intervention” OR “school program” OR “educational program” OR “language intervention” OR “language program” OR “preliteracy skills” OR program OR preliteracy OR language OR intervention
C	Comparison	Not specified
O	Outcome	language OR “semantics” OR “language tests” OR “phonological awareness” OR phonology OR “oral language” OR reading OR preliteracy OR “early literacy skills” OR test
S	Study type	“Clinical trial” OR “randomized controlled trial” OR “controlled clinical trial” OR “meta-analysis” OR systematic review

settings. Exclusion criteria involved interventions in different settings, with a different scope, and with insufficient information on methods or results. After the initial selection of papers based on title and abstract, duplicate papers were removed, leaving the remaining articles to be retrieved for full-text review. The selected papers were then rated using the GRADE (Grading of Recommendations Assessment, Development, and Evaluation; Guyatt et al., 2008) approach, which is a methodology that assesses the certainty of evidence. Only studies rated with high or moderate grades were included in our analyses.

The flowchart (Fig. 1) shows the number of studies retrieved and excluded at each point, as well as the final number of studies included in this review.

Our search showed a disproportionate overall number of intervention studies from WEIRD and non-WEIRD countries, as shown in Fig. 2. There were less studies that included non-WEIRD populations ( $N = 12$ , as opposed to  $N = 34$  from WEIRD countries), with a lower proportion of them being graded with high and moderate quality (50%, as opposed to 59%), suggesting a lack of quality evidence in these contexts. In the next section, we present the findings from all papers that met inclusion criteria, from WEIRD and non-WEIRD countries.

## Findings: What Works for Whom and in Which Context?

Results showed that most intervention programs had overall positive effects. The interaction between specific variables and the extent of the effects, however, varied. In order to present and discuss these findings in light of the existing literature, we divided this section in topics to tap into each contextual factor of interest: (1) environmental, (2) child, (3) school, and (4) intervention. For each analysis, we

