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## The role of phonological awareness and letter-sound knowledge in the reading development of children with intellectual disabilities



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### ABSTRACT

Our study investigated if phonological awareness and letter-sound knowledge were predictors of reading progress in children with intellectual disabilities (ID) with unspecified etiology. An academic achievement test was administered to 129 children with mild or moderate ID when they were 6–8 years old, as well as one and two school years later. Findings indicated that phonological awareness and letter-sound knowledge at 6–8 years of age predicted progress in word and non-word reading after one school year and two school years after controlling for IQ, age, expressive vocabulary, spoken language, and type of placement. Phonological awareness and letter-sound knowledge at 6–8 years of age also predicted progress in reading comprehension after one school year and two school years. These findings suggest that training phonological awareness skills combined with explicit phonics instruction is important to foster reading progress in children with mild and moderate ID with unspecified etiology.

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## 1. Introduction

Illiteracy or reading difficulties are a serious hindrance to inclusion in our society. The development of efficient reading skills is a central goal of school. Individuals with intellectual disabilities (ID) often struggle to learn to read. For many of them, reading skills are lower than might be expected based on their cognitive skills (Cawley & Parmar, 1995; Channell, Loveall, & Connors, 2013; Connors, 2003). Unfortunately, while the processes underlying reading development in typically developing children and children with specific reading disabilities are well known, there is little research on this topic as regards children with ID with unspecified etiology. Indeed, most studies on predictors of reading skills in children with ID were conducted with participants with specific etiologies, mostly Down syndrome. Longitudinal studies on predictors of reading development in children with ID with unspecified etiology are clearly lacking. As a result, it is still unknown if the knowledge acquired on predictors of reading development in typically developing children applies to children with ID with unspecified etiology or if these children display atypical patterns of reading development. More specifically, it is still unknown if phonological awareness (the ability to perceive and manipulate the smallest units of sound) and letter-sound knowledge during the first years of reading acquisition are predictors of later reading development for this group of children. This issue

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is crucial because it has important implications for reading instruction. Indeed, if phonological awareness and letter-sound knowledge are found to be significant predictors, their instruction should be included in reading interventions. Until recently, phonological awareness instruction had been neglected in research on reading interventions for children with ID in favor of sight word instruction (Browder, Wakeman, Spooner, Ahlgrim-Delzell, & Algozzine, 2006; Browder, Ahlgrim-Delzell, Flowers, & Baker, 2012; Joseph & Seery, 2004; Saunders, 2007).

The purpose of the present study is to investigate if phonological awareness and letter-sound knowledge are predictors of progress in reading skills in children with ID with unspecified etiology. The following sections review the contributions of phonological awareness and letter-sound knowledge to reading skills in typically developing children and in children with ID.

### 1.1. *The role of phonological awareness and letter-sound knowledge for typically developing children*

The predictive role of phonological awareness for reading development is well established for typically developing children (Blachman, 2000; Castles & Coltheart, 2004; Kirby, Parrila, & Pfeiffer, 2003; Melby-Lervåg, Lyster, & Hulme, 2012; Plaza & Cohen, 2007). More precisely, phonemic awareness is a strong predictor of word identification skills (Blachman, 2000; Castles & Coltheart, 2004; Plaza & Cohen, 2007; Swanson, Trainin, Necochea, & Hammill, 2003). Letter-sound knowledge in kindergarten pupils has also been found to be a significant predictor of future reading development (Foulin, 2005; McBride-Chang, 1999; Negro & Genelot, 2009; Riley, 1996). Moreover, numerous studies show that phonological awareness training combined with explicit instruction in phonics (relations between letters and sounds) is the most effective intervention to improve reading skills in typically developing children, as well as in children with a reading disability and low-income children (National Institute of Child Health & Human Development, 2000; Ehri et al., 2001; National Institute for Literacy, 2008; Laing & Hulme, 1999; Rack, Hulme, Snowling, & Wightman, 1994).

