

# Children's Language Skills Can Be Improved: Lessons From Psychological Science for Educational Policy

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## Abstract

Oral language is crucial for social interaction and for learning in the classroom; it also provides the foundation for reading comprehension. It follows that children with language difficulties are at high risk of educational failure. Recently, a number of studies have demonstrated that it is possible to produce small but significant improvements in children's oral language through targeted language interventions ( $d = 0.16$ ) and, furthermore, that studies with high-quality implementation show larger effects ( $d = 0.24$ ). There is also evidence that effects of language intervention can generalize to produce improvements in reading comprehension. Although further research examining the long-term effects of language interventions are needed, current findings have important implications for educational policy and practice.

## Keywords

language interventions, reading comprehension, randomized trials

Oral language skills form the foundation for many aspects of formal education, not least because most teaching is delivered via language. Moreover, they play a critical role in learning to read (Hulme, Nash, Gooch, Lervåg, & Snowling, 2015; Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004) and in the development of numeracy (Chow & Jacobs, 2016). Perhaps unsurprisingly, therefore, there is good evidence that variations in oral language ability measured early in development are predictors of variations in educational attainment measured several years later (e.g., Duff, Reen, Plunkett, & Nation, 2015; Roulstone, Law, Rush, Clegg, & Peters, 2011). Children with language difficulties are not only at risk of poor academic outcomes but also often experience social-emotional and behavioral difficulties that may persist into adulthood (Clegg, Law, Rush, Peters, & Roulstone, 2015; Snowling, Bishop, Stothard, Chipchase, & Kaplan, 2006; Winstanley, Webb, & Conti-Ramsden, 2018).

The effects of poor language on educational attainment and well-being raises the question of whether early interventions can improve language skills. Here, we review evidence showing that interventions delivered in

school settings can improve children's oral language skills. This evidence has important implications for educational policy and suggests that language-enrichment programs for young children can be effective in promoting academic attainment.

## Language and Its Development

Oral language is a complex system that involves listening (receptive) and speaking (expressive) skills. Language occurs in a communicative context (pragmatics) and reflects interactive processes tapping phonological, semantic, and grammatical structures. Although some children have problems that primarily affect one system of language, language problems do not segregate into clear subtypes, and there is overlap among problems in speech, language, and communication (Bishop, Snowling, Thompson, Greenhalgh, & Catalise-2 Consortium,

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2017). Furthermore, individual differences in language skills in children are well described by a unidimensional construct because scores on different language tests load together on a single factor. For example, Tomblin and Zhang (2006) found that a unidimensional language factor accounted well for scores from a range of tests assessing receptive vocabulary (picture identification), expressive vocabulary (providing definitions for spoken words), receptive grammatical skills, and expressive language use (grammatical completion and sentence imitation) in 6-year-old children. Similarly, Klem et al. (2015) found that a unidimensional language latent factor (defined by sentence repetition, vocabulary knowledge, and grammatical skills) provided an excellent fit to their data and showed a high degree of longitudinal stability. These findings are important because although language is undoubtedly a complex system, they demonstrate that variations in children's language skills are well described by a unitary construct.

Language typically develops according to a more or less universal sequence, with comprehension preceding production. From the first months of life, the infant's language environment guides the development of native speech-perception and speech-production skills. Similarly, in the early months, the infant is learning about the relationships between spoken word forms and the objects and concepts in the world around them. Speech production begins with single-word utterances and progresses over time to the use of complex syntactic forms (Brown, 1973). In typical development, there is very rapid growth in vocabulary between roughly 18 months and 5 years of age: A typical 18-month-old uses around 50 words and by the age of 6 years knows in the region of 10,000 words (Diesendruck, 2007). Intertwined with lexical development, syntactic skills also develop rapidly.

In the early years, language input is aural, but this is supplemented by written forms when literacy instruction begins in the early school years. As children progress through school, an increasing amount of language input is from print. Although early oral language skills predict reading development, later, a reciprocal relationship between reading and spoken language develops in which reading experience provides a source of both new vocabulary and increasingly sophisticated syntactic structures (Hoff, 2013). During the school years, language skills are fine-tuned and continue to develop through middle childhood and adolescence (Berman, 2007) alongside various forms of meta-linguistic awareness until adult levels of language are reached.

There are wide variations in children's language abilities, and numerous studies have shown a moderate to strong relationship between oral language ability and socioeconomic status (SES; Guo & Harris, 2000; Hart &

Risley, 1995; Sampson, Sharkey, & Raudenbush, 2008; Sirin, 2005). SES is a complex variable typically defined by demographic measures including parental education, income, and housing quality. The relationship between SES and children's language ability likely reflects multiple factors, including both genetic and environmental influences on development.

