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## Evidence-Based Psychosocial Treatments for Children and Adolescents with Attention-Deficit/Hyperactivity Disorder

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### Abstract

**Objective**—The purpose of this research was to update the Pelham and Fabiano (2008) review of evidence-based practices for children and adolescents with Attention-Deficit/ Hyperactivity Disorder.

**Method**—We completed a systematic review of the literature published between 2008 and 2013 to establish levels of evidence for psychosocial treatments for these youth. The review included the identification of relevant articles using criteria established by the Society of Clinical Child and Adolescent Psychology (see Southam-Gerow & Prinstein, in press) using keyword searches and a review of tables of contents.

**Results**—We extend the conceptualization of treatment research by differentiating training interventions from behavior management and by reviewing the growing literature on training interventions. Consistent with the results of the previous review we concluded that behavioral parent training, behavioral classroom management and behavioral peer interventions were well-established treatments. In addition, organization training met the criteria for a well-established treatment. Combined training programs met criteria for Level 2 (Probably Efficacious), neurofeedback training met criteria for Level 3 (Possibly Efficacious), and cognitive training met criteria for Level 4 (Experimental Treatments).

**Conclusions**—The distinction between behavior management and training interventions provides a method for considering meaningful differences in the methods and possible mechanisms of action for treatments for these youth. Characteristics of treatments, participants, and measures, as well as the variability in methods for classifying levels of evidence for treatments, are reviewed in relation to their potential effect on outcomes and conclusions about treatments. Implications of these findings for future science and practice are discussed.

## Keywords

ADHD; intervention research; treatment; treatment effectiveness

Numerous studies document that children and adolescents with Attention-Deficit/Hyperactivity Disorder (ADHD) experience poor outcomes across several domains of functioning, including education, vocation, interpersonal relations, and health risk. These problems lead to substantial impairment (Wehmeier, Schacht & Barkley, 2010), parent distress (Wymbs, Pelham, Molina & Gnagy, 2008), and extensive costs to society (Pelham, Foster & Robb, 2007; Robb et al., 2011). Research on the development and evaluation of psychosocial treatments<sup>1</sup> for children and adolescents (hereafter ‘children’) with ADHD has been focused on improving these outcomes for almost 40 years (see Antshel & Barkley, 2011 for a historical review). Reports of progress in this work have been highlighted in two special issues of the *Journal of Clinical Child and Adolescent Psychology (JCCAP)*. In 1998, Pelham, Wheeler and Chronis published the first in this series of literature reviews of psychosocial treatments for ADHD, and Pelham and Fabiano updated that review in 2008. The current manuscript provides an updated review and follows the current version of the *JCCAP Evidence Base Treatments Updates (EBT)* evaluation criteria (see Table 1; hereafter EBT Evaluation Criteria).

Pelham and Fabiano (2008) evaluated 46 treatment studies and sorted the interventions into one of three categories: behavioral parent training (BPT), behavioral classroom management (BCM), and behavioral peer interventions (BPI). Consistent with the 1998 review, BPT and BCM met criteria for well-established treatments for ADHD. Pelham and Fabiano (2008) reported two conclusions regarding BPI, with one pertaining to traditional, weekly, social skills training groups provided in a clinic (BPI-C) and the other pertaining to interventions targeting peer relationships and functioning in recreational settings (BPI-R) mostly provided in the context of summer treatment programs (STP; Pelham, Fabiano, Gnagy, Greiner, & Hoza, 2005). BPI-C did not have adequate evidence to be considered well-established or probably efficacious. In contrast, BPI-R met criteria for a well-established treatment. Other reviews published since 2008 have reported similar findings about BPT, BCM, and BPI-R (e.g., Fabiano, Pelham, Coles, Gnagy, Chronis-Tuscano & O'Connor, 2009; Owens, Storer & Girio-Herrera, 2011; Sadler & Evans, 2011), but some have reached very different conclusions (Sonuga-Barke et al., 2013). The purpose of the current review is to critically evaluate the empirical literature of treatment studies published during the last five years and incorporate the findings with those in the Pelham and Fabiano (2008) review to:

1. Determine current levels of evidence for psychosocial interventions for children with ADHD, and
2. Report and review characteristics of interventions, participants, and measures that may influence the outcomes of psychosocial treatment research.

