

The Epidemiology of Literacy Difficulties (Focusing on Children with Speech and Language Impairment)

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Speech and language impairment in preschool children is frequently a precursor of language and literacy difficulties that persist throughout childhood into adolescence and beyond. For the majority, the surface level symptoms of speech and language impairment change over time, but the underlying difficulties persist, with negative impact on both spoken and written language development. Children with literacy difficulties are a heterogeneous group. A classification of reading difficulties is presented which is based on a simple model of reading (reading comprehension can be seen as the product of skills in decoding and listening comprehension). Three distinct subgroups of individuals with reading difficulties arise: those with dyslexia, those with a specific comprehension deficit and those with a broader based reading disability (language-based). This paper aims to describe each of these three groups, and present worldwide and local prevalence data (where available).

Literacy is the ability to use and read written contexts. It is used to develop knowledge and understanding, to achieve personal growth and to function effectively in our society. Literacy involves the integration of speaking, listening and critical thinking with reading and writing. Effective literacy is intrinsically purposeful, flexible and dynamic and continues to develop throughout an individual's lifetime (Department of Employment, Education and Training, 1991, p. 9).

Speech and language impairment (SLI) in preschool children is frequently a precursor of language and literacy difficulties that persist throughout childhood into adolescence and beyond. SLI can have a serious effect on children's academic performance and a subsequent impact on their vocational and life choices (Harasty & Reed, 1994). This paper deals with the epidemiology of literacy difficulties, focusing on children with SLI.

There have been many studies of the long term consequences of a preschool language impairment (e.g. Aram, Ekelman & Nation, 1984; Bishop & Adams, 1990; Levi, Capozzi, Fabrizi & Secchi, 1982; Snowling, Adams, Bishop & Stothard, 2001; Stothard, Snowling, Bishop, Chipchase & Kaplan, 1998). In general, the research demonstrates that for the majority, the surface level symptoms of SLI change over time, but the underlying difficulties persist, having a negative impact on both spoken and written language development (Leitão & Fletcher, 2002; Nippold & Schwarz, 2002; Snowling, 2000b; Stackhouse, 2000). The Western Australian Child Health Survey data showed that speech and language difficulties increased the likelihood of low academic achievement by a factor of about seven (Zubrick et al., 1997).

The general consensus is that from 50% to 90% of children with SLI will continue to have language difficulties during the school years (Stothard et al., 1998). In addition, many will go on to experience literacy difficulties.

Diagnostic issues

Prevalence is generally defined as the total number of cases in a population at/during a specified period of time. Factors such as the following, which impact on validity and reliability of diagnosis, will influence the prevalence rate:

- *The prevailing belief at the time as to what constitutes a speech, language or communication impairment and the width/narrowness of the definition (in other words, the boundaries of the definition and thus the diagnosis of SLI)*
- *The nature of the speech and language impairment (the “type” or “subtype”)*
- *The existence of any co-occurring conditions (and how these are accounted for in diagnosis)*
- *The age of the child under consideration (prevalence is known to decrease with age but the decrease is not uniform across different subtypes)*
- *How the diagnosis is made and the degree of severity (prevalence will remain constant if the diagnosis is made purely on the basis of some statistical cut-off point on language tests)*
- *The sample size (a larger sample is not necessarily more accurate; it may lead to data collection via less reliable methods, such as survey questionnaires which may identify only the more obvious cases of SLI)*
- *The method of data analysis (who collects the information and how; the highest prevalence figures come from studies where direct professional evaluation is used).*

Prevalence of speech and language impairment

Prevalence must always be viewed in the light of the dominant thinking at the time of the study. There have been a number of attempts to draw together the literature on the prevalence of SLI. In most cases, they are presented as lists of prevalence figures based on a large variety of designs used to access the population and a wide variety of methods used to ascertain the skills of the children concerned. In some reports there is an attempt to classify the data according to age and/or speech and language domain.

A systematic review of the SLI research literature estimated a median figure of 5.95% (Law, Boyle, Harris, Harkness & Nye, 1998). However, the authors commented:

considerable caution needs to be taken extrapolating from this type of data synthesis to produce single composite prevalence estimates. The most obvious characteristic of these data is their variability (Law et al., 1998, p. 12)

The range of prevalence estimates was from 0.6% to 33.2%, depending on factors such as the specificity of SLI, the domains of speech and language under consideration, the nature of the population concerned, and the criteria used to define delay (Law et al., 1998).