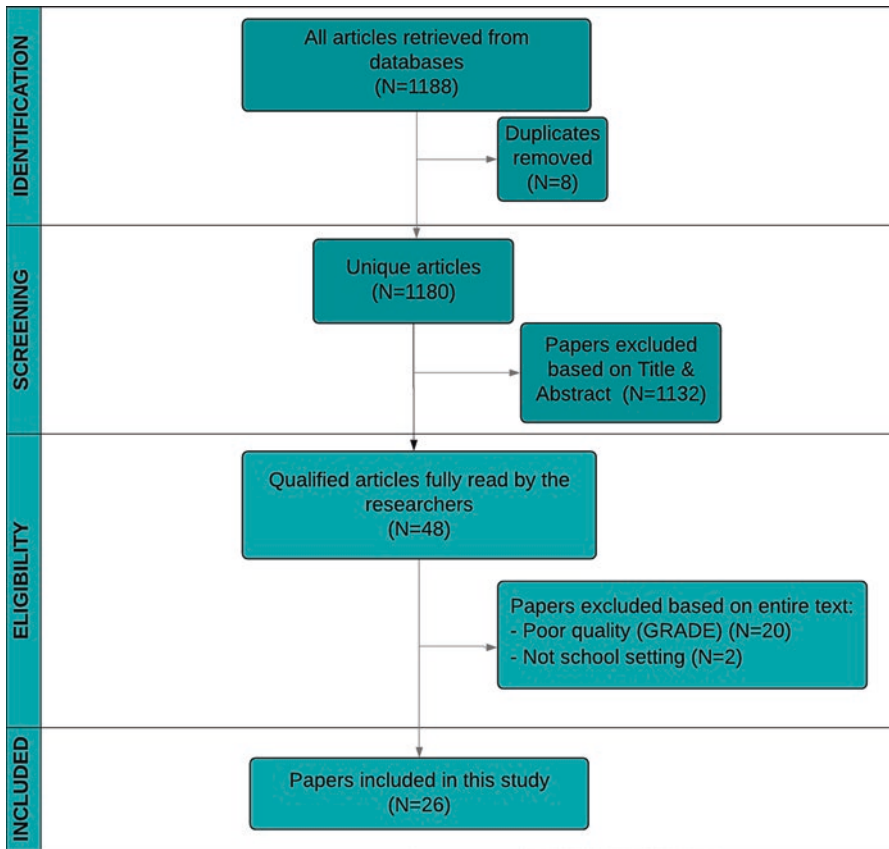


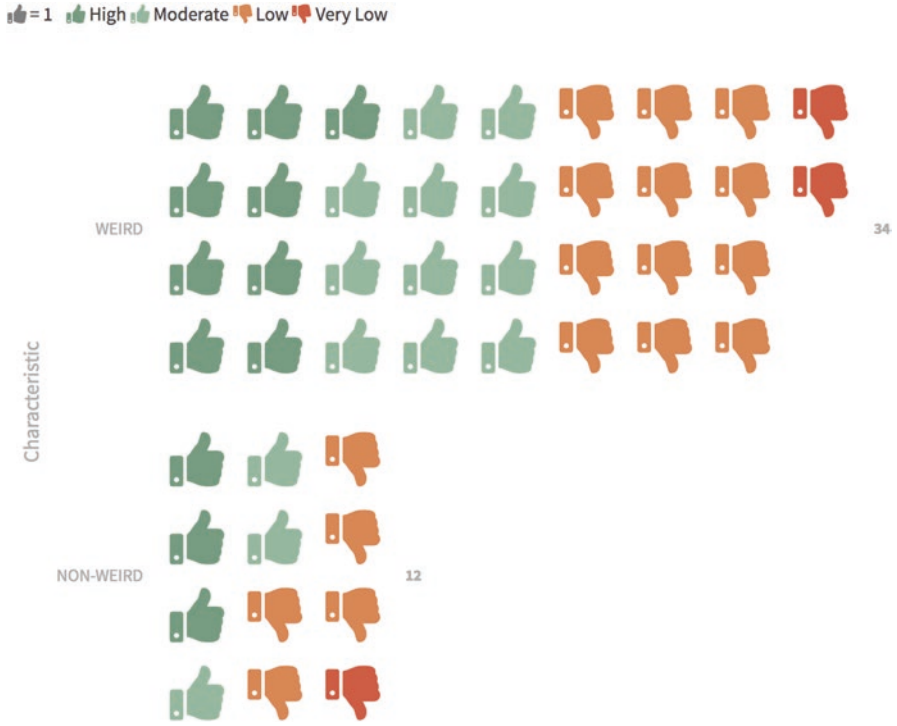
Fig. 1 Flowchart showing the number of studies included and excluded at each point

identified the effects of the intervention on phonological awareness (PA), oral language (OL), and reading skills (read). Figure 3 summarizes the proportion of studies with positive effects for each variable of the contextual factors (1), (2), and (3), which are discussed below.

### *Environmental (Social and Linguistic) Factors*

We identified interventions that were delivered in different SES (low- and mixed-SES) and linguistic (mono- and multilingual) environments. Figure 3 shows the proportion of studies that found significant positive effects for three different outcomes: phonological awareness, oral language, and reading.

We found more studies analyzing intervention effects in low-SES samples ( $N = 15, 58\%$ ) and only three studies gathering subjects from mixed-SES (two