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<sup>1</sup>The terms “treatment” and “intervention” are used synonymously throughout the manuscript.

## Approach to Updated Review

Although it has been only five years since the latest review, the literature has continued to expand at a rapid pace. In 2008, Pelham and Fabiano reported that three types of treatment (BPT, BCM & BPI-R) met criteria for well-established treatment. We maintain these three classifications with a couple of modifications. First, we classify these treatments into the larger category of behavior management (BM) because all treatments in this category involve training parents, teachers or program staff to modify the behavioral contingencies in the environments within which the children function and outcomes are measured. Second, we eliminated the distinction within the BPI category that distinguished between settings including clinic-based BPI (BPI-C) and recreational settings-based BPI (BPI-R). We propose that the setting is not the most critical distinction between these two types of treatment. Instead, BPI-R involves staff members manipulating contingencies to improve the social behavior of the youth in the same environment in which outcomes are measured. In contrast, BPI-C involves training participants to exhibit new prosocial behaviors and to discontinue exhibiting negative behaviors in environments other than the one where treatment is provided. Although some studies of BPI-C include encouraging parents or teachers to reward the participants when they exhibit desired changes in behavior, the main focus of the intervention is training. Thus, to capture this distinction, we propose a second large category: Training Interventions (TI). The TI label applies to social skills training programs that were formerly categorized as BPI-C, as well as several new treatments that have emerged in the last decade. For example, neurofeedback and cognitive training do not involve manipulating contingencies in the environments where the behavior change is intended to occur. Thus, the TI category rather than the BM category, better fits these treatments. Finally, some of the organization training interventions and school-based treatment programs (e.g., Challenging Horizons Program; Evans, Schultz, DeMars, & Davis, 2011) also fit into the TI category, as the skills are taught and their use is rewarded in environments other than where change is intended and outcomes are measured.

The distinction between BM and TI is important for the way in which we conceptualize and study these two types of treatment. For example, there is considerable research in the area of treatment integrity (Perepletchikova & Kazdin, 2005). For BM interventions, treatment integrity applies to those who train the parents and teachers, as well as to the parents and teachers who provide the behavioral interventions strategies. In TI interventions, treatment integrity applies only to those training the children, as there are no secondary implementers of strategies. BM treatments are intended to lead to behavior change by manipulating contingencies in the target environment. Once targeted behaviors are changed, then generalization and maintenance of behavior change may occur and is achieved by fading the modified contingencies and connecting the child to naturally occurring contingencies (Stokes & Baer, 1977). TIs lead to behavior change by improving the skill set of the child and either hoping for generalization (Stokes & Baer, 1977) (e.g., cognitive training interventions) or providing reinforcement and punishment in the training setting for behavior change that occurs outside of that setting. Given that treatments in the BM and TI categories have unique presumed mechanism of action, as well as unique implications for relationships between participant characteristics, integrity, and outcomes; we organize treatments in this

review in accordance with these two overarching categories. Within the BM classification, we retain the categories used in the Pelham and Fabiano (2008) review of BPT, BCM and BPI. Within the TI classification, we include neurofeedback training, cognitive training (including training of working memory, attention, and executive functioning), and organization skills training. We would have also included traditional social skills training (formerly labeled BPI-C) in TI; however there were no studies since 2008 of this intervention that met the criteria for inclusion in this review.

## Characteristics Affecting Outcomes

The previous review concluded that all of the BM treatments were well-established. Research questions in studies testing these treatments were thus likely to change from *does the treatment work* to *how does it work, for whom does it work, or how can outcomes be enhanced*. We examined the extent to which these new questions have been addressed in the last five years of research. In addition, we also examined several characteristics of participants and measures that may influence the results and conclusions of a study. For example, given that participant characteristics that influence treatment outcomes have been identified (see Hoza, Johnston, Pillow & Ascough, 2006; Ollendick, Jarrett, Grills-Taquechel, Hovey & Wolff, 2008), we reviewed some research methods that lead to variations in sample characteristics and discuss how such characteristics may influence treatment effects. In addition, characteristics of measurement may also impact outcomes, making it difficult to compare results across studies (De Los Reyes & Kazdin, 2009). One measurement issue related to eligibility criteria involves the choice of informants and decision rules used to determine a diagnosis of ADHD. Both have been shown to influence the diagnostic decisions (Rowland et al., 2008; Valo & Tannock, 2010) and we examined the variability across studies in this area. Another measurement issue involves the choice of outcome measures. As with diagnoses, the source of outcome data varies considerably across studies and could influence outcomes depending on a variety of factors. Outcomes may depend on the construct chosen as an outcome variable of interest (e.g., symptoms or functional impairment), on the way in which such construct of interest is defined and measured (e.g., objective vs. subjective measurement or informant type), and whether or not informants are aware of the treatment condition (Jadad et al., 1996). For example, as noted in the EBT Evaluation Criteria (see Table 1), outcome measures should map onto the problems targeted in treatment. Thus, one goal of our review was to highlight characteristics of participants and measures that may impact treatment outcomes with the aim of generating hypotheses for the next generation of research in this area.