The literature drawn upon to determine the prevalence rates of speech and language impairment in the UK for the purposes of service planning estimated a prevalence of 6.9% for children of preschool age and 4% for school age children (Enderby & Philipp, 1986). A rate of 8.4% has been suggested in New Zealand (Silva, 1980). A rate of between 8% and 12% of preschool children having some form of language impairment has been suggested in the USA (National Institute on Deafness and Other Communication Disorders, 1995). Recent research suggests the overall prevalence rate of speech and language impairment in children of kindergarten age to be 7.4%, with a gender breakdown of 8% for boys and 6% for girls, and an association between parental education and speech and language impairment (Tomblin et al., 1997).

Phonological disorders are among the most prevalent communication disabilities diagnosed in pre-school and school-age children and affect approximately 10% of this population (Gierut, 1998). Prevalence rates for younger children with speech difficulties vary according to the age studied: 17% for three year olds, 4.6% for grades K–6 and 1–2% for school children of all grades (Blum-Harasty & Rosenthal, 1992). For 80% of children with phonological disorders, the disorders are sufficiently severe to require clinical treatment. Children with phonological disorders often require other types of remedial services, with 50% to 70% exhibiting general academic difficulty through to grade 12 (Gierut, 1998).

There is a lack of research into prevalence rates of SLI in older children and adolescents (Blum-Harasty & Rosenthal, 1992). One study assessed primary school aged children in Australia (from kindergarten to grade 6) and estimated prevalence rates for speech-only and language-only impairment to be 12.6%; for combined speech–language impairment, the rate was estimated at 8% (Harasty & Reed, 1994).

Prevalence of literacy difficulties

Approximately 16% of Australian children are said to have difficulties learning to read (Westwood, 2001). The prevalence of reading disability based on school identification has generally been accepted to be two to four times more common in boys than girls (Shaywitz, Shaywitz, Fletcher & Escobar, 1990). However, epidemiological research has found no significant difference in the prevalence of reading disability in boys and girls in the general population (Shaywitz et al., 1990).

Literacy difficulties and SLI

Many researchers have found academic difficulties to be common in adolescents with a history of preschool language impairment (Aram et al. 1984; Snowling et al., 2001). Of course, not all children with speech and language impairment experience literacy difficulties. Children may struggle with reading and spelling for many different reasons. The literature points to the importance of an intact and robust speech processing system and good phonological processing skills (especially phonological awareness) in supporting the early stages of reading and spelling development, and the role of semantic knowledge and processing skills in supporting literacy development through the school years (Snowling, 2000a).

Researchers have long recognised that children with literacy difficulties are a heterogeneous group. A practical classification system that focuses on reading behaviours, based on a simple model of reading (that reading comprehension is the product of skills in word decoding and listening comprehension) has been proposed (Catts & Kamhi, 1999). Three distinct subgroups of individuals with reading difficulties emerge on the basis of their word decoding and listening comprehension difficulties: those with dyslexia, those with a specific comprehension deficit, and those with a broader based reading disability (language-based) (Catts & Kamhi, 1999). These groups are shown in Table 1 which is based on this classification system.

Table 1. Classification of reading difficulties

Listening comprehension	Word decoding	
	Poor	Good
Good	DYSLEXIA	COMPETENT READERS
Poor	READING DISABILITY (LANGUAGE-BASED)	SPECIFIC COMPREHENSION DIFFICULTIES

Dyslexia (sometimes termed specific reading disability or impairment)

This classification represents a move away from defining dyslexia using a discrepancy definition (such as reading significantly below expected level) to focus on a causal hypothesis at the cognitive level – the “phonological deficit hypothesis of dyslexia”.