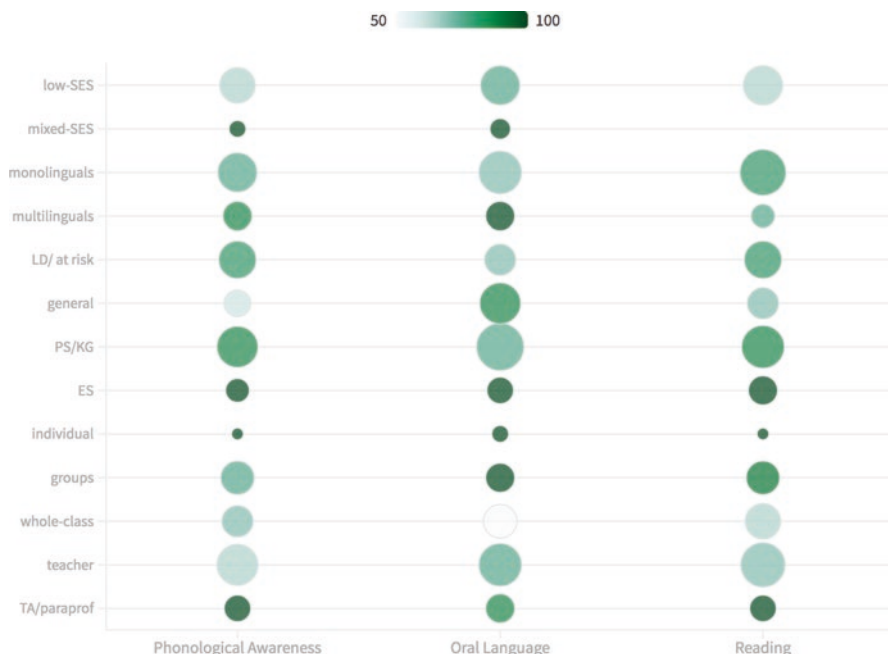


**Fig. 2** Quality of evidence of studies including WEIRD versus non-WEIRD populations

low- and middle-SES; one low- and high-SES). A considerable number of studies, however, did not specify participants’ socioeconomic characteristics ( $N = 8, 31\%$ ; not included in Fig. 3), posing a bias to this analysis. We found that in both low- and mixed-SES conditions, positive outcomes were observed in the majority (65–100%) of the studies. At first glance, it could seem that the proportion of positive findings was higher in the mixed-SES samples, but the limited number of studies (small dot sizes) requires caution in comparing findings.

There is a body of studies showing that children from low-SES usually perform poorly on language tasks (Dicataldo et al., 2020; Hirsh-Pasek et al., 2015; Hoff, 2006, 2013; Hoff & Tian, 2005; Law et al., 2011; Pace et al., 2017; Sirin, 2005). This is usually associated with the quality of the stimuli they are receiving, both at home and at school. A lower-than-ideal stimuli quality is, in turn, a product of a series of conditions related to cultural and social aspects, from parental level of education to the family’s cultural habits and logistical possibilities in daily routines, as well as various dimensions of the classroom language environment, including characteristics of the school and the teacher’s communication features (Justice et al., 2018; Sylva, 2014 ; Sylva et al., 2013). Nevertheless, studies have shown that poorer language and cognitive performances by low-SES children could be counterbalanced by high-quality education at an early stage (Sylva, 2014;





**Fig. 3** Percentage of studies that found positive effects in phonological awareness, oral language, and reading skills, for environmental, child, and school factors

Sylva et al., 2013). This effect may be even stronger for children with better implicit learning skills, as suggested by Eghbalzad et al. (2021). In this study, we did not find that the intervention effects were higher for low-SES samples, but instead that the intervention was beneficial for children in all studies, regardless of their SES. However, we would need more studies analyzing the intervention effects in mid- and high-SES populations to properly address this question.

Regarding language diversity, there were only eight studies analyzing the effect of language interventions in multilingual environments, which showed convergent findings: all of them yielded positive effects in at least one outcome (oral language was the most benefited, with significant effects in all studies in which these skills were measured). However, it is of note that most of these studies were carried out in samples of bilingual immigrant children living in monolingual countries, which is a specific subgroup that is more susceptible to social vulnerability and is not fully representative of multilingual samples.

Many comparison studies have shown that multilingual children may be at disadvantage regarding language development when they enter school (Hoff, 2013, 2021; Hoff & Elledge, 2005). This characteristic, however, is related to the quality and the amount of input these children receive in each language, which is, in turn, related to other environmental factors, such as the effects of SES and other conditions of social vulnerability (e.g., immigrants and refugees) (Hoff, 2013; Hoff et al., 2012; Thordardottir, 2011). For instance, findings from multiple studies conducted

in the United States suggest a “school readiness gap” between low-income bilingual children and monolingual middle-class children (Castro et al., 2011). It is a fact that language minority homes offer a variability of conditions (some only hear their heritage language at home, and others are bilinguals from the start, although the balance between languages may vary), and all these differences may pose both risk and protective factors (Hoff, 2006, 2013).

Regardless of the differences observed in oral language abilities, multilingualism does not make children slow learners (Hoff, 2021; Marchman et al., 2010). In fact, there is strong evidence that multilinguals may show advancements in other areas (e.g., executive functions) once they experienced a rich linguistic environment in the target language (Hoff, 2013, 2021). As with SES and other environmental factors, children’s individual learning abilities may also constitute a protective factor in a context of linguistic diversity (Hoff, 2021), and high-quality education have a fundamental role in bridging the gap for their language and academic outcomes (Hoff, 2013).