## Criteria for Evaluating Treatments

The criteria used to select rigorous studies for review and to determine whether treatments are evidence-based or well-established are generally consistent across reviews in special issues of the *JCCAP*. The only differences between the presently employed criteria and those used in the 2008 special issue are minor wording changes that should not change the classification of the research (Southam-Gerow & Prinstein, in press). However, these criteria have not been used consistently in other reviews, contributing to inconsistent conclusions across studies. For example, a recent review and meta-analysis by Sonuga-Barke and

colleagues (2013) concluded that the mean effect size for ADHD symptoms across well-controlled studies of behavioral interventions for children with ADHD was zero. To calculate the mean effect size, Sonuga-Barke et al. excluded studies wherein raters were aware of treatment condition and combined results from very different types of psychosocial interventions. Further, although many behavioral interventions focus on changing functional impairment, Sonuga-Barke and colleagues' relied solely upon ratings of ADHD symptoms as the outcome variable. The authors acknowledged that this focus on symptoms may be inconsistent with the goals of many psychosocial interventions; however, they noted that this requirement was necessary in order to obtain a common metric to facilitate conducting a meta-analysis. Nevertheless, as a result of this criteria, most of the behavioral treatment literature was excluded from consideration and, consequently, the conclusions reached by Sonuga-Barke and colleagues are different from those reached by most other reviews or meta-analytic studies. As is apparent in this example, the conclusions of any review, including this one, should be considered in the context of the criteria used to evaluate the literature.

Consistent with the two aims of this study, we classified the treatment research reported during the last five years according to the EBT Evaluation Criteria for classifying psychosocial treatments (Southam-Gerow & Prinstein, in press) and organized the studies into two major categories based on the treatments evaluated (BM & TI). We began each section of the results by reporting the conclusions of the most recent review (Pelham & Fabiano, 2008) and then follow with an updated summary of the studies published since 2008 that meet the EBT Evaluation Criteria. In addition, we examined the variability across studies pertaining to characteristics of treatments, participants and measurement. Finally, we highlighted issues pertaining to the classification of treatments according to the level of scientific evidence. Our review concludes with recommendations pertaining to future research and practice guidelines.

## Method

To determine which articles to include in our review, we conducted a three-wave procedure. The first (keyword search) and second (table of contents search) waves involved the identification of articles that met our predetermined set of inclusion criteria. The third wave involved coding of the included articles to identify those that met the EBT Evaluation Criteria.

## Procedure

**Wave 1: keyword search**—To conduct our keyword search, we followed methods proposed by Cooper and Hedges (1994) for completing keyword searches in PsycINFO and Medline. Namely, we compiled and used the following Boolean string: (“attention deficit hyperactivity disorder” OR ADHD OR ADD OR hyperkinesis OR “attention deficit disorder” OR “attention deficit with hyperactivity”) AND (treatment OR intervention OR training) NOT (adult) NOT (pharmacological OR medical). Using these terms, we identified 1,544 articles via the PsycINFO search and 2,479 via the Medline search published since 2007. We conducted a separate search for articles reporting results of the MTA Study, with

the following Boolean string: (MTA OR “Multimodal Treatment of Attention Deficit Hyperactivity Disorder”) and obtained an additional 646 articles via our Medline search (and 0 via PsychINFO), yielding a total number of 4,669 studies.

