

Meta-Analysis Supports Efficacy of Behavioral Interventions for Attention-Deficit/Hyperactivity Disorder–Related Problems

Linda J. Pfiffner, PhD

Effective treatment for attention-deficit/hyperactivity disorder (ADHD) is crucial given the well-documented chronic and impairing nature of the disorder. The 2 most studied treatments include stimulant medication and behavioral interventions. The short-term efficacy of stimulant treatment for decreasing ADHD symptoms is well established (e.g., Pliszka¹). Systematic reviews and meta-analyses also support the efficacy of behavioral treatments on a range of child outcomes, and these are considered well-established treatments for ADHD (e.g., Pelham and Fabiano,² DuPaul *et al.*,³ Evans *et al.*,⁴ Fabiano *et al.*⁵). Professional practice guidelines usually recommend either treatment or both treatments for ADHD depending on age and severity of symptoms (e.g., American Academy of Child and Adolescent Psychiatry and American Academy of Pediatrics⁶). Owing to limitations of each treatment, multimodal approaches are often recommended.

In contrast to the conclusions of some previous reviews of behavioral interventions, a recent meta-analysis by Sonuga-Barke *et al.*⁷ showed only limited support for behavioral interventions for treating ADHD, particularly on blinded measurements of core ADHD symptoms. Differences in conclusions between this meta-analysis and others likely derive from some unique methodologic features of the meta-analysis of Sonuga-Barke *et al.*,⁷ including more restrictive study inclusion criteria (only randomized controlled trials were included, which meant most studies of behavioral interventions that use single-case designs were not considered), emphasis on blinded outcomes (in which raters were blinded to treatment allocation), and sole reliance on ADHD symptoms as the measurement of outcome. The singular focus on ADHD symptoms rather than on functional impairment or conduct problems

has been criticized, because these areas and not core ADHD symptoms per se typically prompt the seeking of treatment and constitute the key targets of behavioral treatments (e.g., Evans *et al.*,⁴ Chronis-Tuscano *et al.*,⁸ Galanter⁹).

In this issue of the *Journal*, Daley *et al.*¹⁰ extend the meta-analysis of behavioral treatment effects to a broader range of child and parent outcomes. For inclusion in the meta-analyses, each domain required a minimum of 5 randomized controlled trials evaluating pre- to posttreatment changes. This was attained for the following domains: positive and negative parenting, child conduct problems, ADHD symptoms (including 2 additional studies since the most recent report), social skills, academic functioning, parenting self-concept, and parent mental health. As in the previous meta-analysis, only randomized controlled trials with active, usual-care, or waitlist controls and only studies with diagnosed cases of ADHD (or who met accepted cutoffs on validated ADHD ratings scales) were included. All behavioral intervention approaches were combined for domain-specific analyses. Two categories of outcomes, the most proximal assessment (rating by individuals closest to the treated setting, usually unblinded) and probably blinded assessment (blinded observations or probably blinded rater in untreated setting) were evaluated separately for parenting, child conduct problems, and ADHD symptoms; only the most proximal assessment was evaluated for the remaining domains because too few trials were available with probably blinded measurements. The standardized mean difference was calculated to represent the magnitude of treatment effect for all comparisons.

In contrast to the previous review, the results showed important positive outcomes for behavioral interventions on blinded outcome measurements (those mostly based on home or analog

observations, rather than on measurements from untreated settings, which had been a concern in the previous review). These included decreased negative and increased positive parenting and decreased comorbid conduct problems (especially when trials with high medication levels were excluded). In addition, analyses of the most proximal outcomes to the treated setting (usually unblinded parent or teacher report) showed improved parenting self-concept, improved child social and academic functioning, and improved parenting, conduct problems, and ADHD symptoms. Only parental mental health failed to show significant benefit from behavioral treatment on proximal measurements, although as the investigators pointed out, it is unclear how many parents in the trials had mental health problems. In fact, all the effects, with the exception of ADHD symptoms, might have been underestimates of true treatment effects because parents and children were not selected for problems in these domains, which might have limited their room for improvement. Probably blinded measurements of ADHD symptoms failed to show a significant treatment effect (identical studies and findings as in the previous review). However, the use of ratings and observations in untreated settings as blinded measurements in several of the studies and the instability of inattention symptoms during a brief analog task with preschoolers in 1 of the studies complicate the interpretation of these findings.

This meta-analysis represents an important extension of the previous report by showing clear benefits of behavioral interventions on some parent and child outcomes directly targeted by these treatments. This review also shows that focusing only on decreasing ADHD symptoms as an outcome underestimates the important and broader impact of behavioral interventions. As noted by the investigators, the findings on functional impairment are especially important given that medication generally has had limited effects on these domains. Findings of improved parenting self-concept are encouraging given the focus of parent training, and this could be a result and/or facilitator of improved parenting and child behavior. Also, the findings are consistent with work of Fabiano *et al.*¹¹ and Pelham *et al.*,¹² which suggests that effects of medication and behavioral interventions in decreasing conduct problems are a function of their relative doses; in this case, the impact of behavioral interventions appears greater in the absence of medication.