It is commonly accepted that children with dyslexia have difficulties learning to decode words (a nonword reading deficit is very characteristic) and in developing a sight vocabulary. Word recognition and associated phonological processing deficits provide the key defining features of dyslexia. In general, language skills fall within the normal range for this group, though a range of difficulties associated with phonological processing weaknesses is apparent. This includes difficulties with phonological awareness, lexical phonological retrieval, phonological memory and complex articulation (Snowling, 2000a)

Current estimates of the prevalence of dyslexia cover a wide range. Researchers have suggested that from 5% to 17.5% (Shaywitz, 1998), 3% to 10% (Snowling, 2000a), or 1% to 10% of the population are affected (Westwood, 2001). Children of dyslexic parents have been found to have an increased risk of dyslexia (a 4.3 odds ratio) (Elbro, Borstrom & Petersen, 1998).

A prevalence figure of 4% appears frequently in the official literature, including Australian publications (National Health and Medical Research Council of Australia, 1990)

Reading disability (language-based) (also termed language-learning disability, backward or “garden-variety” poor readers)

Catts and Kamhi (1999) called this group “language-learning disabled” because they felt the term focused attention on the central role played by language learning difficulties in these children’s problems. They estimated that as many as 50% of poor readers have language deficits that go beyond phonological processing.

These students generally present with ongoing impairments of speech and language and ongoing difficulties with phonological awareness. They may also present with seemingly resolved SLI, though phonological processing tasks often prove sensitive indicators of residual language difficulties. Children in this group may have global cognitive deficits in both verbal and nonverbal abilities or their difficulties may be specific to language processing (SLI)

A systematic literature review found that between 41% and 75% of children with early expressive language delays showed reading problems at age 8 years (Law et al., 1998). Stothard et al. (1998) found the ongoing incidence of literacy difficulties in adolescent children with a history of SLI to be high: 52% of children with resolved SLI and 93% of 15 year olds with persistent SLI (Stothard et al., 1998).

Given that difficulties with oral language are typically observable before children experience any formal literacy instruction, speech pathologists play an important role in early identification of children at risk

One of the most important predictors of literacy development among children with SLI is the status of their oral language skills at the age at which they learn to read (Bird, Bishop & Freeman, 1995). In addition, measures of phonological processing including expressive phonology, phonological awareness, phonological short-term memory (such as nonword repetition tasks), phonological retrieval (rapid naming tasks) and letter knowledge have been shown to predict reading outcome (Bird & Bishop, 1992; Catts, Fey, Zhang & Tomblin, 2001; Heath & Hogben, 2000; Leitão, 1998; Leitão & Fletcher, 2002). Measures of vocabulary, both receptive and expressive, have also been found to be predictive (Scarborough, 1990; Snowling, 2000b).

Both spoken and written language difficulties can stem from a weak underlying speech processing system, with surface indicators changing as children get older, making a single “identifying test” unlikely. A psycholinguistic approach has been suggested as a method for uncovering underlying processing strengths and weaknesses in order to identify children at risk and plan appropriate intervention (Stackhouse & Wells, 1997; Stackhouse & Wells, 2001).

Specific comprehension difficulties (also termed hyperlexia)

It is usually the case that children with reading difficulties experience problems with both decoding and comprehending, and these children will be included in the more general group of children with language and reading disabilities. However, during the last decade it has become clear that there is a small and more “hidden” group of children who experience specific comprehension problems.

Hyperlexia was originally used to refer to children with precocious decoding skills; in its extreme form it has been associated with disabilities such as autism. Not all children have exceptional decoding skills, this profile also fits those with average decoding skills but significant problems in listening comprehension.

These children are often referred to speech pathologists at school age. Their difficulties show up more clearly as they move into the middle and later stages of primary school and curriculum demands place more emphasis on reading comprehension. It is reported that about 10% of children may be able to decode at an age-appropriate level but experience difficulties with reading comprehension (Stothard & Hulme, 1995).

Summary and issues

This paper has presented prevalence data and described a model for classifying reading difficulties from which three distinct subgroups arise. One of those subgroups encompasses SLI. Issues are raised that need to be addressed in the profession.

One key issue is the lack of studies that have integrated clinical judgement with standardised procedures in the estimation of prevalence. The data are generally presented based on psychometric conventions which can lead to the essentially circular nature of statistically derived prevalence rates.