**Wave 2: table of contents (TOC) search**—We searched the tables of contents of issues published since 2007 of well-known journals that publish studies of psychosocial interventions: Behavior Modification, Behavior Therapy, Child and Family Behavior Therapy, Cognitive and Behavior Practice, Journal of Abnormal Psychology, Journal of Abnormal Child Psychology, Journal of the American Academy of Child and Adolescent Psychology, Journal of Applied Behavior Analysis, Journal of Consulting and Clinical Psychology, Journal of Emotional and Behavioral Disorders, Journal of School Psychology, Attention Research Update, School Mental Health, Journal of Attention Disorders, School Psychology Review, School Psychology Quarterly, Journal of Clinical Child and Adolescent Psychology. The search was conducted either by accessing the journal websites or by searching two electronic journal index databases (*Alice* and *The OhioLINK Elec Journal Center*). We obtained 163 articles in this manner.

Thus, we obtained 4,669 articles via the keyword search process and 163 identified via the TOC search process, yielding a total number of 4,832 articles. Of these 4,832, we then limited our scope to those articles that were: 1) empirical studies; 2) published in peer-reviewed journals between 2007 and August 2012 or in-press by August 2012; 3) available in English; 4) treatment studies with children and adolescents with ADHD (up to 17 years); and 5) evaluated at least one psychosocial treatment only group (i.e., evaluates a psychosocial treatment alone or in comparison to another treatment). We defined psychosocial treatment as any intervention that is not medication or diet. Based on our final criterion, studies of multimodal treatments compared to medication but not to psychosocial treatment alone were excluded. Using these criteria, 122 studies remained and we coded these studies using the EBT Evaluation Criteria.

**Wave 3: study coding per the Evidence Base Updates EBT evaluation criteria**—The 122 articles were categorized based on the five EBT Evaluation Criteria (see Table 1) each of which was judged either as characteristic or as not characteristic of the methodology employed. Of the 122 articles, 101 were excluded because they violated at least one of the EBT Evaluation Criteria. Twenty-one met all five criteria and are discussed in detail in our results section below. Although a reduction from 122 studies to 21 eliminates many studies from consideration in this review, it is worth noting that, in the 2008 review, only 29 between-group or crossover design studies were included from a period that covered twice as many years as this one. Similarly, the recently published review by Sonuga-Barke and colleagues only included only 15 studies out of all psychosocial treatment research dating back to at least 1973. Thus, it appears that our sample of studies is not disproportionately small for the time period covered.

## Results

Our review is based on 21 studies that were published since October 2007, met the five EBT Evaluation Criteria, and were not included in the previous review by Pelham and Fabiano

(2008) (see Tables 2 & 3). Table 2 provides a summary of the reviewed studies. For each study, we extracted data on the total sample size, the age range of the sample, and the ethnicity, race and gender of the sample. We also described outcome domains assessed, the methods or informants who provided information about those outcomes, and the category describing the quality of the study according to the standards of Nathan and Gorman (2002) and the What Works Clearinghouse (WWC) Evidence Standards for Reviewing Studies.<sup>2</sup> Because diagnostic assessment procedures varied across studies, we provided a summary of the measures that were reportedly used to determine ADHD diagnosis in each study, as well as the process for combining symptom-based data across informants (i.e., And/Or Rule). More specifically, the process was categorized as using the “And Rule” if symptom rating of both informants (parents and teachers) had to meet the threshold of six symptoms for inclusion in the ADHD group. The process was categorized as using the “Or Rule” if the threshold of six symptoms could be achieved using symptoms endorsed by either the parent or the teacher. If only one rater was used to obtain information about symptoms and/or impairment, we categorized the process as “Parent Only”. Lastly, if the description provided by the authors of the article were insufficiently detailed, we categorized the process as “Unclear”.

We also summarized outcome data for each study (see Table 3). Some studies included a mid-point assessment and some included a follow-up assessment well after the treatment phase; however, because the focus of this article is on immediate outcomes of a given treatment, we reported only the outcomes that represent pre- to post-treatment change. Table 3 includes the effect sizes for the psychosocial intervention relative to a control condition and for the psychosocial treatment relative to an alternative active treatment for which there is evidence of a positive effect on outcomes. In cases where the authors of the article provided effect sizes for pre-post outcomes, we extracted the effect sizes they provided and have highlighted via superscripts the type of effect size reported. In cases where the authors did not provide the effect sizes for pre-post outcomes, we calculated an effect size using data provided in the study (i.e., means, standard deviations and sample sizes, *F* values, or *t* values and corresponding degrees of freedom) and highlight via superscripts the type of effect size reported and/or the equation used to calculate the effect size. Given the variability in how effect sizes were calculated, readers should not attempt to make direct comparisons across studies.

