Strengths and weaknesses in reading skills of youth with intellectual disabilities

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ABSTRACT

Reading-related skills of youth with intellectual disability (ID) were compared with those of typically developing (TD) children of similar verbal ability level. The group with ID scored lower than the TD group on word recognition and phonological decoding, but similarly on orthographic processing and rapid automatized naming (RAN). Further, phonological decoding significantly mediated the relation between group membership and word recognition, whereas neither orthographic processing nor RAN did so. The group with ID also underperformed the TD group on phonological awareness and phonological memory, both of which significantly mediated the relation between group membership and phonological decoding. These data suggest that poor word recognition in youth with ID may be due largely to poor phonological decoding, which in turn may be due largely to poor phonological awareness and poor phonological memory. More focus on phonological skills in the classroom may help students with ID to develop better word recognition skills.

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1. Introduction

Individuals with intellectual disabilities (ID) often struggle with learning to read. In a recent large-scale survey, reading difficulties were named the most common secondary condition of ID, with 67% of the sample reporting reading as a secondary problem area (Koritsas & Iacono, 2011). Interestingly, researchers commonly define secondary conditions as those that are *preventable* (Koritsas & Iacono, 2011; Turk, 2006). This implies that, given sufficient knowledge about reading skills and implementation of appropriate training programs, reading difficulties should be somewhat preventable for those with ID. However, until recently, literacy education for students with ID has been largely overlooked by researchers and educators alike (Katims, 2000). As we now know that many children with ID *can* learn to read but are still struggling, researchers must explore *how* they learn to read. This is a necessary step toward designing effective interventions and reading training programs for students with ID. This can be accomplished by first identifying patterns of strength and weakness in reading skill development.

The purpose of the present study is to identify both strengths and weaknesses in reading skills of students with ID. To do this, we look to the skills that are important in learning to read in the typically developing (TD) population. The well-known Simple View of Reading proposed by Gough and Tunmer (1986) suggests that there are two main components of reading: word recognition (identifying words in print) and language comprehension (extracting meaning from the words). Whereas

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both components are important, the relative significance of each changes across development (Gough, Hoover, & Peterson, 1996; Vellutino, Tunmer, Jaccard, & Chen, 2007). The focus of early readers is often word recognition. Later in reading development, the focus usually shifts toward comprehension. Because the sample in our study consists of students who are struggling to read at the beginning stages, our focus is on word-level reading rather than comprehension.

In the literature on TD readers, researchers have identified three primary skills that are used in word recognition: phonological decoding (Kirby, Parrila, & Pfeiffer, 2003; Parrila, Kirby, & McQuarrie, 2004; Wagner et al., 1997), orthographic processing (Barker, Torgesen, & Wagner, 1992; Cunningham, Perry, & Stanovich, 2001; Cunningham & Stanovich, 1990), and rapid automatized naming (RAN; Kirby et al., 2003; Parrila et al., 2004; Wolf & Bowers, 1999). These three skills, described in detail below, are unique contributors to word recognition in TD children but have not been fully examined in participants with ID.

1.1. Phonological decoding

Phonological decoding refers to the process of sounding out words by making grapheme–phoneme (visual–sound) correspondences. It is often used by readers when they encounter unfamiliar or novel words; consequently, nonword reading tests are commonly used to measure decoding ability. The process of phonological decoding utilizes other phonological skills, such as phonological awareness and phonological memory (see Wagner & Torgesen, 1987). In the literature on TD children, there is an established link between such phonological skills and reading outcome skills such as word recognition and reading comprehension (Kirby et al., 2003; Parrila et al., 2004; Wagner et al., 1997).

Not surprisingly, the literature on phonological decoding skills in those with ID is more sparse (Conners, 2003; Saunders, 2007). However, researchers have found that decoding ability as measured by nonword reading performance is correlated with reading ability in children and adults with ID of mixed etiology (Saunders & DeFulio, 2007; Wise, Sevcik, Romski, & Morris, 2010) as well as in those with Down and Williams syndromes (e.g., Cardoso-Martins, Peterson, Olson, & Pennington, 2009; Fowler, Doherty, & Boynton, 1995; Laing, Hulme, Grant, & Karmiloff-Smith, 2001; Levy, Smith, & Tager-Flusberg, 2003).