Twin studies provide evidence for significant heritability of language skills, with heritability increasing with age (Hayiou-Thomas, Dale, & Plomin, 2012). In young children between the ages of 2 and 4 years, the heritability of language is around 30% but rises to 60% by the age of 12 years. This increased heritability of oral language skills in middle childhood and into adolescence may reflect gene-environment correlation (children with a greater genetic propensity to learn language may seek out richer linguistic environments and engage in more language-related activities). It is also possible that additional genetic factors (e.g., those influencing sociability) start to influence language development as children get older. The genetic factors influencing oral language development also appear to influence the development of reading fluency and reading comprehension; in particular, the genetic correlation between oral language and reading comprehension is above .80 (Tosto et al., 2017).

Notwithstanding the importance of genetic influences, language acquisition clearly depends on environmental input. There is evidence that the home language environment of children from lower-SES backgrounds is typically less language rich than that of children from higher-SES backgrounds. In a classic study, Hart and Risley (1995) analyzed the home language environment experienced by 42 children followed for 2.5 years between 6 months and 3 years of age. They reported remarkably large differences in the quantity and quality of home language exposure as a function of SES. They estimated that on average, children from professional families would be exposed to 11 million words in a year compared with 3 million words for children from the poorest families. In addition, parent-child interactions in low-SES families tended to involve more directives being given to the child, whereas in higher-SES families, parent-child interactions tended to be more conversational. Converging evidence comes from studies revealing that children from disadvantaged backgrounds show lower levels of oral language skill than their more advantaged peers on measures of language processing, language comprehension, and language production from infancy through school, and this gap widens with age (Hoff, 2013; Huttenlocher, Waterfall, Vasilyeva, Vevea, & Hedges, 2010). Similarly, high rates of migration can result in significant educational challenges for children

who enter school without proficiency in the language of instruction (Castro, Páez, Dickinson, & Frede, 2011; Melby-Lervåg & Lervåg, 2014). Such language differences can be long-lasting. Vocabulary levels of immigrant children at 11 years still lag behind those of nonimmigrant children (Mancilla-Martinez & Lesaux, 2011), and these language weaknesses are paralleled by persistent difficulties with reading comprehension (Melby-Lervåg & Lervåg, 2014).

Finally, the home learning environment, including the language and literacy skills of parents, is a critical factor determining school readiness and mediating the effects of SES on educational outcomes (Dilnot, Hamilton, Maughan, & Snowling, 2016; Puglisi, Hulme, Hamilton, & Snowling, 2017). The need to close the gap between language-disadvantaged and typically developing children presents a *prima facie* case for language intervention (Lervåg, Dolean, Tincas, & Melby-Lervåg, 2019).

### The Effectiveness of Language Interventions

There are now several studies that have evaluated the effects of intervention on language development (e.g., Elleman, Lindo, Morphy, & Compton, 2009; Lonigan, Shanahan, & Cunningham, 2008; Marulis & Neuman, 2010). However, many of these studies have limitations. First, some of them included studies without a control group; second, many focused exclusively on vocabulary; and third, in some cases, they merged effects on directly taught vocabulary with standardized measures testing knowledge of words not directly taught. To remedy this, Rogde, Hagen, Melby-Lervåg, and Lervåg (2019) reported a meta-analysis of 28 randomized controlled trials and 15 quasiexperiments evaluating language interventions delivered either to whole classes or to small groups. The interventions typically involved children between the ages of 4 and 9 years for a mean duration of 18 weeks ( $SD = 10$ ). Two coders independently assessed the risk of bias for each study. Each category (selection bias, performance bias, detection bias, attrition bias, and reporting bias) was classified as high risk of bias, unclear risk of bias, or low risk of bias. Approximately half the studies suffered from selection bias (nonrandom allocation), and outcome assessment was reportedly blind in only half as well. However, the risk of attrition was low in most studies, and a *p*-curve analysis suggested that the risk of publication bias was low. Overall, there was a small but significant effect of language intervention on oral language skills ( $d = 0.16$ ) based on standardized assessments that involved measures of vocabulary and language comprehension. However, for standardized

measures of reading comprehension, the overall effect size was close to zero ( $d = 0.05$ ).

At first glance, these results are disappointing. However, it is important to note that studies with high-quality implementation showed a larger effect size than those with poor-quality implementation ( $d = 0.24$  vs.  $d = 0$ , respectively). Studies with interventions in small groups also demonstrated larger effects than whole-classroom interventions or those involving larger groups ( $d = 0.25$  vs.  $d = 0.10$ , respectively). According to the What Works Clearinghouse and Promising Practices Network (Cooper, 2008), an effect size of 0.25 standard-deviation units or larger can be considered substantially important. Thus, it appears that language interventions of good quality, especially when delivered to small groups, can have meaningful beneficial effects.