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<sup>2</sup>Per the WWC standards (Institute of Education Sciences, 2011), a study that met criteria for either *Meets Evidence Standards* or *Meets Evidence Standards with Reservations* was conducted within a relevant time-frame, tested a relevant intervention with a relevant sample, employed relevant and adequate (i.e., valid and reliable) outcomes measures, provided enough information to calculate an effect size for at least one outcome measure, and was a randomized controlled trial or a quasi-experiment. For a study to be categorized as *Meets Evidence Standards*, the study also had to employ random assignment or functionally random haphazard assignment, the research team had to demonstrate the absence of high overall or of high differential attrition, groups had to be equated on a pretest of the outcome measure, and the intervention had to be free of intervention contamination. If a study failed to meet one or more of the criteria for *Meets Evidence Standards* but employed a quasi-experimental design, group assignment, equating and baseline equivalence; had no severe overall or differential attrition or, if it did have severe attrition, such attrition is accounted for in the analysis, and had no intervention contamination; it was categorized as *Meets Evidence Standards with Reservations*. All studies that met the five task force method criteria used in this review met one of these two WWC standards. The Nathan and Gorman categorization ranges from 1 to 6 and all studies that met criteria for being included in this review met criteria for either Type 1 or 2. Type 1 studies employ the most rigorous scientific evaluations and are randomized, prospective clinical trials with comparison groups, blind assessments, state-of-the-art diagnostic procedures, clear inclusion and exclusion criteria, an adequate sample size and a clear description of statistical methodology. Type 2 studies are clinical trials wherein an intervention is tested but the study lacks one component of Type 1 criteria.

In determining the level of evidence for each type of treatment, some judgments about the quality of the outcome measures had to be made. Broadly speaking, the following principles were used to consider quality; (1) outcome measures assessing change in functioning were considered to be of greater importance than measures assessing symptoms; (2) ratings provided by informants who were not involved in the treatment were considered to be of higher quality than ratings provided by informants who were involved in treatment; (3) objective measures obtained within the context of typical functioning (e.g., observations in the classroom) were considered to be of higher quality than objective measures obtained devoid of context (e.g., neuropsychological measures); and (4) studies that provided outcomes across multiple domains and/or multiple informants were considered to be more compelling than those that provided outcomes in only one domain or by a single informant. Lastly, we indicate whether or not the authors of the article reported the clinical significance of outcomes (e.g., reported percentage of participants falling below a clinical threshold or meeting a reliable change index). Because very few studies ( $n=3$ ) included an analysis of moderating or mediating variables, the results of such analyses are briefly reviewed in the Results and Discussion sections but not presented in Table 3.

We begin our review with the BM category and the three subcategories of BPT, BCM and BPI. In addition, because some studies used a combination of these treatments we have a Combined Category for BM treatments. The TI category is reviewed next and includes cognitive, neurofeedback, and organization training followed by a Combined Category for TI.

### **Behavior Management (BM)**

**Behavioral parent training (BPT)**—Both of the previous treatment reviews (Pelham & Fabiano, 2008; Pelham et al., 1998) concluded that BPT was a well-established treatment for youth with ADHD. Six studies that meet the EBT Evaluation Criteria for this review have been published since the last review. All of the BPT programs focused on behavior management procedures that are consistent with those that achieved well-established status such as the *Community-Oriented Parenting Education (COPE)* program (Cunningham, Bremner, & Secord-Gilbert, 1993) and the *Defiant Children* program, Second Edition (Barkley, 1997). In 4 of the 6 studies, BPT was conducted in groups with weekly sessions lasting between 2 and 2.5 hours, over 8 to 12 weeks (Chacko et al., 2009; Fabiano et al., 2009; Fabiano et al., 2012; van den Hoofdakker et al., 2007). The other two studies evaluated individual BPT sessions, with one study evaluating the efficacy of a single session of treatment (Meyer & Kelly, 2008) and the other providing 12 sessions (McGrath et al. 2011).