Phonological awareness and letter-sound knowledge have also been found to predict reading comprehension (Muter, Hulme, & Snowling, 2004; Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004; Storch & Whitehurst, 2002). However, this relation is mediated by decoding and word identification. Indeed, reading comprehension partly depends on word identification (Ecalte, Magnan, & Bouchafa, 2008; Jenkins, Fuchs, van den Broek, Espin, & Deno, 2003; Vellutino, Tunmer, Jaccard, & Chen, 2007). Nevertheless, the latter is necessary but not sufficient on its own to guarantee efficient reading comprehension. Oral comprehension is also a significant predictor of reading comprehension (Ecalte et al., 2008; Nation & Snowling, 2004; Vellutino et al., 2007).

Other predictors have also been found to be related to non-word reading, word identification, or reading comprehension: rapid automatized naming (Bowey, McGuigan, & Ruschena, 2005; Elbro & Scarborough, 2004; Kirby, Georgiou, Martinussen, & Parrila, 2010), vocabulary (Elbro & Scarborough, 2004; Tannenbaum, Torgesen & Wagner, 2006; Vellutino et al., 2007), phonological short-term memory (Elbro & Scarborough, 2004), and morphological awareness (Carlisle & Nomanbhoy, 1993; Singson, Mahony, & Mann, 2000). Among typically developing children, it has been shown that the weight of these different predictors changes over time (Vellutino et al., 2007). Therefore, the age of the study samples is of considerable importance when dealing with reading predictors.

The spoken language can also lead to quantitative and qualitative differences in children's reading development. Alphabetic orthographies of different spoken languages differ in the consistency of the relationship between letters and sounds. Languages such as German or Spanish have transparent orthographies with a consistent relationship between letters and phonemes. Other languages such as French are less transparent with more inconsistencies between orthography and phonology. French is, however, less inconsistent than English, which has the most opaque orthography (Seymour, Aro, & Erskine, 2003). The growth of reading skills is slower in more opaque languages such as English (Caravolas, Lervag, Defior, Malkova, & Hulme, 2013; Seymour et al., 2003). The strength of reading predictors seems to be slightly different across different languages, with phonemic awareness being a stronger predictor in opaque orthographies (Ziegler et al., 2010). Nevertheless, phoneme awareness and letter-sound knowledge remain significant predictors of reading development in different orthographic languages independently of the consistency of their orthography (Caravolas et al., 2013; Ziegler et al., 2010).

### 1.2. *The role of phonological awareness and letter-sound knowledge for children with ID*

The majority of studies on predictors of reading skills among children with ID were conducted with children with a specific etiology. Phonological awareness was found to be related to current word or non-word reading among children with Williams syndrome (Laing, Hulme, Grant, & Karmiloff-Smith 2001; Levy, Smith, & Tager-Flusberg, 2003; Menghini, Verucci, & Vicari, 2004) and children with Down syndrome (Lemons & Fuchs, 2010). Letter-sound knowledge was also found to be related with word and non-word reading in children with Down or Williams syndrome (Boudreau, 2002; Kennedy & Flynn, 2002; Laing et al., 2001; Laws & Gunn, 2002; Snowling, Hulme, & Mercer, 2002). There seems to be increasing evidence that children with Down syndrome display a specific profile in reading, with weaknesses in phonological awareness and non-word reading (Lemons & Fuchs, 2010; Næss, Melby-Lervåg, Hulme, & Lyster, 2012).

Most of the studies conducted with children, adolescents or adults with ID with mixed or unspecified etiology found that phonological awareness was significantly related to word identification or non-word reading (Channell et al., 2013; Saunders & DeFulio, 2007; Soltani & Roslan, 2013; Wise, Sevcik, Ronski, & Morris, 2010). However van Tilborg, Segers, van Balkom, & Verhoeven (2014) found a contradictory finding. According to their results, phonological awareness did not predict word decoding. They concluded that children with ID with mixed etiologies showed a deviant pattern compared to

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