ENCYCLOPEDIA
on Early Childhood
Development

Speech Development and Literacy

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Introduction

Literacy is essential to success in modern life. Literacy levels predict school completion,[1] vocational outcomes,[2] mental[3] and physical health,[4,5] and quality of life.[2] Ensuring optimum literacy levels requires a focus on young children because oral language skills are the foundation of literacy.[6] According to the "simple view of reading"[7] the ability to comprehend text is determined by oral language comprehension and decoding skills. Decoding, or sounding out letters to recover words from print, is founded on the ability to perceive speech accurately, pronounce speech clearly and understand how speech sounds are combined to form words. These are all aspects of phonology. For most children, phonological development begins before birth, when the fetus hears the melody of maternal speech in the womb, and continues through 9 years of age when the child has learned to accurately pronounce all sounds in the native language.[8]

Subject

Speaking and reading are related because these skills are dependent upon phonological processing.[9,10] Phonological processing includes perceiving speech sounds in speech input ('bin' and 'pin' sound different), recognizing patterns in speech input ('hat', 'mat', and 'sat' share a

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similar ending), and holding phonological information in memory long enough to use it ('b'–'a'–'t', that makes 'bat').[11,12] Within the first year the normal-hearing infant has learned which speech sounds are important in the native language and which speech rhythms are commonly used in words and phrases.[13] This knowledge supports the onset of babbling as well as word learning.[14] Over time the young child learns how speech sounds are combined to form words and gradually speech accuracy improves.[15,16] The older child combines an explicit awareness of the sound structure of words with the alphabetic principle to acquire reading.[17,18]

Problem

Children vary greatly in phonological processing skills[19] and in the rate and typology of speech development.[20] Children with the slowest speech development are at risk for reading disability (dyslexia) when they are school-age. However, some children with unclear speech have no difficulty learning to read and many children with dyslexia had no prior speech difficulties. The challenge of identifying and intervening to prevent reading difficulties is even greater when the child speaks more than one language or does not speak the school language at school entry. Another complication is that the relationship between accurate speech production and reading acquisition is not direct: it is mediated by phonological processing which is a relatively hidden ability. If the child has poor phonological processing but reasonably clear speech the child may not be referred for intervention. When a child with unclear speech is referred to a speech-language pathologist, the intervention may focus on producing accurate speech sounds while ignoring the underlying deficit in phonological processing.

Research Context

Longitudinal studies have revealed how earlier developing skills (speech accuracy, word learning, emergent literacy) predict later developing skills (decoding, reading comprehension). These studies might follow large samples of children drawn from the general population[21-23] or clinic-referred samples with known delays in speech and language development.[24-26] Other longitudinal studies have examined the relative contributions of genetic and environmental factors to language and literacy outcomes by following twins[27] or children born to dyslexic parents.[28,29] Other studies have examined family characteristics and parent behaviours that are associated with the development of emergent literacy skills during the preschool period.[30,31] Finally, some studies have tried to determine best practices for speech-language pathologists and preschool teachers when providing services to children who are at-risk for reading difficulties.[32-35]

Key Research Questions

What can parents do to help their children be ready to learn to read at school entry? Which children with speech problems are most likely to have difficulties learning to read? What are the implications of this research literature for speech-language pathology practice when treating preschoolers with speech sound disorders?

Recent Research Results

Children with delayed or disordered speech development are at increased risk for dyslexia. It is important for parents and professionals to monitor the child's achievement of important milestones in speech development, specifically:

- 7 to 11 months: onset of babbling, that is, repetitive strings of speech-like syllables like "baba" and "deedee;"[36]
- 3 to 4 years: intelligible speech, that is, even strangers can understand almost all or all of the child's speech;[37,38]
- 4 to 6 years: implicit awareness of alliteration and rhyme and sounds in words;
- 7 to 9 years: accurate speech sound production, that is, all speech sounds are produced correctly although slight distortion of some sounds might occur but decline during this period.

The ages at which these milestones are achieved are roughly similar regardless of the language(s) that the child is learning even though the details of speech development vary by language group.[39,40] A useful tool has been developed for measuring speech intelligibility in different languages (see http://www.csu.edu.au/research/multilingual-speech/ics).[41] Not all children with unclear speech are at equal risk of dyslexia however. Referral to a speech-language pathologist is most important when there are additional risk factors, specifically concomitant delay in language skills and a family history of speech, language or reading problems.[42] Note that multilingualism is not a specific risk factor for delayed acquisition of decoding skills.[43]

Parents can teach their child phonological awareness which is the knowledge that words are made up of smaller parts.[44] Spoken language is a continuous stream of sound that does not map easily onto the letters or words that we see in print. Word games that involve breaking up words into parts and recombining them get the point across (football, tee-ball, teacup, buttercup). Matching

words that share the same beginning (sun, soup, sand) to the appropriate letter (s) is an important activity that 4-year-olds can learn.[45] Most children know some of the alphabet before they begin kindergarten.[46] Phonological awareness skills are heritable because there is a strong genetic component to the neurodevelopmental underpinnings of phonological processing.[27,47-50] When phonological processing is poor, a large vocabulary helps the child acquire better phonological awareness than they might otherwise[9] as well as supporting future reading comprehension.[18,51] High quality parental language input is essential to language development and shared reading is an excellent context for vocabulary teaching.[52-54]

These kinds of parental inputs will be especially important if the child is struggling to speak clearly. Speech sound disorders affect 3 to 5% of preschool aged children,[23] 11% of kindergarten aged children[55] (with at least a third of these also having a language disorder)[56] and 18% of 8-year-old children.[57] Children with unclear speech should be referred to a speech-language pathologist. Early intervention is desired because persistence of the speech problem past the point at which reading instruction begins is another risk factor for dyslexia.[58-60] The speech-language pathologist must organize resources to address the child's challenges in the areas of speech accuracy, phonological processing and oral language development.[61-66]

Research Gaps

Children with speech sound disorders are a heterogeneous population made up of different subgroups with varied risk of future reading difficulty.[59] The development of effective interventions for these specific subgroups is in the beginning stages. Furthermore, little is known about optimum intensity and scheduling of treatment.[64,67] Boys are at greater risk of speech disorders[68,69] and often score worse than girls on measures of emergent literacy and reading.[70,71] More research to understand these gender differences and to develop gender-sensitive responses to speech and reading difficulties is required.

Conclusions

Phonological development begins before birth and continues throughout childhood with parallel and gradual improvements in speech perception, speech production accuracy and phonological awareness. Phonological development is closely linked to reading development and the ability to decode words in print is built upon these earlier developing oral language skills.

Implications for Parents, Services and Policy

Parents, educators and health care workers should monitor the child's achievement of certain easily observable milestones in speech production development—babbling by 11 months, speech intelligibility by 4 years and speech accuracy by 7 to 9 years. Parents and teachers can use direct teaching and shared reading to increase vocabulary size and phonological awareness, thus preparing the child for success when reading instruction begins in school.

For children with delayed speech development, the speech-language pathologist must attend to speech accuracy and underlying deficits in phonological processing that put the child at risk for dyslexia. Service providers should ensure that speech therapy services are sufficiently intense and multidisciplinary, engaging families, educators, and other professionals when necessary, to ensure that children achieve normalized speech, language and emergent literacy skills before the onset of formal reading instruction.

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