Contents lists available at ScienceDirect



Research in Developmental Disabilities

journal homepage: www.elsevier.com/locate/redevdis

Six factors of adult dyslexia assessed by cognitive tests and selfreport questions: Very high predictive validity



Peter Tamboer*, Harrie C.M. Vorst, Peter F. de Jong

University of Amsterdam, Faculty of Social and Behavioural Sciences, Nieuwe Achtergracht 127, 1018WS, Amsterdam, The Netherlands

ARTICLE INFO

Number of reviews completed is 2 *Keywords:* Dyslexia

Digital assessment Self-report questions Discriminant analysis Principal components analysis

ABSTRACT

The Multiple Diagnostic Digital Dyslexia Test for Adults (MDDDT-A) consists of 12 newly developed tests and self-report questions in the Dutch language. Predictive validity and construct validity were investigated and compared with validity of a standard test battery of dyslexia (STB) in a sample of 154 students.

There are three main results. First, various analyses of principal components showed that six or more factors of dyslexia can be distinguished (rapid naming, spelling, reading, short-term memory, confusion, phonology, attention, complexity). All factors are represented by the MDDDT-A. Second, various discriminant analyses showed good predictive validity for both the tests of the MDDDT-A (90%) and the STB (90%). However, predictive validity of the questionnaire was highest (97%). Third, we analysed the best predictors of dyslexia and found that predictive validity is higher when construct validity is high, that is when a set of predictors represents many characteristics of dyslexia.

The main conclusion is that a digital test battery can be a reliable screening instrument for dyslexia in students, especially when it is accompanied by self-report questions. A theoretical conclusion is that dyslexia is characterized by at least six cognitive impairments in a complex way. In students, this structure may be modulated by high intelligence and good schooling through various compensation strategies. It is therefore recommended to include assessments of all characteristics of dyslexia to achieve the most reliable diagnoses in different samples and in different countries.

1. Introduction

In the Netherlands, various methods for diagnosing dyslexia have been developed for children. Reliable methods for diagnosing dyslexia in adults are however sparse and expensive. Although many young adults with dyslexia have been tested during their school days, an unknown but probably substantial portion of them was never tested at all. Of older adults with dyslexia, a majority was never tested because when they were young, diagnosing dyslexia at school was not a widespread practice like it is nowadays. This resulted in the present situation where there are still many adult people who are not aware of having dyslexia. They may experience various difficulties at work while they do not know that dyslexia may be the underlying cause. But even when they come up with the idea of having themselves tested, prohibitive costs may prevent them following through on it.

Worldwide, most traditional diagnostic instruments are based on definitions of dyslexia, such as the one provided by the World Health Organization (2010). Dyslexia is generally defined as a specific reading disorder characterized by a specific and significant impairment in the development of reading skills, which is not due to problems with visual acuity, schooling, or overall mental

* Corresponding author at: Overtoom 247B, 1054HW, Amsterdam, The Netherlands.

E-mail addresses: petertamboer@kpnmail.nl (P. Tamboer), H.C.M.Vorst@uva.nl (H.C.M. Vorst), P.F.deJong@uva.nl (P.F. de Jong).

http://dx.doi.org/10.1016/j.ridd.2017.09.010

Received 17 October 2016; Received in revised form 5 September 2017; Accepted 16 September 2017 Available online 15 October 2017 0891-4222/ © 2017 Elsevier Ltd. All rights reserved. development. It is also generally assumed that early learning delays cannot be overcome completely despite remedial teaching programs, and that these learning delays interfere with academic achievements into adulthood for most of the people with dyslexia. Prevalence estimates of dyslexia range from about 5% to about 15% of the population across countries.

Specific characterizations of dyslexia are provided by various theories which were developed in more than two decades of scientific research. Many theories have related reading difficulties of people with dyslexia to various underlying deficits (see for reviews: Elliott & Grigorenko, 2014; Peterson & Pennington, 2012). Of these, the most frequently reported are phonological deficits. The phonological deficit theory posits that dyslexia is caused by impairments in phonological information processing, probably caused by problems in the access to or fuzziness of phonological representations of spoken words (e.g. Shaywitz & Shaywitz, 2005; Snowling & Hulme, 2005; Vellutio, Fletcher, Snowling, & Scanlon, 2004). In recent years, also visual/attentional deficits have been frequently reported although their relevance as a cause of dyslexia is debated (e.g. Goswami, 2015; Lobier & Valdois, 2015). The most important hypotheses postulate deficits in visual attention span (e.g. Bosse, Tainturier, & Valdois, 2007; Lobier, Zoubrinetzky, & Valdois, 2012; Romani, Tsouknida, Betta, di, & Olson, 2010), temporal spatial attention (e.g. Faccetti, Ruffino, Peru, Paganoni, & Chelazzi, 2008; Faccetti et al., 2009), noise exclusion (e.g. Sperling, Lu, Manis, & Seidenberg, 2006) and visual crowding (e.g. Lorusso et al., 2004; Martelli, Di Filippo, Spinelli, & Zoccolotti, 2009).