With regard to outcomes, these six studies documented significant benefits on parent ratings of child symptoms and/or impairment for BPT when compared to a waitlist or routine care condition (Chacko et al., 2009; Fabiano et al., 2012; McGrath et al., 2011; Meyer & Kelley, 2008; van den Hoofdakker et al., 2007) and when compared to active alternative treatment conditions (e.g., Meyer & Kelley, 2007). Fabiano and colleagues (2009; 2012) as well as Chacko and colleagues (2009) evaluated an enhanced BPT to address the needs of a specific population (i.e., fathers, single mothers) and reported that the adapted version of BPT was



equivalent, and in the case of some outcomes, better than the standard well-established version. As a result, these studies extend the foundation of research that led Pelham and Fabiano (2008) to conclude that BPT was a well-established treatment for youth with ADHD.

It is noteworthy that 5 of these 6 studies of BPT evaluated unique adaptations of the structure of BPT (e.g., single session; phone session) to better address the needs of a unique group of individuals who do not typically attend BPT (e.g., single mothers, fathers). In their program, Strategies to Enhance Positive Parenting (STEPP), Chacko and colleagues modified traditional parent training sessions by increasing the length of the sessions to 2.5 hours and included opportunities for single mothers to observe staff modeling behavior management and incentive procedures. Mothers participating in the STEPP program reported improvements in their children's oppositional defiant disorder (ODD) symptoms and functioning (i.e., parent-child relations; family functioning) relative to traditional BPT services and to no treatment. Similarly, Fabiano and colleagues (2009; 2012) modified a traditional BPT program to make it appealing for fathers. The Coaching Our Acting-out Children: Heightening Essential Skills (COACHES) program delivered behavior management skills training in the context of fathers coaching their children to play soccer. The investigators reported little difference between traditional BPT and COACHES in father and mother ratings of child symptoms except that fathers in the COACHES program reported greater perceived improvement in their child's behavior, relative to fathers in the traditional BPT program (Fabiano et al., 2009). In the second study of COACHES (Fabiano et al., 2012) the investigators reported improvements over a waitlist group in observed rates of fathers' making positive and negative statements to their child and in fathers' ratings of child behavior. These studies indicate that adaptations of traditional BPT engages individuals not typically served while maintaining the treatment gains of BPT.

Two of the other studies also included unique applications of BPT including a single-session intervention (approximately 90 minutes with four weekly follow-up telephone calls) with young adolescents (Meyer & Kelley, 2008) and telephone-based BPT (McGrath et al., 2011). The one-session BPT targeted homework compliance and the authors reported significant improvements in parent ratings of homework completion and objective measures of percent of submitted homework. The telephone-based BPT included 12, forty-minute telephone calls in addition to handbooks and videos that parents read and viewed at home. Although BPT typically targets impairment, McGrath and colleagues examined change in participants' ADHD diagnostic status. Both the one-session BPT targeting homework compliance and the telephone based BPT represent treatment models that remove barriers to treatment attendance that are commonly found in multi-session clinic-based parent training programs.

Having established the evidence base for BPT (Pelham & Fabiano, 2008), investigators appear to have moved towards modifying procedures to improve access and engage individuals who previously showed low participation rates or less desirable outcomes. The push towards innovative delivery models can extend the reach of well-established BPT practices and moves the science beyond a primary focus on efficacy to one of dissemination. Some limitations of these studies include an over-reliance on ratings of outcomes from those

receiving services (i.e., parents), a low number of participants from minority groups (see Chacko et al. for an exception), and an exclusive focus on elementary school-age children. As additional adaptations and enhancements to BPT are made, it may be important to follow the models of Chacko and Fabiano by comparing enhanced BPT to traditional BPT so that the exact benefits offered by enhanced models can be understood. For example, some enhancements may produce child outcomes that are similar to and not better than traditional BPT, yet they serve to engage new populations that otherwise would not receive services. In contrast, other enhancements may provide benefits both in terms of service engagement and in child and adolescent outcomes. This contrast helps to highlight important mediators of treatment outcomes for future study (mediators and moderators were not examined in any of these studies).