In sum, most studies included in our sample showed positive results for the outcomes of interest (PA, OL, read) in all environmental conditions. This means that most intervention programs were effective both for disadvantaged children (i.e., children from low-SES and those from multilingual environments) and children with more favorable environmental backgrounds. The implications of the improvements, however, may be interpreted differently. For disadvantaged students, the positive effects suggest that most interventions have the potential to close the gaps imposed by the unfavorable conditions, providing them with more opportunities to succeed academically. For students with unidentified environmental disadvantages, the interventions may have boosted the development of linguistic abilities that are prerequisites to literacy and formal academic instruction.

As argued by Hoff (2013), the initial differences caused by poorer linguistic environments should be recognized as deficits rather than differences that should be embraced. As such, the implementation of effective interventions may leverage the ground for all children to achieve their maximum potential. Although there is scientific evidence that creates expectation for positive effects for language interventions in low-SES and multilingual environments, systematic reviews are needed to address this question more robustly.

### ***Child Factors***

Children’s characteristics also varied between interventions. We identified interventions that targeted different populations based on their language status (language disorder/at risk for language disorder – LD/at risk and “general,” which means children were not selected for their language status) and educational level

(preschool/kindergarten and elementary school<sup>3</sup>). Figure 3 shows the proportion of studies that found significant positive effects for three different outcomes: phonological awareness, oral language, and reading.

We found that intervention effects did not vary based on the target population. The intervention effects for all outcomes (phonological awareness, oral language, and reading) were positive for all groups, regardless of children's language status (60–83%).

The group of children with or at risk for language disorders included both individuals with confirmed diagnosis and those who had never seen a specialist but performed poorly on language tests. As discussed previously, children may struggle with language and literacy development for several reasons (Lonigan, 2006; Lundberg, 2009), from individual predisposition to poor stimulating environments. Our clinical sample might have reflected this heterogeneity, including both children with persistent language learning difficulties (language disorders) and those with poor language development (language delay). Different responses to intervention, however, are expected for each of these subgroups.

Children with language disorders usually require intensive and ostensive training delivered with multisensory learning cues to compensate their long-lasting language difficulties (Ebbels, 2014; Ebbels, McCartney, et al., 2019, Ebbels, Wright, et al., 2017). Children with language delay, on the other hand, need an enriched environment to overcome their initial difficulties, since their language learning capacity is usually preserved. These are the ones who probably benefit the most from good quality interventions (Dodge, 2020). From the 12 papers that studied clinical samples included in this review, 11 recruited at-risk children and only one study involved children with diagnosed language disorder (over half of these included children from low-SES). We can hypothesize, thus, that most children in our clinical groups meet criteria for language delay instead of disorder, which helps explain their good response to intervention.

Regarding children's educational level, all interventions delivered in elementary school showed positive effects, while those targeting preschool and kindergarten years were still effective but to a lesser extent (a little over 80% for each outcome). It is important to emphasize, however, that there were fewer studies focusing on elementary school children, as shown in Fig. 3.

Even so, at this point, the importance of early language intervention for literacy readiness is beyond question (Fricke et al., 2013; Snowling & Hulme, 2021; Terrell & Watson, 2018). There is enough evidence showing that individual differences in oral language skills for school entry-level children can predict literacy and later reading performance (Snowling, Bishop, et al., 2000, Snowling, Nash, et al., 2019). Indeed, our results showed that most interventions studies actually produced positive effects for all relevant outcomes, regardless of the educational level targeted.

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<sup>3</sup>Preschool, also known as early childhood education and care, refers to noncompulsory education for under school-aged children. Kindergarten, also known as pre-elementary or primary school entry level, refers to the compulsory, first stage of formal education. Elementary school, also known as primary or grade school, refers to compulsory first level education for ages 5–10

Nevertheless, the finding that for children in preschool and kindergarten not all interventions were effective suggests that the implementation of structured language programs may be more difficult in the early years, especially for complex programs, which pose additional difficulties in maintaining quality and consistency over time (Snow & Matthews, 2016).