Apart from phonological and visual/attentional deficits, other symptoms of dyslexia are also widely investigated and discussed. These include deficits of short-term memory, rapid naming, speed of processing and many more. None of these deficits is regarded as a necessary or sufficient cause of dyslexia. Instead, most researchers adhere to a multiple deficit view of dyslexia, that dyslexia is caused by multiple cognitive factors which operate probabilistically (Pennington, 2006; van Bergen, van der Leij, & de Jong, 2014).

In the present study, our goal is not to evaluate different theories of dyslexia, but to find the best way to diagnose dyslexia in adults. Especially for diagnosing dyslexia, it is crucial to understand that apart from reading and spelling deficits, many other deficits are related to dyslexia. Although the literature on adult dyslexia is sparse compared to that on dyslexia as a developmental disorder in children, various symptoms of dyslexia in adults were recently investigated. As children with dyslexia, adults with dyslexia experience difficulties with phoneme awareness, rapid automatized naming, reading, spelling, written word recognition and working memory (e.g. Cavalli et al., 2016; Kemp, Parrila & Kirby, 2009; Nergård-Nilssen & Hulme, 2014; Tops, Callens, Lammertyn, Van Hees, & Brysbaert, 2012; Vellutio et al., 2004). In addition, deficits in various executive functions have been reported (Smith-Spark, Henry, Messer, Edvardsdottir, & Ziecik, 2016).

In summary, adults with dyslexia seem to experience most of the deficits that are also commonly reported in children with dyslexia. However, an issue to account for is that reading and spelling difficulties of adults with dyslexia may differ depending on the language. Some languages are known for their difficult spelling and related difficulties with phonological transitions (for instance English), while other languages are known for their transparency between their spelling and phonology (for instance Italian). Therefore, the best diagnosis of dyslexia in adults should comprise different measurements for different languages. The present study focuses on the Dutch language. Another issue to account for is that while in children with dyslexia reading and spelling difficulties may be the key symptom of dyslexia, in adults with dyslexia a complicating factor is that some well-educated people may have overcome difficulties such as these. Some deficits may have been compensated for, while other deficits may manifest themselves more severely when compared to children.

Which tests to be used to diagnose dyslexia in adults has hardly been studied. One example in the English language is the Dyslexia Adult Screening Test (DAST) (Nicolson and Fawcett, 1997, 1998), which includes measures of reading, spelling, writing, rapid naming, phonology, working memory, balance, and various verbal skills. In a validation study of the DAST (Harrison & Nichols, 2005), it was found that the spelling, reading, writing, and phonology tests contributed to the best classification accuracy, which however remained below 90 percent. Another example is a study by Tops et al. (2012). In this study, it was examined how a reliable diagnosis of dyslexia could be made in students in higher education with Dutch as their first language. Predictive validity of 53 subtests was examined covering abilities of reading and spelling, phonological awareness, general intelligence, vocabulary, rapid naming, memory, morphology and syntax, math, and speed of processing. Tops et al. recommended that a test battery for adults in higher education with Dutch as their first language should include measures of word reading, word dictation, proofreading, phonological awareness, rapid naming, and calculation. This is quite an extensive list of tests for a reliable diagnosis, and it requires a lot of time to administer all these test as well as the need for test assistants. As a result, the costs of a diagnosis will be substantial and this is a hurdle for persons who must pay for themselves. For these persons, a cheap and easily available screening battery for dyslexia could be of immense help. Two workable solutions are fully digitised tests with automatic reports and digitised self-assessment through self-reports.

One such battery in the English language is the Bangor Dyslexia Test (BDT) (Reynolds & Caravolas, 2016), which is a valid screening tool for dyslexia with a classification rate of 94%. This test battery measures various abilities such as verbal/phonological short-term working memory, spatial awareness, arithmetic skills, and executive functioning. By our knowledge no fully digitised test batteries are available for adults in the Dutch language, although the 'IDAA15 + ' (Schraeyen et al., 2009) was validated for young adults (16 years). A disadvantage of this test is that it only can be used by professional psychologists with relatively large costs for the client.

A second cheap solution for a reliable digitised diagnosis of dyslexia is a self-report questionnaire. In several previous studies, support was found for the reliability and validity of self-assessment of dyslexia (Snowling, Dawes, Nash, & Hulme, 2012; Tamboer & Vorst, 2015; Willcutt, Boada, Riddle, Chabilda, DeFries, & Pennington, 2011). For example, Tamboer and Vorst (2015) reported classification performances using various criteria of dyslexia of 94% or higher. This study also concerns the further validation of the questionnaire that was used by Tamboer and Vorst.

The prime aim of the present study was to validate the Multiple Diagnostic Digital Test Battery for Adults (MDDDT-A), a fully

Download English Version:

https://daneshyari.com/en/article/4940976

Download Persian Version:

https://daneshyari.com/article/4940976

Daneshyari.com