Learning and Cognitive Disorders
Multidiscipline Treatment Approaches

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KEYWORDS

• Youth • Children • Adolescents • Learning disorders • Working memory • Auditory processing disorders • Treatment • Intervention

KEY POINTS

- Numerous interventions with varying evidence bases exist for the treatment of learning and cognitive disorders.
- There are clear evidence-based interventions for reading disorders (eg, peer-assisted learning strategies) and disorder of written expression (eg, self-regulated strategy development).
- There is emerging evidence suggesting that certain intervention approaches (eg, fact-retrieval intervention, schema-based instruction, mnemonic strategy instruction, cognitive strategy instruction) may be beneficial for mathematics disorder, but will require more rigorous evaluation.
- A concrete-to-representational-to-abstract strategy for the treatment of mathematics disorder has good evidence for middle-school and high-school students.
- Although several commercially available interventions exist for the treatment of auditory processing disorder and poor working memory, review of the existing literature suggests caution in using these treatments.

INTRODUCTION

Learning and cognitive disorders affect a substantial number of youth, resulting in considerable concurrent impairment and diminishing the potential for successful long-term academic and social functioning of affected youth. Given these issues,

Disclosures: The authors have no disclosures to report.
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Child Adolesc Psychiatric Clin N Am 22 (2013) 457–477
http://dx.doi.org/10.1016/j.chc.2013.03.006 **childpsych.theclinics.com**
1056-4993/13/$ – see front matter

considerable investment has been made in developing and evaluating treatments to address these problems. A comprehensive review of all interventions focused on various learning and cognitive disorders is well beyond the scope of this article; the authors focus instead on a select review of interventions that are commonly used to address reading disorder, mathematics disorder, disorder of written expression, poor working memory, and auditory processing disorder. As the reader will glean from this review, there are numerous treatments, many publicly available, for addressing these issues. Although several interventions are well established for certain disorders, there are several that require considerably more rigorous evaluation. **Table 1** summarizes the interventions reviewed herein, and **Table 2** recaps the authors' opinions regarding the value of these interventions for the various disorders.

READING DISORDERS

Reading disorders are neurobiological conditions with deficient phonologic coding. Subsequently, interventions aimed at this underlying etiology have been the most efficacious. Although many different remediation programs exist, there is no one "magic" program identified in the literature[1]; rather, programs that encompass shared, critical components are recommended.[1,2] Essential elements of such interventions include individualization, feedback and guidance, ongoing assessment, and regular ongoing practice.[3] Programs should be highly structured and intensive, and should include explicit reading instruction. Content should be organized in a hierarchical manner, starting with phonemic awareness, sound-symbol association, phonics, awareness of rhyme, and word segmentation. Phonemic awareness involves the ability of a listener to be able to hear, identify, and manipulate phonemes, the smallest units of sound that can differentiate meaning. Separating the spoken word "cat" into 3 distinct phonemes, k/, /æ/, and /t/, requires phonemic awareness. As children develop, instruction should advance to fluency training, vocabulary, and comprehension, then to syllable instruction, morphology, memorizing sight words, spelling, syntax, and semantics.[4] In particular, a multisensory, small-group approach that focuses on applying phonemic awareness skills and phonemic manipulation, particularly with letters (vs sounds) is most commonly recommended.[2,5]

Using curricula with many of these components, for younger children (k to first grade), small-group instruction (2–3:1) that occurs 4 to 5 times a week that includes phonologic awareness, letter knowledge, and explicit phonics is recommended.[2] Younger children have the best outcome using this methodology, often with long-term gains. For older children, improved outcomes have been achieved with 1-on-1 instruction, with more intensive work for a longer duration in comparison with younger youth. In general, reading comprehension appears to be most directly affected by intervention, with less improvement observed in spelling and fluency.

The Orton-Gillingham approach has been used since the 1930s for reading intervention, and many commercial remediation programs based on this approach are available (eg, the Wilson Reading System, Project Read, Alphabetic Phonics, the Herman method, the Slingerland method, Language!, and the Spalding method). The Orton-Gillingham approach is a multisensory, sequential, phonics-based system that focuses on basic word formation before whole meanings. Few of the commercial programs, however, have been tested in rigorous, randomized controlled trials.[5] School-based programs that have been more widely studied include Lindamood phoneme sequencing (LiPS),[6] Fast ForWord (FFW),[7] and Peer-assisted learning strategies (PALS).[8] Although many other programs exist, the literature on their evaluation is scarce.[9–11]