Behavioral Interventions in Attention-Deficit/Hyperactivity Disorder: A Meta-Analysis of Randomized Controlled Trials Across Multiple Outcome Domains

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Objective: Behavioral interventions are recommended as attention-deficit/hyperactivity disorder (ADHD) treatments. However, a recent meta-analysis found no effects on core ADHD symptoms when raters were probably blind to treatment allocation. The present analysis is extended to a broader range of child and parent outcomes. **Method:** A systematic search in PubMed, Ovid, Web of Knowledge, ERIC, and CINAHAL databases (up to February 5, 2013) identified published randomized controlled trials measuring a range of patient and parent outcomes for children and adolescents diagnosed with ADHD (or who met validated cutoffs on rating scales). **Results:** Thirty-two of 2,057 nonduplicate screened records were analyzed. For assessments made by individuals closest to the treatment setting (usually unblinded), there were significant improvements in parenting quality (standardized mean difference [SMD] for positive parenting 0.68; SMD for negative parenting 0.57), parenting self-concept (SMD 0.37), and child ADHD (SMD 0.35), conduct problems (SMD 0.26), social skills (SMD 0.47), and academic performance (SMD 0.28). With probably blinded assessments, significant effects persisted for parenting (SMD for positive parenting 0.63; SMD for negative parenting 0.43) and conduct problems (SMD 0.31). **Conclusion:** In contrast to the lack of blinded evidence of ADHD symptom decrease, behavioral interventions have positive effects on a range of other outcomes when used with patients with ADHD. There is blinded evidence that they improve parenting and decrease childhood conduct problems. These effects also may feed through into a more positive parenting self-concept but not improved parent mental well-being. J. Am. Acad. Child Adolesc. Psychiatry, 2014;53(8):835–847. **Key Words:** ADHD, parenting, intervention, conduct

Attention-deficit/hyperactivity disorder (ADHD) is characterized by age-inappropriate, persistent, and pervasive inattention and/or overactivity/impulsiveness that impairs daily functioning[1] and is associated with substantial long-term burden on patients, families, and health and educational services.[2,3]

This article is discussed in an editorial by Dr. Linda J. Pfiffner on page 830.

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Multimodal treatment approaches are recommended.[4] Medication is typically used as the first-line intervention, especially for severe cases.[5] Despite robust evidence of medium-term symptom control,[6] medication has some limitations. A proportion of patients shows partial or no response.[6] Long-term effectiveness remains to be established.[7,8] Important aspects of functioning may not improve (e.g., academic achievement[9]). Adverse effects on sleep, appetite, and growth, although rarely serious and generally manageable, are common and may not be well tolerated.[10] Treatment compliance can be low, especially during adolescence.[11] Parents and clinicians can have reservations about

medication use[12] and may prefer nonpharmacologic approaches.[13]

Interventions using behavioral techniques also are recommended and commonly used as ADHD treatments.[14] Systematic reviews of treatment trials have provided evidence to support their efficacy.[15-17] However, these reviews can be difficult to interpret, because they sometimes include nonrandomized controlled trials (RCTs), mix individuals with and without ADHD, and have not always drawn clear boundaries between ADHD-specific and other outcomes. Furthermore, outcome assessment is often made unblinded by individuals taking an active part in the intervention (e.g., parents receiving parent training), which is likely to inflate efficacy estimates.[18] Sonuga-Barke *et al.*[19] published a meta-analysis of RCTs of behavioral interventions. Stringent inclusion and exclusion criteria addressed some limitations of previous meta-analyses. There was a moderate, statistically significant, positive effect on ADHD core symptoms for assessments made by individuals most proximal to the therapeutic setting—typically unblinded parent ratings. However, these effects were not corroborated by probably blinded measurements made by observers or raters unaware of treatment allocation when the effect size decreased to near 0 and became nonsignificant. A similar, although less marked, decrease was found for neural feedback and cognitive training. There are some possible explanations for these findings. First, that unblinded raters are biased and overestimate treatment effects.[20] Second, that interventions increase parental tolerance for ADHD or their ability to cope with its negative impact rather than decreasing symptom levels.[19] Third, that probably blinded measurements were less valid than most proximal measurements.[21] Fourth, that intervention effects did not generalize from the therapeutic setting (e.g., the home) to other settings (e.g., school).[22] The authors concluded that more evidence from studies with blinded assessments is required before behavioral interventions can be supported as treatments for core ADHD symptoms.

The limited effects of behavioral approaches on blinded core ADHD measurements may be explicable if one considers the treatment models on which many are based. For instance, although most treatments in the trials included in the meta-analysis of Sonuga-Barke *et al.*[19] were implemented to target ADHD symptoms, they were initially developed and have been used extensively for children with oppositional and conduct problems.[23-25] For many of these, the rationale is that children's challenging behavior develops because of coercive interactional cycles that, over time, co-reinforce noncompliant and oppositional behaviors in the child and negative and inappropriate responses from significant adults (usually the parent but also potentially teachers and other caregivers).[26] During intervention, the adult is taught to apply behavior modification techniques to reinforce appropriate and discourage inappropriate child behaviors, enhance effective and enjoyable adult–child interactions,[27] and so transform negative into positive interactional cycles. Such interventions, it could be argued, are unlikely to be effective as treatments for core ADHD symptoms because ADHD does not emerge along a similar environmentally mediated route as conduct problems and therefore is less likely to respond to the modification of environmental contingencies.[28]

However, the value of behavioral interventions does not rest exclusively on their potential effects on ADHD symptoms. Patients with ADHD often have conduct problems[29] and other comorbidities[30] in addition to poor social and organizational skills and low academic achievement. Their parents can have poor parenting self-concept and mental health problems.[31] These associated features of the disorder are important treatment targets in and of themselves because each is associated with substantial burden to the child, the child's family, and society through the criminal justice, social, and health systems.[22,32] Behavioral interventions may have an important role in treating these problems whether or not they decrease core ADHD symptoms. Indeed, behavioral treatments used with patients with ADHD have targeted ADHD-related but nonspecific aspects of impairment rather than ADHD symptoms themselves (e.g., social skills,[33] organizational skills,[34] and academic achievement[35]).

In this article, the authors build on the previous meta-analysis[19] to address the broader impact of behavioral interventions for children with ADHD. They address 3 related questions. First, given that most, although not all, interventions are implemented by changes in the behavior of responsible adults (typically parents or teachers), do behavioral interventions improve adult responses to children with ADHD? Second, do they improve the sense of efficacy and competence and decrease the mental health problems of adults working with children with ADHD? Third, do they decrease