Prevalence should reflect the number of cases that the natural history would suggest are least likely to resolve spontaneously and, therefore most likely to be in need of intervention (Law et al., 1998, p. 14)

Whilst evidence exists that educational, literacy and social difficulties are noted for children with earlier SLI, the data do not at this stage make it possible to clearly predict which children are likely to have persistent problems. Few studies have followed identified but untreated groups; a larger set of studies have followed up treated children. Further research is greatly needed in this area in particular investigating the role of clinical judgement along with standardised procedures in identifying children whose difficulties are likely to persist.

A second key issue relates to long-term access to services. Literacy skills have been found to have a significant effect on the attainments of young people with a history of language impairment, even after cognitive ability has been taken into account (Snowling et al., 2001). Limitations in reading and writing as well as in speech and language are associated not only with poor classroom performance but also with difficulties in the social use of language, peer interactions, social-emotional and behavioural difficulties and mental health morbidity (Law et al., 1998; Taylor, 2002). These associations have implications for ongoing needs in literacy support for students with SLI throughout their schooling.

However, if there is strict adherence to a discrepancy definition of dyslexia, many of these students will not be considered to have a specific reading disability, because of the presence of concomitant language

difficulties. They may therefore be excluded from services for the dyslexic population. In addition, special considerations which are available to those with a diagnosis of dyslexia, such as extra time in examinations, may not be granted.

Unfortunately, as the persistence of SLI is often unrecognised and unacknowledged, there is a lack of services for older students with SLI. In America and the UK, resources for high school students are lacking. In many states in Australia, the situation is even worse, with few services provided for children once they commence school, unless families are able to access and afford private speech pathology services. The Western Australian Child Health Survey identified a gulf between the numbers of students at academic risk and the availability of educational and related support services to assist them and their teachers. The authors recommended that services need to be targeted to students with identifiable speech and language problems (Zubrick et al., 1997).

References

- Atam, D., Ekelman, B. & Nation, J. (1984). Preschoolers with language disorders: 10 years later. *Journal of Speech and Hearing Research*, 27, 232-244.
- Bird, J. & Bishop, D. (1992). Perception and awareness of phonemes in phonologically impaired children. *European Journal of Disorders of Communication*, 27, 289-311.
- Bird, J., Bishop, D. & Freeman, N. (1995). Phonological awareness and literacy development in children with expressive phonological impairments. *Journal of Speech and Hearing Research*, 38, 446-462.
- Bishop, D. & Adams, C. (1990). A prospective study of the relationship between specific language impairment, phonological disorders and reading retardation. *Journal of Child Psychology and Psychiatry*, 31(7), 1027-1050.
- Blum-Harasty, J. & Rosenthal, J. (1992). The prevalence of communication disorders in children: A summary and critical review. *Australian Journal of Human Communication Disorders*, 20(1), 63-80.
- Catts, H., Fey, M., Zhang, X. & Tomblin, B. (2001). Estimating the risk of future reading difficulties in kindergarten children: A research-based model and its clinical implementation. *Language, Speech and Hearing Services in Schools*, 32, 38-50.
- Catts, H. & Kamhi, A. (1999). *Language and reading disabilities*. Boston: Allyn and Bacon.
- Department of Employment, Education and Training (1991). *Australia's language: The Australian language and literacy policy*. Canberra: Australian Government Publishing Service.
- Elbro, C., Borstrom, I. & Petersen, D. K. (1998). Predicting dyslexia from kindergarten: The importance of distinctness of phonological representations of lexical items. *Reading Research Quarterly*, 33(1), 36-60.
- Enderby, P. & Philipp, R. (1986). Speech and language handicap: Knowing the size of the problem. *British Journal of Disorders of Communication*, 21, 151-165.
- Gierut, J. A. (1998). Treatment efficacy: Functional phonological disorders in children. *Journal of Speech, Language and Hearing Research*, 41, 85-100.
- Harasty, J. & Reed, V. (1994). The prevalence of speech and language impairment in two Sydney metropolitan schools. *Australian Journal of Human Communication Disorders*, 22(1), 1-23.
- Heath, S. & Hogben, J. (2000). Auditory temporal processing, phonological awareness and oral language ability in pre-readers: Can we identify children at risk for reading disability more accurately? *The Australian Educational and Developmental Psychologist*, 17(1), 32-62.
- Law, J., Boyle, J., Harris, F., Harkness, A. & Nye, C. (1998). *Screening for speech and language delay. A systematic review of the literature*. Health Technology Assessment, 2(9), monograph.
- Lentão, S. (1998). *Speech impairment, phonological processing skills and literacy outcomes*. Unpublished PhD thesis, University of Western Australia.
- Lentão, S. & Fletcher, J. (In Press). Literacy outcomes for students with speech impairment: long-term follow-up.
- Levi, G., Capozzi, F., Fabrizi, A. & Sechi, E. (1982). Language disorders and prognosis for reading disabilities in developmental age. *Perceptual and Motor Skills*, 54, 1119-1122.
- National Health and Medical Research Council of Australia (1990). *Learning difficulties in children and adolescents*. Canberra: Australian Government Publishing Service.

