

Introduction

Dyslexia is a learning disorder, primarily characterized by severe reading difficulties despite average intelligence and adequate education (e.g., Grigorenko, 2001). The percentage of school-age children having dyslexia ranges from 1% (in Japan and China) to about 20% in English-speaking countries and between 2 and 10% in the Dutch speaking population (e.g., Ghèsquire & Ruijsseenaars, 1998; Grigorenko, 2001).

Co-morbidity refers to the co-occurrence of one or more diseases or disorders in an individual. **Dyslexia** is frequently associated with other learning disabilities, development and conduct disorders.

Research questions

Do children with dyslexia also have

- problems with visuospatial skills?
- mathematical problems?
- more attention and/or hyperactivity problems?

Method

Subjects

Participants were 22 average intelligent children (18 boys and 4 girls) with a clinical diagnosis of dyslexia and 22 age-matched controlled children between 7.6 and 10.6 years. All children with dyslexia had a clinical diagnose, so they scored several times beneath percentile 10 on tests to evaluate technical reading of words and spelling within Dutch speaking children, namely the EMT (Brus & Voeten, 1999), Klepel (Van den Bos et al., 1994) and PI-dictation (Geelhoed & Reitsma, 1999).

Instruments.

Mathematical problem solving was evaluated with two tests: the Number Facts Test (Tempotest Rekenen, TTR, De Vos, 1992) and the Tedi-Math (Gregoire, Noël & Van Nieuwenhoven, 2004) and a teacher rating: the shortened visuospatial questionnaire (SVS, Cornoldi, Venneri, Marconato, Molin & Montinari, 2003).

To investigate co-morbidity of attention and behavior deficits Dutch versions of the Disruptive Behavior Scale namely the VVGK (Oosterlaan, Scheres, Antrop, Roeyers & Sergeant, 2000) was completed by the teacher and the parents.

All children were assessed by specially trained investigators and this at three different moments.

Conclusion

This study indicates that children with dyslexia might have less developed visuospatial skills than peers without dyslexia. On mathematical tasks both groups differed on number words and magnitude comparison but not on Arabic numbers. Finally all analysis indicated that children with dyslexia had more attention and hyperactivity problems than age-matched peers. This study might suggest that dyslexia is often more than difficulties in the mastery of reading.

Although the generalization of the results from 44 cases is severely limited, the results indicate that co-morbidity is more rule than exception, stressing the importance of assessing mathematical number word and magnitude comparison skills as well as attention and behaviour capacity in children who are presented with reading or writing disabilities. The lack of correct and complete diagnoses may negatively influence the choice of appropriate care. Early assessment of co-morbid disabilities might have a positive influence on the psychological development and socialization process in children with dyslexia. To conclude, there can be little dispute that the presence of co-morbidity poses a serious challenge to the instruction and choice of the remediation techniques designed to address problems of children.

References

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Results

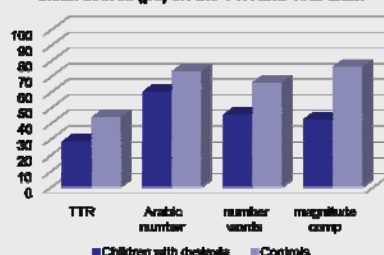
1. Visuospatial skills

The two groups differed significantly on visuospatial skills ($F(2,36)=14.41$; $p<.05$). Children with dyslexia scored significantly lower than peers on the visual spatial scale ($F(1,37)=12.62$; $p<.05$); Dyslexia $M= 29.95$; $SD=5.67$; peers $M= 35.47$; $SD= 3.81$) as well as on the verbal scale ($F(1,37)=26.08$; $p<.05$; Dyslexia $M= 5.10$; $SD=1.37$).

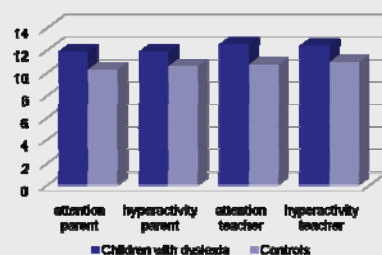
2. Mathematical skills

For mathematical skills (results on TTR and 3 subscores (related tot the Triple Code model) of the Tedi-Math (Arabic number system, number words, magnitude comparison)) there was also a significant difference on the multivariate level ($F(4, 38) = 4.83$; $p<.05$). Children with dyslexia performed significantly worse on number words ($F(1,41)=5,01$; $p<.05$) and magnitude comparison ($F(1,41)=17,96$; $p<.05$). There was a trend of difference between both groups on the Number Fact retrieval ($F(1,41)=3,16$; $p=.07$).

Mean scores (pc) on the TTR and Tedi-Math



Mean scores on the VVGK



3. Attention and hyperactivity

Children with dyslexia have significantly higher standardized scores (SS) on the parent attention and hyperactivity rating ($F(2, 26) = 3,72$; $p<.05$). They also scored higher on the teacher ratings of the VVGK ($F(2, 34) = 7,02$; $p<.05$).