



## Basic reading skills in Swedish children with late developing language and with or without autism spectrum disorder or ADHD

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### ABSTRACT

Reading skills at age 7–8 years were examined in a community-representative sample of 21 screened and clinically examined children with language delay (LD) followed prospectively from 2.5 years of age. The present study aimed to (1) determine whether these children with a history of LD had deficits in basic reading skills, i.e. decoding and comprehension, compared to the age norms of standardized tests, (2) analyze if there was a relationship between reading outcome and neuropsychiatric diagnosis by comparing three subgroups of children, LD pure, LD + ASD (autism spectrum disorder) and LD + ADHD, and, (3) determine what language measures at age 6 years were associated with the 7–8-year reading outcome. Both decoding and comprehension of single word reading were significantly below the norm for the whole LD group, where children with LD + ASD scored lowest, and children with LD highest. However, the differences between the three groups did not reach significance. Two reader groups were identified according to the results of word decoding and comprehension, respectively, resulting in the same 7 children. ANOVA revealed that the only differences on the 6-year language tests between the two groups were found on color naming and word memory. This study has shown that children with LD and subsequently identified neurodevelopmental problems such as ASD and ADHD experience continued deficits, demonstrated also in reading skills and that the picture of the reading problems seemed to resemble those of typically developing children.

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### 1. Introduction

Numerous studies during the past decades have shown that children with late developing language are at risk for developing future reading problems. According to a systematic review by Law, Boyle, Harris, Nye, and Norris (1998), 41–75% of children with delayed early expressive language show later reading problems at age 8 years. Risk factors for persistent problems include the initial severity, whether the language difficulties are generalized across language domains (phonology, grammar, semantics and pragmatics) and if also cognitive and developmental skills are delayed (Conti-Ramsden, Simkin, & Botting, 2006; Law et al., 1998; Paul, 2000; Snowling, Bishop, Stothard, Chipchase, & Kaplan, 2006).

It is well known that children gradually shift focus from *language content* to *language form* during the late pre-school years, i.e. they successively develop a meta-linguistic awareness in different language domains, for example phonological awareness (“Is there an [a] in “kaka” [biscuit]), morphological awareness and syntactical awareness. This meta-linguistic awareness is important for children to master in order to learn to read and write (e.g. Lundberg, 2002; Snowling, 2000;

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Stackhouse, 2000). However, phonological awareness, necessary for *word decoding*, is only one of two strands of linguistic development necessary for reading acquisition. According to the Simple View of Reading (Hoover & Gough, 1990) the other component in reading is *comprehension* with the best prediction of reading ability being made from the product of these two components. This second component concerns semantic and syntactic ability, memory and inferencing ability (Lundberg, 2002). Reading comprehension can thus break down either for problem with (1) word decoding, (2) language comprehension or (3) a combined weakness of both sets of skills (Gough & Tunmer, 1986). Hoover and Gough (1990) also found that the correlation between the two components went towards more negative values in less efficient readers.

Children with late developing language have received relatively little scientific attention in Sweden when it comes to literacy. In a longitudinal study, based on language screening of 1658 Swedish 4-year-old children, 15% were considered in need of a referral for a speech and language examination. At age 9 years, 20% of these children had problems with reading comprehension (Westerlund, 1994). In another Swedish longitudinal study, Magnusson and Naclér (1993) found a strong relationship between language skills and phonological awareness in 115 6-year-old children with and without diagnosed language impairment (LI). At age 18, reading comprehension and spelling skills were still poorer in students previously diagnosed with LI than in the control group. Catts (1993) investigated pre-school children with LI and found that children with problems with grammar and phonological awareness who also had problems with rapid word retrieval were the ones most likely to have reading and writing difficulties in the long run. “Late-talking” children also performed more poorly than typical developing children on measures of verbal short-term memory and word retrieval by school age (Rescorla, 2000). Increasing knowledge of children with LI has shown that there are particular deficits and limitations in their capacity to process and store information (Bishop, 1997; Botting, 2005; Conti-Ramsden & Hesketh, 2003). Processing markers such as verbal memory measured as digit-, word- or sentence span have also been identified as related to literacy (Snowling, Adams, Bishop, & Stothard, 2001).