### *School Factors*

We found interventions that have been delivered in different school settings (whole classroom x small groups x individual) and by professionals with different backgrounds (regular teachers, teacher assistants, and paraprofessionals, which were students, tutors, or professionals with nontechnical backgrounds). Figure 3 shows the proportion of studies that found significant positive effects for three different outcomes: phonological awareness, oral language, and reading.

Regarding school settings, only two studies presented programs delivered in individual sessions; 11 reported interventions in small groups, and for other 11 interventions were delivered for the whole class (other two studies did not mention this information). Positive effects on phonological awareness were frequent for the single intervention delivered in individual sessions, as well as for interventions adopting group (75%) and whole-classroom arrangements (71%). When the outcome was oral language, positive effects were robustly found for individual and group interventions (100%), but only 50% of the studies with whole-classroom settings were effective. A similar trend was observed for outcomes in reading skills: the only study with individual and most of the studies with group (87%) interventions had positive effects, while whole-classroom arrangements also had positive findings but to a lesser extent (67%).

The fact that individual sessions were the best setting to improve children's phonological awareness, reading and language skills is not surprising, given that, in that context, the professional delivering the intervention can precisely recognize and address children's needs. However, this conclusion must be taken cautiously because of the very few quality studies with this school setting. Likewise, evidence showing small group settings are effective to promote language and literacy skills for either targeted (Snowling & Hulme, 2011) and universal interventions (Cohen-Mimran et al., 2014) come as no surprise. The fact that classroom-based interventions did not improve children's oral language and reading outcomes as much as the other settings may also be related to the amount of support and participation needed in activities that target – directly or indirectly – these abilities. Within the classroom context, it is considerably more difficult for the person delivering the program to involve all students and recognize their individual needs (ref).

For professional background, we also found different patterns according to the outcome of interest. Curiously, interventions delivered by teacher assistants and paraprofessionals had a slightly higher impact on all skills (100% for phonological awareness, 83% for oral language, and 100% for reading) than interventions

delivered by regular teachers (67%, 77%, and 71% respectively). It is important to note, however, that there was a much higher number of studies involving teachers (18 studies) than teacher assistants and paraprofessionals (8 studies), which may have posed some bias in our results.

The literature shows that language interventions can be delivered successfully by trained professionals, being them teaching assistants (Bowyer-Crane et al., 2008) or specialist teachers (Snowling & Hulme, 2011). However, Lonigan (2006) found that programs evaluated as teacher-implemented rather than researcher-implemented yielded significantly smaller gains on children's skills. He argues that many early childhood educators would consider some of the phonological awareness activities outside the range of developmentally appropriate practice for preschool children. If these beliefs are in fact true for experienced teachers, we could speculate whether paraprofessionals and teacher assistants are naturally more dependent on norm-following and "sticking to the rules" of intervention guidelines due to their novel status as applicants. As far as speculations go, of note here is research lacking clear parameters for such granular analysis.