Another important issue on which the evidence so far is limited concerns the durability of effects from language intervention. Rogde et al. (2019) identified only eight studies with longer-term follow-up. The average effect size remained almost unchanged at delayed follow-up ( $d = 0.23$ ) compared with immediate posttest. Only four studies had delayed follow-up data on reading comprehension; interestingly, the average effect size for these studies was larger at follow-up ( $d = 0.33$ ) than at immediate posttest. Although these data are limited and might be biased if studies with only positive effects proceed to collect follow-up data, they suggest that the effects of language intervention are moderately durable—the average lag between posttest and delayed posttest was 7 months. This contrasts with typical findings of reading intervention (in which intervention effects are often short-lived) and suggests that language enrichment may lead to increased engagement with learning.

An example of an early language intervention that has been evaluated in several randomized controlled trials is the Nuffield Early Language Intervention (NELI). NELI is an intensive program for children who enter school with weak oral language skills and is delivered daily for 20 (or 30) weeks alternating between small-group work and one-on-one sessions. Teaching assistants are trained to deliver the program and are supported during delivery. The program focuses on improving children's vocabulary, developing narrative skills, encouraging active listening, and building confidence in independent speaking.

Bowyer-Crane et al. (2008) compared the NELI program with an active control condition designed to promote reading and phonological skills with delivery beginning at the end of the first year in school. The children who received the NELI program did significantly better on language tests than children who received the alternative treatment, with an average effect size ( $d$ ) of

0.30 on three key language measures. Other similar, recent randomized trials of young children have shown corresponding findings (Hagen, Melby-Lervåg, & Lervåg, 2017; Rogde, Melby-Lervåg, & Lervåg, 2016). Fricke, Bowyer-Crane, Haley, Hulme, and Snowling (2013) assessed a 30-week variation of the program that was delivered in the final term of preschool and for two terms straight after school entry. The effect size ( $d$ ) on a language latent variable at the end of program was 0.80 ( $d = 0.83$  at 6-month follow-up). Reading comprehension also improved substantially at delayed follow-up ( $d = 0.52$ ), and the gains were mediated by improvements in oral language (rather than in decoding skills that had not been trained as part of the intervention). A further larger-scale trial compared this 30-week version of the program with a 20-week version starting at school entry (Fricke et al., 2017). Both versions brought about significant gains in oral language skills: The estimated effect sizes ( $d$ s) for language at the end of program were 0.30 (30-week program) and 0.21 (20-week program), and these effects were maintained at 6-month follow-up. Although the magnitude of the effects obtained in this program have varied across different studies, it is clear that this program produces consistently positive effects on children's language skills. In the latest study, West et al. (2020) reported a cluster randomized trial of the NELI program in 193 UK schools and found clear improvements on two different language latent variables ( $d$ s = 0.26 and 0.32, respectively).

Some evidence suggests that language interventions have stronger effects on measures of expressive rather than receptive language (Melby-Lervåg, Hagen, & Lervåg, 2020). In the meta-analysis by Rogde et al. (2019), the effects on expressive and receptive language were similar ( $d$ s = 0.21 and 0.19, respectively). However, effects on tests measuring narrative retelling were somewhat larger ( $d = 0.42$ ); at follow-up, only expressive and retelling measures showed lasting effects ( $d$ s = 0.21 and 0.27, respectively), and there were no lasting effects on receptive measures ( $d = 0.07$ ). More research is needed to confirm whether interventions have differential effects on receptive and expressive language skills (Melby-Lervåg et al., 2020). However, distinguishing these effects is not straightforward because many language measures tap both receptive and expressive language and because receptive tests are typically less reliable.

## Lessons Learned From Studies of Language Intervention

The findings reviewed here have important implications for theory and for educational policy. Theoretically, they highlight the fact that structural aspects of

language are strongly related and that although they are highly heritable, they are also malleable. The efficacy of language intervention and the generalization of its effects to reading comprehension confirms a causal relationship between oral language and reading comprehension. However, further research needs to examine the durability of these effects and transfer effects to reading comprehension and other aspects of educational attainment.

The importance of language as a foundation for education broadly, and specifically as critical to both reading and mathematics, is a key message for educational practice and policy. The fact that many children enter school with poor oral language places them at a significant educational disadvantage. This is also true for immigrant children for whom the language of the classroom differs from their native language. To meet these challenges, researchers need to develop curricula that respond to this in the early years with the inclusion of activities to promote vocabulary, narrative, and listening skills and, more specifically, mathematical language. Beyond the early years, teachers need to use language well in order to ensure a context for instruction that is responsive to variations in language ability in mainstream classrooms. Theoretically, it is also important to understand the associations between language and socioemotional skills and to evaluate the impact of language interventions on behavior, well-being, and adjustment.

## Recommended Reading

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## Transparency

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