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Effective Interventions for Improving Reading Accuracy and Fluency in Children with Dyslexia

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Dyslexia, also referred to as a reading disability, is the most common learning disability in school age children. It is primarily characterized by difficulties in reading accuracy, fluency, and spelling that stem from problems with phonological awareness, decoding, verbal memory and verbal processing speed (Torgesen, 2006). Physicians' observations of individuals with reading disabilities date back to the 17th century, but the understanding of dyslexia was very limited until the late 1800s. In 1872 William Henry Broadbent was the first to hypothesize that specific locations in the brain are responsible for word processing and speech. In 1877 Kussmual used the term "word blindness" in regards to adults with normal intelligence but significant difficulties in reading (Anderson, 2001). However, it was not until 1884 that ophthalmologist Rudolf Berlin coined the term "dyslexia" to describe reading problems that he believed had a neurological basis (Rooney, 1995).

Since the coining of the term in the late 19th century, researchers have continued to develop an understanding of the neurological basis of dyslexia and its implications for instruction. Dr. Samuel T. Orton is regarded as a particularly influential in the development of educational strategies for children with dyslexia. In his papers he emphasized the importance of multisensory teaching approaches, which engage auditory, visual, and tactile senses (Rooney, 1995). The multisensory approach to education for dyslexics is still supported today, but researchers have also pinpointed a variety of other, more specific strategies that are effective for improving reading and spelling skills in children with dyslexia.

There are a vast number of instructional strategies documented in the literature, but successful approaches all share a few key components including, a high degree of structure, intensive and explicit instruction, and a low student to teacher ratio (Alexander & Slinger-Constant, 2004). Additionally, the effectiveness of the intervention is highly dependent on age, regardless of the specific strategy used. Multiple studies show that the earlier the intervention, the more successful it is (Alexander & Slinger-Constant, 2004; Torgesen, 2001; Torgesen, 2006). This is because children who are taught phonological awareness early on have a better ability to decode unfamiliar words and are more likely to practice reading skills during the early years of their education. Children who do not receive early intervention become progressively more frustrated with their inability to decode words and read less. As a result, they are exposed to few new vocabulary and cannot recognize as many sight words as their peers (Torgesen, 2006). By fourth and fifth grade this gap in sight words is considerable and begins to have more obvious effects on the child's ability to learn. While improvement in reading skills is possible, the prospect of catching up to grade level becomes increasingly unlikely (Alexander & Slinger-Constant, 2004). The challenge of

helping older children makes the need for effective interventions all the more important.

There are dozens of companies selling their instructional programs online, but most research-backed strategies fall into one of two categories: programs that target phonological awareness, and programs that target orthographic pattern recognition and morphology. The most widely used approach is phonological awareness training. Many different phonological awareness programs exist, but most include similar components. One of the oldest and most popular programs is the Lindamood Phoneme Sequencing Program (Alexander & Slinger-Constant, 2004). In this program, students are taught how to recognize the different phonemes, or units of sound, in speech. Students learn the physical movements involved in producing each phoneme and are then taught to track these sounds in speech with particular attention to the order and number of phonemes within a syllable. Later exercises involve practicing blending phonemes to produce words, as well as substituting and deleting phonemes to create new words. Letter-sound associations are taught only after students have a firm grasp of basic phonology. Students practice decoding words and spelling words by breaking them down into their different phonemes and syllables (Alexander et al., 1991).

A study by Torgesen in 2001 showed the significant effectiveness of the LiPS program for improving word decoding and reading accuracy. The study involved 8-11 year-old children that fell below the 2nd percentile for word level reading ability. The children received 1 hour and 40 minutes of one-on-one instruction five days a week for eight weeks. Over the course of the intervention, reading skills grew rapidly and most students continued to make gains during the following two years. Two years after the original treatment, the students averaged in the 30th percentile for word level reading ability and 40% had been transferred out of special education classes. Unfortunately, about a fourth of the students lost most of their reading gains after the intervention and the majority of students continued to struggle with reading fluency (Torgesen, 2001). Despite the fact that this treatment did not produce significant gains for some students, its overall effectiveness should not be undervalued. Furthermore, numerous other studies on phonological awareness training have supported these positive findings (Lovett & Borden, 1994; Alexander et al., 2001, Blythe, 2006).

In addition to phonological awareness training, another strategy for improving word-decoding and reading skills focuses on orthographic pattern recognition and word morphology. The goal of this strategy is to improve students' word recognition and naming speed. Fluent readers do not need to sound out words letter by letter because they are able to recognize letter patterns in words as single units and recall them quickly. In many cases of dyslexia, the student's slow naming speed of letters makes it much harder to form and memorize these letter associations. Additionally, students with dyslexia are often

unable to recognize common morphological and orthographic patterns in language, which can slow down their word processing speed (Conrad & Levy, 2011).

Studies have shown strategies that explicitly teach orthographic patterns and common morphemes (root words, prefixes, suffixes etc.) can help to improve reading fluency and accuracy (Conrad & Levy, 2011; Obrien et al., 2011). Conrad and Levy's study involved 40 elementary age children with slow naming speeds. Naming speed was tested using a Rapid Automatized Naming Test (RAN), which tests how quickly a person can read symbols, letters, or numbers out loud. For the orthographic training, the students were shown families of words with a shared 2-3 letter orthographic pattern. The words in each family were presented one after another with the orthographic pattern written in red, and participants were asked to read the word as quickly and accurately as possible. The researcher recorded the accuracy and speed of each participant over the course of 6 days. Results showed that the accuracy and speed of reading the trained words improved significantly (Conrad & Levy, 2011). A similar study by Obrien produced comparable results (Obrien et al., 2011).

Another study involved phonological awareness training followed by the Retrieval, Automaticity, Vocabulary, Elaboration, and Orthography Program (RAVE-O). The RAVE-O program uses semantic, morphologic, and orthographic interventions to improve the recognition and naming speed of words. The RAVE-O program produced the most significant reading gains out of the various methods compared in a study by Wolf et al. in 2000. All of these findings suggest that orthographic pattern recognition training could help to improve reading accuracy and fluency in children. Although strategies aimed at improving naming speed have had positive results, it is important to note that most researchers agree phonological awareness training is the most crucial intervention for children with dyslexia (Alexander & Slinger-Constant, 2004). Perhaps more studies should be done on the effects of combining phonology-based programs with other supplemental strategies.

More research is also needed to understand why some children fail to make significant gains even with intensive intervention, and what factors determine whether reading gains after intervention will be sustained or lost. One factor that is known to affect the long-term success of intervention is socioeconomic status. In the Torgesen 2006 study socioeconomic status was one of the lead predictors of students' long-term reading gains after intervention. Studies have not explored this relationship, but it very likely stems from issues of equity, such as lack of access to educational services, reading materials, and adequately trained teachers. Parents' educational background and the amount of time they have to invest in their child's education could also influence their ability to help the student maintain their reading gains. When looking at reading interventions

from an equity standpoint, it becomes clear that in order to be effective for all students they must include continued access to resources and services.

There is a long way to go in making sure all dyslexic students have access to effective interventions, and at the youngest age possible. Ideally, schools should more actively screen and identify students at risk of dyslexia and provide them with daily, intensive instruction on phonemic awareness. However, the reality is that many schools do not have the resources and funding to implement these programs. Another reality that schools must consider is the current trend of “mainstreaming” students in general education as much as possible. As students with more severe dyslexia enter general education classrooms, teachers will need to be trained on strategies for working with these students. Given the public awareness and high prevalence of dyslexia, it is hopeful that current approaches to improving reading skills will improve and new strategies will be discovered.

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