Cognitive and linguistic predictors of reading comprehension in children with intellectual disabilities

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A B S T R A C T

A considerable number of children with intellectual disabilities (ID) are able to acquire basic word reading skills. However, not much is known about their achievements in more advanced reading comprehension skills. In the present study, a group of 49 children with ID and a control group of 21 typically developing children with word decoding skills in the normal ranges of first grade were compared in lower level (explicit meaning) and higher level (implicit meaning) reading comprehension abilities. Moreover, in the group of children with ID it was examined to what extent their levels of lower level and higher level reading comprehension could be predicted from their linguistic skills (word decoding, vocabulary, language comprehension) and cognitive skill (nonverbal reasoning). It was found that children with ID were weaker than typically developing children in higher level reading comprehension but not in lower level reading comprehension. Children with ID also performed below the control group on nonverbal reasoning and language comprehension. After controlling for nonverbal reasoning, linguistic skills predicted lower level reading comprehension but not higher level reading comprehension. It can be concluded that children with ID who have basic decoding skill do reasonably well on lower level reading comprehension but continue to have problems with higher level reading comprehension.

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1. Introduction

Being able to read is crucial for a person's independence in life, and expands opportunities for gaining knowledge (Boudreau, 2002; Verhoeven, 1994). This also applies to children with intellectual disabilities (ID). Despite developmental disabilities, many children with ID are able to acquire basic literacy skills, although their level of literacy can vary widely (Jones, Long, & Finlay, 2006; Kliewer, 2008; Koppenhaver & Erickson, 2003). But being able to read or recognize words does not guarantee comprehension of what is read.

The current knowledge regarding reading comprehension in children with ID is limited. Most research in this area concerned intervention studies, focusing on a wide range of reading comprehension strategies, rather than identifying the underlying reasons for difficulties in reading comprehension (Browder, Wakeman, Spooner, Ahlgrim-Delzell, & Algozzine, 2006; Mason, 2013; Van den Bos, Nakken, Nicolay, & Van Houten, 2007). Also, no clear distinction has yet been made between different levels of reading comprehension in individuals with ID. In order to optimize future intervention programs for children with ID, it is necessary to increase explanatory power and gain more insights regarding specific characteristics of their reading profile. In the present study, we investigated predictors for reading comprehension once word decoding skills were attained. The aim was to distinguish the main predictors for lower level (explicit) and higher level (implicit) reading comprehension in children with ID who were already at first-grade word decoding level.

1.1. Typical reading comprehension

Comprehending a text involves connecting the individual elements within the text in order to construct a meaningful message (Kintsch & Rawson, 2005; Oakhill & Cain, 2012). Based on lexical knowledge, the single word meanings can be organized into meaningful propositions. Next, these propositions are connected by using cues within the text, like anaphoric pronouns and adverbs. This allows detection of the underlying text structure and the overall meaning of the text. In addition to comprehension of explicit text meaning (lower level comprehension), full understanding of a text requires reasoning, induction, deduction and resolving of anaphoric ambiguities. A reader needs to draw inferences about the implicit meaning of words and sentences in the context of a particular passage (higher level comprehension; Hannon & Daneman, 2004; Kintsch & Van Dijk, 1978).

One of the leading theories on reading comprehension in the typical population is the Simple View of Reading (Gough & Tunmer, 1986; modified by Hoover & Gough, 1990), stating that successful reading comprehension is a product of decoding skill and language comprehension. According to the Convergent Skills model, decoding is the main contributor to reading comprehension during the early stages of literacy, because most cognitive resources are involved in interpreting the graphic symbols. Over time, when decoding becomes an automatic process, language comprehension becomes the main determinant of reading comprehension (Vellutino, Tunmer, Jaccard, & Chen, 2007; Verhoeven & Van Leeuwe, 2008).

Complementary to the Simple View, the Lexical Quality Hypothesis states that the degree of comprehension is influenced by the size of the vocabulary, as well as the quality and flexibility of individual lexical representations (Perfetti, 2007; Perfetti & Hart, 2002; Tannenbaum, Torgesen, & Wagner, 2006). Vocabulary indeed is a strong predictor for reading comprehension, even after decoding skill and language comprehension have been controlled for (Cain, Oakhill, & Lemmon, 2005; Ouellette & Beers, 2010; Protopapas, Mouzaki, Sideridis, Kotsolakou, & Simos, 2013).

Recently, several studies have attempted to connect both theories. In a longitudinal study, Verhoeven and Van Leeuwe (2008) observed that in higher grades in Dutch primary schools, only vocabulary directly predicted reading comprehension, while language comprehension influenced reading comprehension through a reciprocal relationship with vocabulary. For Greek, Protopapas et al. (2013) found similar results in a cross-sectional longitudinal study that vocabulary was a strong predictor for reading comprehension in Grades 3–6. In addition, they demonstrated that the predictive value of decoding for reading comprehension may be largely interrelated to language comprehension. These recent studies confirm the importance of decoding skill, language comprehension, and vocabulary for reading comprehension (Hoover & Gough, 1990; Perfetti, 2007). Furthermore, they indicate that reading comprehension is largely attained through a combined contribution of these three linguistic skills.

Reading comprehension is not predicted by linguistic skills only. In addition, a certain degree of cognitive development is required for attaining higher level reading comprehension (Oakhill & Cain, 2012). Reasoning ability has been shown to be a steady, unique predictor of reading comprehension next to linguistic predictors in lower grades of primary school (Fuchs et al., 2012). Cognitive skills enable the reader to relate the linguistic information from the text to their existing world knowledge, monitor text comprehension, and adjust their interpretation if necessary (Hagoort & Van Berkum, 2007; Oakhill & Cain, 2012; Sesma, Mahone, Levine, Eason, & Cutting, 2009).

1.2. Reading comprehension in children with ID

Children with ID generally show limitations in their level of cognitive development, and a slower learning curve for the skills they do develop (Katz & Lazcano-Ponce, 2008). This characteristic is also observed with regard to literacy skills (Erickson et al., 2009; Kaiser, Hester, & McDuffie, 2001). The level of reading comprehension in persons with ID varies widely. In a study including 19 literate adults (IQ 50–79), reading comprehension was found equal to that of typically developing children between 72 months and 114 months of age (Jones et al., 2006). Intervention studies evidenced that reading comprehension can be significantly improved in persons with mild to moderate ID by using direct and comprehensive instruction programs (Allor, Mathes, Roberts, Cheatham, & Al Otaiba, 2014; Ip & Lian, 2005; Van den Bos et al., 2007). However, the term 'reading comprehension' has been used in a broad sense and no clear distinction has yet been made between different aspects of reading comprehension, such as lower level (explicit) and higher level (implicit) reading comprehension. Studies attempting to identify specific cognitive or linguistic precursors to reading comprehension in children with ID are scarce. As a consequence, it is still unclear to what extent the construction of reading comprehension in children with ID differs from typically developing children.