Additional support for the important role of phonological decoding in reading for youth with ID comes from training studies. Phonological decoding based intervention programs have been successful in improving reading-related skills in samples with mixed-etiology ID (Bradford, Shippen, Alberto, Houchins, & Flores, 2006; Cohen, Heller, Alberto, & Fredrick, 2008; Conners, Rosenquist, Sligh, Atwell, & Kiser, 2006; Hoogeveen, Smeets, & Lancioni, 1989; Neville & Vandever, 1973; Vandever & Neville, 1976) as well as syndrome-specific (e.g., Down syndrome) samples with ID (Baylis & Snowling, 2012; Burgoyne et al., 2012; Lemons & Fuchs, 2010a).

Although the above-mentioned studies are promising because they showed that individuals with ID can develop reading skills via phonological-based instruction of decoding and related skills, it is possible that poor phonological decoding skills could be one of the primary reasons why those with ID struggle with reading. One study by Jenkinson (1992) found that children with ID scored lower than mental age-matched TD children on a measure of nonword reading but not on word recognition. Poor nonword reading skills relative to developmental level or word recognition level have also been reported in groups with Down syndrome (see meta-analysis by Næss, Melby-Lervåg, Hulme, & Lyster, 2012a, 2012b) and Williams syndrome (e.g., Menghini, Verucci, & Vicari, 2004). If weakness in phonological decoding is general to ID and not syndrome-specific, similar results should appear in the present study, replicating Jenkinson's (1992) findings.

To examine phonological decoding in more detail, we considered two of its subskills: phonological awareness and phonological memory (see Lonigan et al., 2009). *Phonological awareness* encompasses a variety of skills that allow one to differentiate among speech sounds, including the ability to both segment sounds within words and combine them to produce words. It is primarily an oral language skill (Wagner & Torgesen, 1987). *Phonological memory* refers to the ability to hold speech sounds in working memory (Baddeley, 1986) and in the context of reading, to remember them long enough to sound out words (Wagner & Torgesen, 1987).

In samples of individuals with mixed-etiology ID, *phonological awareness* is related to both word recognition and nonword reading measures (Saunders & DeFulio, 2007; Wise et al., 2010). Wise et al. (2010) studied children with mixed-etiology ID who were identified as struggling to learn to read. They found that phonological awareness skills predicted both word and nonword recognition, after accounting for age and vocabulary. Saunders and DeFulio (2007) obtained similar results for adults with nonspecific etiologies of ID. They found significant partial correlations between phonological awareness and measures of word and nonword reading, after accounting for verbal IQ. Findings from both of these studies fit with the literature on TD readers, suggesting that phonological awareness is also core to reading development in individuals with ID (see National Institute of Child Health and Human Development, 2000; Snow, Burns, & Griffin, 1998). However, neither study included a TD comparison group. Although these studies have established an important link between phonological awareness and word-level reading in individuals with ID, there is still a need for basic comparisons of such reading subskills between mixed-etiology ID and TD samples.

Relatively more phonological awareness research has been conducted in etiology-specific ID samples than in mixed-etiology ID samples. Several studies have shown that individuals with Down syndrome (DS) have weak phonological awareness skills compared to TD children of similar developmental level (Fletcher & Buckley, 2002; Kay-Raining Bird, Cleave, & McConnell, 2000; Kennedy & Flynn, 2002; Roch & Jarrold, 2008; Verucci, Menghini, & Vicari, 2006; see Abbeduto, Warren, & Conners, 2007; Lemons & Fuchs, 2010b), and it is thought that this is one reason why they are also poor decoders (Roch & Jarrold, 2008). There is also evidence that at least some aspects of phonological awareness are especially weak in Williams