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Research report

Long-term reading and spelling outcome in Italian adolescents with a history of specific language impairment

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ABSTRACT

Specific language impairment (SLI) diagnosed in the pre-school years is frequently associated with reading and writing difficulties at school age. The nature of this relationship is unclear, despite the availability of a large number of studies, mostly on English speaking children. Phonological processing deficits have been considered the prominent cause of both difficulties. However recent findings in both children with SLI and in children with reading difficulties are not easily accommodated within a single dimensional model explaining the relationship between oral and written language deficits.

Our study focuses on the long-term reading and spelling outcome in relation to preschool oral language skills in a group of Italian adolescents with a documented history of SLI.

Sixteen Italian adolescents diagnosed as SLI at our Hospital in the pre-school years and 32 normal controls were submitted to an extensive assessment of oral and written language skills. At a group level SLI adolescents had weak oral and written language skills in almost all tests. Results show that reading difficulties have some features in common with those of Italian developmental dyslexics but also have distinct characteristics, since reading accuracy and written comprehension, usually relatively spared in Italian developmental dyslexics, were impaired in adolescents with SLI.

Longitudinal analyses showed that expressive morpho-syntactic and lexical abilities at pre-school age were the oral language skills that best predicted reading and spelling outcomes in adolescents with SLI.

However, also children with severe phonological impairment in the absence of other oral language deficits showed later literacy difficulties, although less severe and mainly limited to reading accuracy.

Our study supports the notion that there is a complex relationship between oral and written language difficulties which may change at different developmental time points, not captured by a single deficit model, but best conceptualized considering multiple interactions between language skills and literacy abilities.

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1. Introduction

Oral language difficulties in early childhood place children at a high risk of developing disorders of reading and spelling skills. A number of studies have shown that children with specific language impairment (SLI), a disorder of speech and language in the presence of normal non-verbal cognitive abilities (Leonard, 1998), are at risk of developing specific reading and spelling difficulties at school age (Bishop and Adams, 1990; Snowling et al., 2000; Catts et al., 2002; Botting et al., 2006). In a study on a group of 106 children with SLI, selected from a representative population-based sample, Catts et al. (2005) showed that 17–29% of children with SLI in kindergarten met IQ-referenced definitions of developmental dyslexia (DD) in primary and middle school years. On the other hand, oral language difficulties have been frequently reported in developmental dyslexics. In a series of four studies, McArthur et al. (2000) found that approximately 55% of children with DD, selected from clinical populations, had lower than normal scores in language tests. Taken together these findings indicate that there is continuity between the two disorders but the nature of the relationship between SLI and DD remains unclear.

Different models explaining the relationship between SLI and DD have been put forward. The two disorders may be manifestations of the same underlying impairment differing only in severity (“severity” hypothesis), with SLI being a more severe form of the reading difficulty (Bishop and Adams, 1990) or variants of the same language impairment at different developmental stages (Tallal et al., 1997). These disorders may show similar but also distinct features: SLI may be a form of ‘dyslexia-plus’ (Bishop and Snowling, 2004) entailing broader language difficulties extending beyond phonology into morpho-syntactic and semantic domains. Syntactic deficits are a hallmark of SLI (Leonard, 1998): children with SLI mainly produce simple syntactic structures, may have difficulties in understanding complex sentences (van der Lely and Stollwerck, 1996) and in using grammatical morphology both in English and in Italian (Rice and Oetting, 1993; Bortolini et al., 1997; van der Lely and Ullman, 2001). An alternative view posits that SLI and DD are “comorbid”, that is distinct disorders, with different cognitive deficits and behavioral manifestations (Caron and Rutter, 1991; Catts et al., 2005).

The search for common cognitive factors underlying both SLI and DD has been focused mainly on phonological processing deficits, since they have been considered a “core deficit” in DD but also a marker of SLI (Bishop et al., 1996). Both children with SLI and DD have indeed been repeatedly demonstrated to fail in oral tasks requiring explicit manipulation of phonological representations (such as phoneme elision, addition, segmentation and fusion) and in tasks involving phonological coding and maintenance in working memory, such as repetition of nonsense polysyllabic strings (Kamhi and Catts, 1986; Gathercole and Baddeley, 1990; Hulme and Snowling, 1992; Bishop et al., 1996; van der Leij and van Daal, 1999; Goulandris et al., 2000; Bishop, 2001; Conti-Ramsden et al., 2001a; Casalini et al., 2007). However, studies showing that there are developmental dyslexics without phonological impairments (Castles and Coltheart, 1993; McCloskey and Rapp, 2000) and dyslexics with oral language

difficulties extending beyond phonological processing into lexical–semantics and morpho-syntax (Joanisse et al., 2000; Chilosi et al., 2009) have begun to challenge the popular idea that deficits in phonological processing alone are sufficient to explain DD. Snowling, in a recent study (2008) on children at family risk of dyslexia, showed that multiple deficits (including language problems) but not isolated phonological deficits were associated with reading failure.

The complexity of the neurocognitive deficits underlying DD has been revealed by many recent studies, showing a variety of deficits, both within and outside the language domain in developmental dyslexics in different languages. Impairments of visual-verbal association in rapid automatized naming tasks (Brizzolara et al., 2006a; Di Filippo et al., 2006; Lyytinen et al., 2006; Bergmann and Wimmer, 2008), letter position encoding deficits (Friedmann and Rahamim, 2007), magnocellular-dorsal stream impairments (Stein, 2001; Boden and Giaschi, 2007; Kevan and Pammer, 2009), multisensory (visual and auditory) spatial attention deficits (Bosse et al., 2007; Facchetti et al., 2010), visual search difficulties (Ferretti et al., 2008) have all been described in DD. Moreover, many of these neurocognitive deficits have been detected in studies using multiple tasks on the same group of DD (Menghini et al., 2010).

The search for cognitive deficits underlying reading and spelling difficulties in children with SLI has been mainly focused in the language domain (Bishop and Snowling, 2004): however the question of who is at risk and why, among the many children who experience language difficulties remains largely unclear (Snowling et al., 2000; Brizzolara et al., 2006b; Larkin and Snowling, 2008). The heterogeneity of the clinical manifestations of SLI, in terms of range, severity and persistence of impairment, may explain why not all children with SLI develop reading and spelling difficulties. Hence, it is of particular interest to study the development of reading and spelling abilities in children with SLI in relation to different clinical manifestations of the language impairment preceding literacy acquisition.

A few studies have focused on the relationship between type, severity and persistence of language impairment and literacy outcome using a longitudinal approach. In a pioneering work Bishop and Adams (1990) found that measures of expressive and receptive morpho-syntactic competence at 4 and 5 years of age were significant predictors of reading outcome at 8 years, while, unexpectedly, expressive phonological measures at 5 years accounted for only a small proportion of the variance in reading accuracy in third grade. Catts (1991, 1993) obtained similar results: children with more widespread language impairment in kindergarten did develop reading difficulties in first grade. However an isolated phonological problem, if severe enough (Bird et al., 1995) and still present during the early phases of reading acquisition, will determine difficulties in mapping graphemes to phonemes. Persistence and severity of language problems go usually hand in hand so that it is not easy to disentangle the effects of the two factors on the development of reading and writing.

However, reading and spelling acquisition is a long lasting and multicomponent process that requires increasingly heavier demands on a broader range of language processing skills. There is scarce evidence documenting the long-term outcome

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