- National Institute on Deafness and Other Communication Disorders (1995) *National strategic research plan for language and language impairments, balance and balance disorders, and voice and voice disorders* (Publication No 97-3217) Bethesda, MD NIH
- Nippold, M & Schwarz, I (2002) Do children recover from specific language impairment? *Advances in Speech-Language Pathology*, 4(1), 41-49
- Scarborough, H (1990) Very early language deficits in dyslexic children *Child Development*, 61, 1728-1743
- Shaywitz, S (1998) Current concepts Dyslexia *The New England Journal of Medicine*, 338(5), 307-312.
- Shaywitz, S., Shaywitz, B., Fletcher, J. & Escobar, M (1990) Prevalence of reading disability in boys and girls: Results of the Connecticut longitudinal study. *Journal of the American Medical Association* 264(8), 998-1002
- Silva, P (1980) The prevalence, stability and significance of developmental language delay in preschool children *Developmental Medicine and Child Neurology*, 22, 768-777.
- Snowling, M (2000a) *Dyslexia* Oxford, Blackwell Publishers
- Snowling, M (2000b) Language and literacy skills, Who is at risk and why? In D. V. M. Bishop & L. B. Leonard (Eds.), *Speech and language impairments in children: Causes, characteristics, intervention and outcome* (pp. 245-260). Hove, UK, Psychology Press
- Snowling, M., Adams, J., Bishop, D. & Stothard, S (2001) Educational attainments of school leavers with a preschool history of speech-language impairments. *International Journal of Language and Communication Disorders*, 36(2), 173-183
- Stackhouse, J. (2000). Barriers to literacy development in children with speech and language difficulties. In D. V. M. Bishop & L. B. Leonard (Eds.), *Speech and language impairments in children: Causes, characteristics, intervention and outcome* (pp 73-97). Hove, UK, Psychology Press.
- Stackhouse, J. & Wells, B. (1997). *Children's speech and literacy difficulties* London, Whurr Publishers.
- Stackhouse, J. & Wells, B (2001). *Children's speech and literacy difficulties 2 Identification and intervention*. London Whurr
- Stothard, S. & Hulme, C (1995) A comparison of phonological skills in children with reading comprehension difficulties and children with decoding difficulties. *Journal of Child Psychology and Psychiatry*, 36, 399-408.
- Stothard, S., Snowling, M., Bishop, D., Chipchase, B. & Kaplan, C. (1998). Language impaired preschoolers: A follow-up into adolescence. *Journal of Speech, Language and Hearing Research*, 41(2), 407-418
- Taylor, C (2002) Specific language impairment: A persistent developmental health problem. *Advances in Speech-Language Pathology*, 4(1), 59-63
- Tomblin, B., Records, N., Buckwalter, P., Zhang, X., Smith, E. & O'Brien, M (1997). Prevalence of specific language impairment in kindergarten children. *Journal of Speech, Language and Hearing Research*, 40(6), 1245-1260.
- Westwood, P (2001) *Reading and learning difficulties: Approaches to teaching and assessment*. Camberwell, Victoria Australian Council for Educational Research
- Zubrick, S., Gurrin, L., Teoh, H., Shepard, C., Carlton, J. & Lawrence, D (1997). *Western Australian Child Health Survey: Education, Health and Competence*. Perth, Western Australia Australian Bureau of Statistics and the TVW Telethon Institute for Child Health Research