In a British longitudinal study (Conti-Ramsden, Botting, & Faragher, 2001), 242 children attending language units in the United Kingdom at 7 years of age were followed-up at 11 years of age. The result showed that specific language impairment (SLI) is likely to persist not as a specific deficit but as a difficulty across a wide range of language skills and literacy performance. In the study by Stothard, Snowling, Bishop, Chipcase, and Kaplan (1998) 48% of the children diagnosed with specific language impairment (SLI) at age 4, still fitted the profile of SLI at age 15, but only 20% had reading problems. This finding corresponds with the results of Rescorla’s follow-up study (2000) where the late talkers, identified at age 24–30 months, had more problems with spoken language (vocabulary and grammar) than with reading and spelling at age 13. Thus, as suggested by Rescorla (2000), it seems that different aspects of the reading process are interrelated with different aspects of oral language, and oral and written language problems are not necessarily identical.

LI in children seem to have a negative impact on social development, cognitive development and academic achievement (Botting, 2005; Conti-Ramsden et al., 2006; Snowling et al., 2006). There is also an increased risk of neuropsychiatric disorder in children with a history of LI according to longitudinal studies (Conti-Ramsden et al., 2006; Miniscalco, Nygren, Hagberg, Kadesjö, & Gillberg, 2006; Snowling et al., 2006) and LI has been found to be associated with adult psychiatric disorder (Beitchman et al., 2002; Clegg, Hollis, Mawhood, & Rutter, 2005). Language impairment and other developmental disorders such as ADHD and ASD are often associated with reading disabilities (e.g. Åsberg, Dahlgren, & Dahlgren Sandberg, 2008; Åsberg, Kopp, Berg-Kelly, & Gillberg, 2010; Clair, Durkin, Conti-Ramsden, & Pickles, 2010; Nation, Clarke, Wright, & Williams, 2006). In a study by White and co-workers (2006), more than half of the ASD group had word decoding difficulties, poor phonological awareness and problems with rapid naming. Pursuing the question of the course of additional language problems in children with SLI Clair et al. (2010) followed the development of the children with SLI described above during a 9-year period (see Conti-Ramsden, Botting, & Faragher, 2001; Conti-Ramsden, Botting, Simkin, & Knox, 2001; Conti-Ramsden et al., 2006). They found reading problems of both decoding and comprehending but also that the development followed what could be expected from children without SLI. They identified two groups of children, SLI only and SLI with autistic symptoms, with slightly different reading patterns. Children with SLI with autistic symptoms performed adequately on the reading decoding task and were significantly better than the SLI only group. On reading comprehension, there was no difference between the groups. These results are in line with those of Nation et al. (2006) but in contrast to the results from Åsberg et al. (2008) who found word decoding and reading comprehension problems to be common in Swedish children with ASD and ADHD. In addition, it was found that there were striking similarities in reading performance in the two clinical groups. There was a strong correlation between sentence comprehension and word decoding even after the effect of verbal IQ and chronological age had been partialled out (Åsberg et al., 2008). This result did not support the common belief that children with ASD are proficient word decoders with mainly reading comprehension difficulties. Instead, the authors suggested that the word-reading problem for some children with ASD and ADHD is a reflection of phonological weakness. In still another study on word reading and reading related skills Åsberg and Dahlgren Sandberg (in press) found that the patterns of difficulties in a group of children with ASD corresponded well to what could be expected in a group of typically developing readers and late readers. Thus, it does not seem self-evident that studies on English speaking children can generalize to Swedish-speaking children due to linguistic differences for example in orthography (Åsberg et al., 2008). Therefore, a search for predictors indicating long-term outcomes in Swedish “late talkers” is still of great interest to both clinicians and researchers.

In the present study, we prospectively followed a community-representative sample of carefully screened and clinically examined children with late developing language from early childhood, i.e. 2.5 years of age through to school age with a particular view to documenting both language and reading problems and neuropsychiatric/neurodevelopmental disorder at

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