



# The relationship between phonological processing skills and word and nonword identification performance in children with mild intellectual disabilities

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## ABSTRACT

Word and nonword identification skills were examined in a sample of 80 elementary school age students with mild intellectual disabilities and mixed etiologies who were described as struggling to learn to read by their teachers. Performance on measures of receptive and expressive vocabulary, measures of phonological awareness, and measures of word and nonword identification were included for analyses. Hierarchical regression analyses indicated that, after controlling for chronological age and vocabulary knowledge, phonological processing accounted for a large and significant amount of unique variance of both word and nonword identification. In addition, the pattern of results found in this study is similar to that obtained with typically developing learners. As with typically developing children, measures of phonological awareness were significantly correlated with measures of both reading achievement and vocabulary knowledge.

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## 1. Introduction

Limited research exists concerning the literacy skills of children with intellectual disabilities. Recent research conducted with this population suggests that phonological awareness is related to reading performance by these individuals and that they can benefit from phonemic literacy instruction. The limited corpus of research documenting the literacy skills of children with intellectual disabilities mainly has been conducted with very small samples of children with Down syndrome. Data reported here are part of a larger ongoing project with children who have mild intellectual disabilities resulting from various etiological factors that examines the impact of two reading programs on both early developing reading skills (e.g., phonological awareness, word decoding) and the development of fluency and comprehension skills.

### 1.1. The relationship between phonological awareness and reading performance by children with intellectual disabilities

Children with a range of intellectual disabilities have been taught to read primarily through sight words since it has been assumed that individuals with intellectual difficulties cannot benefit from phonemic instruction because of their limited cognitive skills and associated language difficulties (e.g., Browder & Xin, 1998). Evidence for this assumption comes from an early study by Cossu, Rossini, and Marshall (1993). They reported that 10 children with Down syndrome, whose mean age

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was 11.4 years, were able to learn to read single Italian words yet performed poorly on measures of phonological awareness. These children evinced word and nonword reading skills that were comparable to a younger (mean age = 7.3) sample of 10 typically developing children. In contrast, the children with Down syndrome performed significantly worse than the group of typically developing children on tasks of phoneme segmentation, phoneme deletion, oral spelling, and phoneme blending. These findings prompted the authors to conclude that phonological awareness was not a prerequisite for learning to read with children with Down syndrome. One of the many criticisms of this interpretation is that the phonological awareness tasks used by Cossu and colleagues were beyond the working memory and attentional capacities of the children participating in their study. In contrast to the findings of Cossu et al., more recent research (e.g., Gombert, 2002; Snowling, Hulme, & Mercer, 2002; Verucci, Mehghini, & Vicari, 2006) has found a relationship between phonological awareness and reading performance by children with Down syndrome.

Gombert (2002) studied 11 French children with Down syndrome (mean age = 13.9) who were matched on reading ability with 11 typically developing children (mean age = 7.1). While the children with Down syndrome evinced phoneme spelling, phoneme counting, and phoneme deletion scores that were significantly lower than the group of typically developing children, a composite score of these measures of phonological awareness correlated significantly with word reading performance for both groups of children. In contrast to the Cossu et al. (1993) study, results from Gombert's study suggested that phonological awareness is involved in the process of learning to read for children with Down syndrome. Additionally, although the children with Down syndrome evinced rime judgment, rime oddity, and phoneme synthesis scores that were lower than those of the matched typically developing children, this difference was not significant. Further, scores on these phonological awareness tasks for the children with Down syndrome were considerably higher than the scores obtained on measures of phoneme spelling, phoneme counting, and phoneme deletion. This pattern of results was not seen in the group of typically developing children and supports the argument that task complexity can partially explain the group differences demonstrated in both the Cossu et al. (1993) and Gombert (2002) studies.

Similarly, Snowling et al. (2002) reported that measures of phonological awareness (e.g., syllable segmentation and phoneme identification) were correlated significantly with a measure of single word reading in a sample of 29 children with Down syndrome. Further, they also found that these children (mean age = 13.2) achieved scores on these measures that did not differ significantly from scores produced by a group of younger, typically developing children (mean age = 5.3) matched on word reading level. Just as Gombert (2002) had reported, results from this study evidenced a relationship between phonological awareness and reading in children with Down syndrome.

Snowling and her colleagues also found that the group of children with Down syndrome evinced significantly lower rhyme detection scores than the group of typically developing children. Further, in contrast to the typically developing participants, performance on the rhyme detection task did not correlate significantly with the word reading performance of the children with Down syndrome. These results led the authors to conclude that children with Down syndrome have a specific deficit in rhyming ability. They argued that the development of reading and phonological skills by the children with Down syndrome differs from the development of these skills by typically developing children since it led to only a partial development of phonological awareness skills. One potential criticism of this interpretation is that the children with Down syndrome had not received the same type of reading instruction as had the typically developing children. Differences in the pattern of the relationship between different measures of phonological awareness could be the result of instructional experiences rather than a fundamentally distinct developmental trajectory of phonological awareness.

More recently, Verucci et al. (2006) compared the phonological processing and reading skills of 17 individuals with Down syndrome (mean age = 16.5) with a group of typically developing children (mean age = 7). Despite their older chronological age, the individuals with Down syndrome had lower mental age scores (mean age = 6.2) than the group of typically developing children (mean age = 7.6). Although the individuals with Down syndrome evinced lower performance scores on measures of phonological processing (e.g., rhyming, phoneme deletion, and syllable segmentation) and nonword reading than the typically developing children, correlation analyses indicated that scores on the phoneme deletion and rhyming tasks correlated both strongly and significantly ( $p < .05$ ) with the accuracy of text level reading. Results of this study add further support that children with Down syndrome use phonological awareness skills for word identification and may benefit from phonics-based instruction.

## 1.2. Literacy instruction with children with mild intellectual disabilities

Sight word instruction has been considered a superior instructional approach for children with intellectual disabilities because of the assumption that they, due to low IQ and language difficulties, cannot benefit from phonemic instruction. In contrast to this assumption, Conners, Atwell, Rosenquist, and Sligh (2001) found that a group of children with mild intellectual disabilities with stronger decoding skills ( $n = 21$ ) did not differ from a group of children with mild intellectual disabilities with weaker decoding skills ( $n = 44$ ) on measures of intelligence. Further, when age was covaried out of the analysis, the groups did not differ with respect to language abilities. The only significant difference between the groups that remained was on a phonological working memory task. Decoding problems in the weaker decoding group were not due to limited intelligence or impaired language abilities. This finding led the authors to suggest that during the decoding process, those children with superior working memory skills can hold the beginning sounds of words longer while they attend to subsequent letter/sound combinations. This ability, they argued, then results in better performance in the sounding out of words. Without knowledge of the children's instructional histories, however, it is also possible that children with better early

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