**Behavioral classroom management (BCM)**—Both of the previous treatment reviews (Pelham & Fabiano, 2008; Pelham et al., 1998) determined that BCM interventions were well-established treatments. Since the last review, there were two published studies that meet the EBT Evaluation Criteria for the current review. The first is a study of BCM by Fabiano and colleagues (2010) who evaluated BCM in elementary schools in the context of special education services. Namely, the effectiveness of a Daily Report Card (DRC) intervention in combination with ongoing teacher consultation (DRC + consultation) throughout the entire academic year, relative to special education “business as usual” was examined. Results indicated that the DRC + consultation services condition led to statistically significant improvements in classroom rule violations and teacher ratings of ODD/conduct disorder symptoms, classroom behavior, and academic productivity, as well as teacher-rated improvement on behavior goals compared to the business as usual condition. The results of this study demonstrate that the DRC can be feasibly implemented by school-employed classroom teachers to produce meaningful gains in the behavior of students with ADHD.

The second study of BCM was conducted by Mikami and colleagues (2012) who presented an innovative approach to BCM by leveraging specific factors (i.e., student-teacher interactions) within the classroom context. The investigators contrasted two methods of managing classroom behavior of elementary school-aged children in an analogue classroom setting. Both methods included the most common core components of classroom-wide behavior management, but differed in the way in which teachers applied some of the behavior management techniques, such as praise, individual attention, and direct and indirect messages of acceptance of others. The additive benefit of Making Socially Accepting Inclusive Classrooms (MOSAIC) over a well-established treatment was evaluated. In MOSAIC, the goal was to reduce rejection, social devaluation, and exclusion of children with ADHD within the peer group. By the end of the 2-week program, behavior problems did not differ between the two groups. However, relative to the traditional BCM condition, children with ADHD in MOSAIC were significantly less rejected by their peers and had more reciprocated friendships; yet, this outcome was moderated by child sex; the effect was stronger for boys than for girls. This innovative intervention extends the research on BCM to include the manipulation of subtle behavior management techniques and outcomes related to peer acceptance.

Overall, the two studies of BCM that met EBT Evaluation Criteria increase the support for BCM as a well-established treatment for ADHD and add to the literature by evaluating BCM in a naturalistic setting (Fabiano et al., 2010) and by challenging BCM researchers to consider teacher and student behaviors in a new light (Mikami et al., 2012). Although BCM has met the criteria for being a well-established treatment since 1998, the literature supporting this claim only includes elementary-school aged children. Given the developmental changes occurring within children as they progress through puberty and transition into young adulthood, as well as the differences between the contexts of middle and high schools (compared to elementary schools), it is unclear whether the findings described above generalize to adolescent populations.

**Behavioral peer interventions (BPI)**—In the previous review interventions targeting social impairment were sorted into two categories. The first included traditional social skills training and that has been reclassified as a TI in this review. The second category included behavioral peer interventions in recreation settings with most of these occurring in Summer Treatment Programs (STP; Pelham & Hoza, 1996). Based on two large, between group studies conducted in the STP (Pelham et al., 2008 and one of the MTA studies, Pelham et al., 2000), Pelham and Fabiano (2008) indicated that BPIs in recreational settings were a well-established treatment for ADHD. The rationale for this type of treatment is that by training staff in specific settings to manipulate contingencies in those settings, children will demonstrate improvements in social functioning. One study of BPI was published since the 2008 review and the treatment evaluated in this study (Mikami, Lerner, Griggs, McGrath & Calhoun, 2010) involved training parents to be social coaches and to modify contingencies when their children were in social situations to facilitate appropriate social behavior. Although not in a recreational setting, the manipulation in Parent Friendship Coaching (PFC) is the same as in the studies of STP; adults are taught to manipulate contingencies in a target setting to improve the social behavior of children with ADHD. PFC consisted of eight 90-minute weekly group sessions and participants were families of 124 children (half diagnosed with ADHD) between the ages of 6 and 10 years. Participants with ADHD were randomly assigned to either receive PFC or to a no treatment control condition. In addition to significant improvements in parents' ratings of social skills and quality of play, the investigators also reported significant improvements for those receiving PFC compared to controls on teacher ratings of peer liking and acceptance. The investigators asked parents to not inform the teachers about their involvement in treatment so the teachers' ratings were completed without awareness of condition. Further, although support was not found for many hypothesized mediators, the authors found that changes in some parenting behaviors during peer interactions, specifically parent facilitation of successful behaviors, correction of child behavior, and reductions in criticisms, mediated the effect of PFC on child peer functioning. Little support was found for possible moderating effects of sex, ADHD subtype, ODD comorbidity or medication status, suggesting that the intervention effects are applicable across several subgroups. Thus, this study extends previous findings in a number of ways. First, participants achieved gains in settings other than the one in which contingencies were directly manipulated. Second, raters who were unaware of treatment condition confirmed these improvements. Lastly, some of the results support the hypothesized mechanism of change (i.e., change in parenting behaviors during playdates).

