

**Language problems at 2½ years of age and their relationship with early school-age language impairment and neuropsychiatric disorders**

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This thesis is based on the following papers:

- I Miniscalco Mattsson C., Mårild S. and Pehrsson N-G. (2001). Evaluation of a language screening programme for 2.5-year-olds at Child Health Centres in Sweden. *Acta Paediatrica* 90, 339-344.
- II Miniscalco C., Westerlund M. and Lohmander A. (2005). Language skills at age 6 years in Swedish children screened for language delay at 2.5 years of age. *Acta Paediatrica* 94, 1798-1806.
- III Miniscalco C., Nygren G., Hagberg B., Kadesjö B. and Gillberg C.(2006). Neuropsychiatric and neurodevelopmental outcome at age 6 and 7 years of children who screened positive for language problems at 30 months. *Developmental Medicine and Child Neurology* 48, 361-366.
- IV Miniscalco C., Hagberg B., Kadesjö B., Westerlund M. and Gillberg C.(2006). Narrative skills, cognitive profiles and neuropsychiatric disorders in 7 to 8-year-old children with late developing language. Accepted for publication in *International Journal of Language and Communication Disorders*.



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## **Abstract**

**Background:** International research has shown that language delay (LD) is associated with social, cognitive, emotional and/or behavioural deficiencies, but there is still a need for extended knowledge about LD at early age and its relationship with long-term language impairment and neuropsychiatric disorders in Swedish children.

**Aims:** To study (a) if children with a positive screening result or a negative screening result at 2½ years of age showed persistent or transient language difficulties at 6 years of age and, (b) whether or not children identified by language screening at 2½ years of age were diagnosed with language, neurodevelopmental and/or neuropsychiatric impairments at school age.

**Materials and methods:** At the *2½-year screening* 25 children with LD and 80 screening-negative children constituted the study population, i.e. in all 105 children (Study I). At the *6-year examination* the follow-up group consisted of 99 children – 22 children from the LD group and 77 children from the screening-negative group (Study II). The 7 to 8-year-old follow-up (study III and IV) included 21 of the 22 children with LD who participated in study II. Screening results from nurses were re-classified blindly (study I) by the use of Reynell Developmental Language Scale. Study II included tests that examined both reception and production in different areas of speech and language as well as linguistic awareness. Study III and IV consisted of a multidisciplinary in-dept examination of language, intellectual functions and the presence of neuropsychiatric/neurodevelopmental disorders.

**Results:** The sensitivity of the screening tool was 0.69, and the specificity was 0.93 (study I). The 6-year examination showed that there was still a highly persistent and significant difference between the children with and without LD on almost every variable tested (study II). In studies III-IV it was found that 62% of the LD children also had received a neuropsychiatric diagnosis at age 7 to 8 years: eight children were diagnosed with ADHD and five children with ASD. Half of the 21 children with LD had marked problems with performance on narrative tasks according to the Bus Story test and the NEPSY Narrative Memory Subtest independently of co-occurrence of neuropsychiatric disorder. The only difference between the children with LD pure and those who had LD+AD/HD or LD+ASD was on Freedom from Distractibility, where children with AD/HD and ASD scored low. In addition, children with ASD had a much lower overall cognitive level (FSIQ) and poorer results on tasks assessing Processing Speed.

**Conclusion:** It is possible to identify children with LD at 2½ years of age. All children identified with LD at 2½ years of age also appeared to be at later risk of complex neurodevelopmental/ neuropsychiatric disorders. Remaining language problems at 6 years of age strongly predicted the presence of neuropsychiatric/ neurodevelopmental disorders at age 7 to 8 years. The observed difficulties, including narrative problems, in the LD children indicate that these children are at high risk of persistent language impairment and future problems concerning reading and writing.

**Clinical implications:** Children identified with late developing language at 2½ years of age need to be followed carefully for several years. Follow-up should include neuropsychiatric as well as speech-language assessments, and the multidisciplinary team should be particularly prepared to diagnose ASD, AD/HD, and various kinds of learning disorders. Assessment of non-word repetition, semantic and narrative skills at the follow-up occasions may be a useful clinical tool for identifying children with more persistent subtle language problems who are at risk of academic failure.

*Keywords:* language screening, language development, language delay, longitudinal, neuropsychiatric disorders, narrative skill