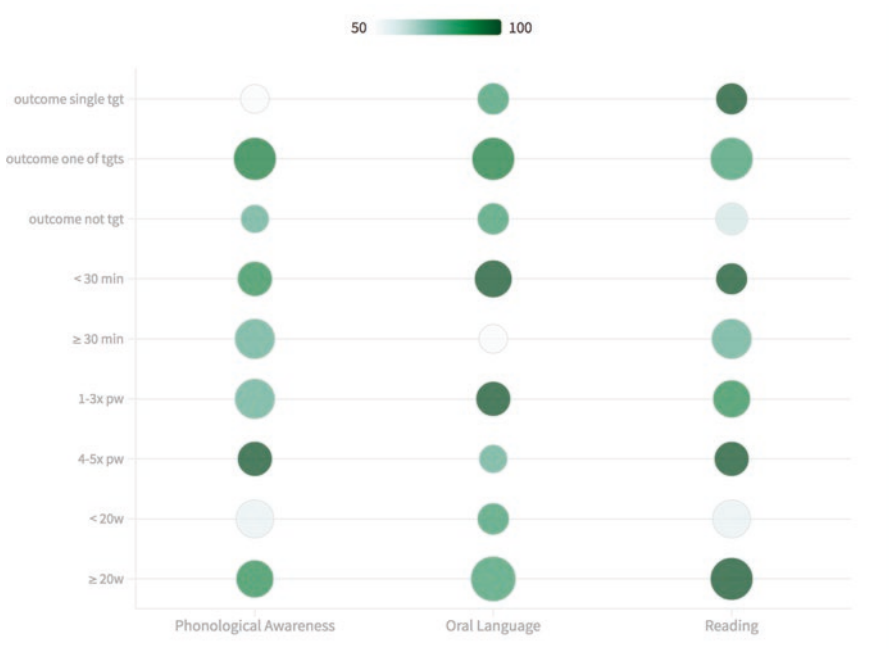
### *Intervention Factors*

Interventions differed in scope (which abilities were at focus) and intensity (length of the session, frequency of sessions per week, and overall duration in weeks). Figure 4 shows the proportion of studies that found significant effects in each variable related to these factors, for three different outcomes: phonological awareness, oral language, and reading.

We identified interventions that targeted different language skills: phonological awareness, oral language, and/or reading. Intervention scope was divided into three categories: (1) "outcome as the single target" refers to interventions in which the outcome (either PA, OL, or read) was the only skill trained directly, (2) "outcome as one of the targets" refers to interventions in which the outcome was one of the skills trained directly, and (3) "outcome not a target" refers to interventions in which the outcome has not been directly trained but could have been influenced indirectly.

Phonological awareness seemed to be more effectively improved with interventions targeting them directly in combination with other skills (89%) or indirectly (75%). Interestingly, fewer studies showed improvements in these skills when targeted in isolation (only 50%). Oral language, on the other hand, had a more even improvement, regardless of how it was targeted: the greater proportion of positive effects were observed when it was one of the targets (89%), but significant improvements were also observed when it was directly targeted in isolation (75%) and when it was not directly targeted (75%). Showing a different pattern, reading skills improved the most as single targets (100%) but also ameliorated as one of several targets (78%) and, to a lesser extent, as an outcome not directly targeted (60%).

In general, interventions were effective to improve trained skills – in isolation or combined with other targets. The exception was the effectiveness of programs



**Fig. 4** Percentage of studies that found positive effects in phonological awareness, oral language and reading skills, for intervention factors

focusing on phonological awareness skills as single targets. A more refined analysis showed that, in our sample, phonological awareness was better improved when trained together with reading ( $N = 6, 100\%$ ) than with oral language skills only ( $N = 2, 0\%$ ). We speculate, therefore, that combining phonological awareness training with reading may more beneficial to children than targeting them alone.

Regarding transfer effects to nontargeted areas, we surprisingly found significant findings, especially for oral language and phonological awareness. There is a consistent body of evidence showing indeed that intervention studies rarely find what is called “transfer of knowledge.” For example, in a large-scale longitudinal study training dialogic reading in 4-year-olds, positive effects on vocabulary did not generalize to reading scores at the end of second grade (Lonigan, 2006). The author justifies that promoting oral language does not impact phonological awareness or print knowledge. Similarly, Bowyer-Crane et al. (2008) found that training phonological awareness and reading fostered decoding skills whereas the oral language program improved vocabulary and grammatical skills. The same group of researchers concluded in a further study that neither program produced statistically significant improvements in secondary outcomes (Fricke et al., 2017).

Given the evidence that emergent literacy skills are relatively modular and that interventions usually improve more consistently the trained skills, Lonigan (2006) advocates that it may be advantageous to incorporate in preschool curricula all language and emergent literacy skills that are crucial for learning to read and write. He

even demonstrates, for example, that phonological awareness interventions that have included letter knowledge training produced larger gains than phonological awareness training alone (Lonigan, 2006). Our data is in line with these findings, since interventions that simultaneously targeted multiple skills were the ones that yielded more positive effects for all outcomes, with a more consistent body of evidence.

With regard to intervention intensity, we identified programs with different lengths for sessions (less or more than 30 minutes), for weekly frequency (1–2; 3–4, or 5 times per week) and overall weekly duration (less than 10 weeks, between 10 and 20 weeks, and more than 20 weeks). Figure 4 shows the proportion of studies that found significant effects for phonological awareness, oral language, and reading.