There are some qualifiers to these findings that reflect limitations of existing treatment research and highlight directions for future study. There are continuing challenges related to measurement. Much of the evidence supporting the use of behavioral interventions is based on reports from parents and teachers who were necessarily involved with the treatment; few blinded observations were available for most outcomes in this report. Reliance on reports from parents and teachers involved in treatment (or awareness of treatment allocation) might be susceptible to bias and inflate true treatment effects. Conversely, it can be argued that parent and teacher reports are valuable given their status as consumers, and perhaps more importantly, because these informants are uniquely knowledgeable about the children's behaviors. It is a feasibility challenge to locate alternative individuals who can monitor children's functioning closely enough in the natural setting to provide informed ratings and yet remain blinded to treatment participation (perhaps especially for inattention symptoms). In trials for this review, brief analog observations and proximal parent ratings successfully detected treatment effects for parenting and child conduct problems. Findings such as these, which show convergence across varied measurement sources, might be especially useful for alleviating concerns that the limitations of each source account for the findings. As recommended by others, there is a need to expand the use of nonbiased measurements of outcome in treatment settings (e.g., Evans *et al.*⁴) and at the same time not dismiss the value of parent and teacher report.

In addition, although the number of randomized controlled trials has increased in recent years, there is a need for more. Several important outcome domains (e.g., child impairment, executive/organizational skills, internalizing problems, general measurements of family functioning) could not be evaluated in this meta-analysis owing to a dearth of studies. In addition, most included studies were of parent training; the value of newer, more tailored interventions focused on specific areas of impairment with child- and/or teacher-focused interventions were too few to be assessed.

Greater consideration of moderators and mediators of effects is needed. There was significant variation in response to treatment as evidenced by the significant heterogeneity in effect sizes across the reviewed trials. This could reflect differences in efficacy between types of behavioral

treatments and/or the impact of potential moderators (e.g., socioeconomic status, parent psychopathology, child symptom severity, comorbid disorders) or mediators (e.g., engagement, adherence, and implementation fidelity for treatment participants; parenting practices). Importantly, the effects of behavioral interventions likely differ based on the extent to which parents and teachers consistently implement the treatment procedures. Future studies are needed that focus on how to best support implementation and tailor programs for nonresponders and partial responders. Then, meta-analyses could incorporate these important factors into conclusions about treatment effects and recommendations.

There is also a need for greater clarity and consensus about levels of evidence required for drawing conclusions about the efficacy of an intervention (see Evans *et al.*⁴). Varied classification systems and varied criteria for study inclusion have led to different conclusions about efficacy. In addition, there is no clear system for evaluating and interpreting mixed

outcomes within and across studies. A multi-method, multi-informant approach to evaluating treatments has the potential to provide a far more nuanced picture of treatment efficacy than single approaches and better matches the complexities inherent in treating ADHD and its associated impairments. Ultimately, these approaches seem best equipped to inform clinical decision-making and guidelines for practice. &

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Correspondence to Linda Piffner, PhD, Professor of Psychiatry, University of California, San Francisco, 401 Parnassus Avenue, Box 0984, San Francisco, CA 94118; e-mail: lindap@ppsi.ucsf.edu

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REFERENCES

1. Pliszka S; AACAP Workgroup on Quality Issues. Practice parameters for the assessment and treatment of children, adolescents, and adults with attention-deficit/hyperactivity disorder. *J Am Acad Child Adolesc Psychiatry*. 2007;46:894-921.
2. Pelham WE, Fabiano GA. Evidence-based psychosocial treatments for attention-deficit/hyperactivity disorder. *J Clin Child Adolesc Psychol*. 2008;37:184-214.
3. DuPaul GJ, Eckert TL, Vilaro B. The effects of school-based interventions for attention deficit hyperactivity disorder: a meta-analysis 1996-2010. *School Psychol Rev*. 2012;41:387-412.
4. Evans SW, Owens JS, Bunford N. Evidence-based psychosocial treatments for children and adolescents with attention-deficit/hyperactivity disorder [published online ahead of print November 18, 2013]. *J Clin Child Adolesc Psychol*. PMID:24245813.
5. Fabiano GA, Pelham WE, Coles EK, Chronis-Tuscano A, O'Connor BC. A meta-analysis of behavioral treatments for attention-deficit/hyperactivity disorder. *Clin Psychol Rev*. 2009;29:129-140.
6. American Academy of Pediatrics. Clinical practice guideline for the diagnosis, evaluation and treatment of attention deficit hyperactivity disorder in children and adolescents. *Pediatrics*. 2011;128:1007-1022.
7. Sonuga-Barke EJ, Brandeis D, Cortese S, *et al.* Nonpharmacological interventions for ADHD: systematic review and meta-analyses of randomized controlled trials of dietary and psychological treatments. *Am J Psychiatry*. 2013;170:275-289.
8. Chronis-Tuscano A, Chacko A, Barkley RA. Key issues relevant to the efficacy of behavioral treatment for ADHD [letter to the editor]. *Am J Psychiatry*. 2013;170:799.
9. Galanter CA. Limited support for the efficacy of non-pharmacological treatments for the core symptoms of ADHD [editorial]. *Am J Psychiatry*. 2013;170:241-244.
10. Daley D, van der Oord S, Ferrin M, *et al.* Behavioral interventions in attention-deficit/hyperactivity disorder: a meta-analysis of randomized controlled trials across multiple outcome domains. *J Am Acad Child Adolesc Psychiatry*. 2014;53:835-847.
11. Fabiano GA, Pelham WE Jr, Gnagy EM, *et al.* The single and combined effects of multiple intensities of behavior modification and methylphenidate for children with attention deficit hyperactivity disorder in a classroom setting. *School Psychol Rev*. 2007;36:195-216.
12. Pelham WE, Burrows-MacLean L, Gnagy EM, *et al.* A dose-ranging study of behavioral and pharmacological treatment in social settings for children with ADHD [published online ahead of print January 16, 2014]. *J Abnormal Child Psychol*. PMID: 24429997.