Phonological awareness improved both through interventions that had shorter (less than 30 minutes) and longer (more than 30 minutes) sessions (83% and 75%, respectively), lower (1–3 times per week) and higher (4–5 times per week) frequency (75% and 100%, respectively) but overall longer ( $\geq 20$  weeks), rather than shorter ( $\leq 20$  weeks) duration (86% and 57%, respectively).

Reading skills had a similar pattern, benefiting both from interventions with shorter (100%) and, to a lesser extent, longer (75%) sessions. The frequency of the sessions also did not differentiate the proportion of positive findings, as both higher and lower frequencies showed consistent positive results (100% and 86%, respectively). Reading outcomes, however, consistently required longer (100%) rather than shorter (57%) intervention program (20 or more weeks were mostly effective).

Differently, oral language skills improved more consistently in studies with interventions that had shorter (100%) rather than longer (50%) sessions. They also required a much less intense training than phonological awareness, with 1–3 sessions per week (100%) yielding more consistent positive effects, although daily sessions were also effective for most studies (75%). The duration of the program did not matter as much for these skills, as studies with both shorter and longer durations had mostly positive effects (80%).

For intervention intensity, at first glance, the more seems to be the merrier. However, it is important to scrutinize the variables used to measure the intervention intensity and the effects on each type of outcome. Our analyses showed that most intervention regimens produced positive effects on all measured outcomes. The duration of sessions (less than versus equal or more than 30 minutes) was not a variable that played a significant part in producing more improvements for phonological awareness or reading, but shorter sessions were better for oral language outcomes. Frequency of the sessions were also did not differentiate the effectiveness of the programs for any measured outcomes. The duration of the intervention, on the other hand, yielded different effects for phonological awareness and reading outcomes, in favor of longer interventions (equal to or more than 20 weeks). Thus, it is reasonable to suggest that shorter sessions (low dose) distributed with higher or lower frequency for longer periods of time produce better outcomes for phonological awareness, oral language, and reading skills.

Regarding variables used to measure the intervention intensity, Schmitt et al. (2017) were the first and only ones to find that more intensive treatments measured

as time were not significantly associated with improved outcomes. They demonstrated that best combinations of features to improve the language abilities of clinical groups were treatments delivered in high frequency and low dose or low frequency and high dose. These two conditions promoted better outcomes than the ones involving high frequency, high dose or low frequency, low dose. Similarly, Smith-Lock et al. (2013) found that, under a constant overall number of sessions, children receiving more distributed treatment over time (weekly) had more gains in grammar than massed treatment sessions (daily). It is important therefore to analyze intensity parameters separately rather than cumulatively.

Regarding the overall duration of language interventions, there is evidence showing that two versions of the same language program (one lasting for 20 weeks and the other lasting for 30 weeks) improved children's oral language skills, but the shorter version showed small effect size ( $d = 0.21$ ) while the longer version had moderate effect size ( $d = 0.30$ ) (Fricke et al., 2017).

## Summary

In summary, this chapter explored for whom and in which contexts language interventions seem to be more effective. Although our intention was to analyze the effectiveness of language interventions delivered in school settings comparing WEIRD and non-WEIRD populations, we could only find a few studies from non-WEIRD countries, most of which rated with poor quality of evidence. Therefore, the results of all good-quality studies (both with WEIRD and non-WEIRD populations) were taken together in our analyses. We emphasize the need for more research with good methodological quality in non-WEIRD countries for further conclusions on possible effectiveness differences as compared to WEIRD populations.

We found that, in general, factors related to the quality of the provided interventions (i.e., methodological variables, such as who delivered the intervention, which abilities were stimulated, and intensity of the intervention) produced more consistent effects than factors related to the individuals (i.e., which are risk factors, such as background SES, multilingualism, and previously detected language disorders).

It is relevant to point out, though, the limitations of these analyses. This chapter provided a scope rather than a systematic review. Although our search retrieved 46 studies that initially met the criteria for our analyses, almost half of them were excluded from our sample for poor quality ratings (20 studies). Furthermore, not all of the contextual factors were explored in all studies included, which restricts the robustness of our findings. We are aware of these limitations and highlight that the intention of this chapter is to raise the contextual factors that seem to play an important role on the effect of language interventions. Future studies are needed to approach the topic in a more systematic way.



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