Although it is questionable whether or not the studies reported in the 2008 review were conducted by two independent research teams (as is required for a designation of well-established), the addition of this study by Mikami and colleagues (2010)<sup>3</sup> yields adequate evidence for BPI to be considered a well-established treatment.

**Combined behavioral treatment studies**—Pelham and Fabiano (2008) noted that some studies, such as the MTA, included a combination of BPT, BCM, and/or BPI preventing them from reaching conclusions about the degree to which each treatment individually contributed to outcomes. For this reason, we added a fourth category for BM studies that evaluated treatments that were a combination of any of the above three categories. We identified six studies that reported the results of treatments that combine aspects of BPT, BCM, and/or BPI. Given prior evidence supporting BPT and BCM, it is not surprising that these studies reported numerous benefits for the combined treatment relative to a no treatment condition or to an active psychosocial support intervention (Abikoff, Gallagher, Wells, Murray, Huang, & Feinham, 2013; Kern et al., 2007; Langberg et al., 2010; Pfiffner et al., 2007; Power et al., 2012; Webster-Stratton, Reid, & Beauchaine, 2011). Possible mediators and moderators were only examined in the study by Langberg and colleagues (2010). Specifically, at the 14-month assessment point in the MTA study, the benefits of the combined intervention on homework problems (relative to all other treatment conditions) were strongest for children with moderate (rather than severe) parent-rated ADHD symptoms. Variables that did not moderate the outcomes included child sex, learning disability status, medication status, and receipt of school services. These outcomes highlight the impact of combining well-established treatments to improve ADHD symptoms and functioning in areas that may not be adequately addressed by any individual treatment alone (e.g., homework management, organizational skills).

### Training Interventions (TI)

**Cognitive training**—There were two studies of cognitive training that met all five EBT Evaluation Criteria (Beck, Hanson, Puffenberger, Benninger, & Benninger, 2010; van der Oord, Ponsioen, Geurts, Brink & Prins, in press). In the study conducted by Beck and colleagues, participants (ages 7 to 17) were randomly assigned to either a trial involving 25, 30-40 minutes sessions of a computerized cognitive training task (Cogmed R M) or to a waitlist control condition or a trial involving 25, 30-40 minutes sessions of a computerized cognitive training task (Cogmed R M) over a 5-week period. The sessions took place in the participants' homes and parents were instructed to monitor and reward children for completing sessions on a computer. Investigators gathered parent and teacher ratings of ADHD symptoms and behaviors thought to be related to executive functioning at pretreatment, post-treatment, and at 4-month follow-up. The results of the study were mixed; many factors on the parent rating scales revealed significant benefits for the intervention at post-treatment and follow-up relative to the control condition; however, only 1 of 20 (5%) factors on the teacher rating scales indicated a statistically significant advantage for

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<sup>3</sup>We understand that this study may have been classified in the BPT section; however, the purpose of the intervention was to train adults to modify contingencies in the environments with which children socially interacted with peers for the purpose of enhancing their social functioning, therefore, we judged that it fit better in the BPI category than BPT.

treatment over control. Reconciling these large rater-specific differences raises questions about the degree to which improvements in parent ratings may have been partially attributable to parents' awareness of the treatment and investment in their child's practice.

In the second study of cognitive training, conducted by van der Oord and colleagues (in press), training procedures that were more varied than those used by Beck et al. were evaluated. Specifically, the cognitive training intervention tested by van der Oord et al. included a novel computer game feature that may have helped with treatment engagement. Participants completed 25, 40-minute training sessions over a five-week period. Similar to Beck and colleagues' findings, results indicated that parent ratings of ADHD symptoms and parent ratings on two of five subscales of a behavioral measure of executive functioning were improved for the treatment group compared to the wait-list control group. Ratings from teachers revealed no differences between the groups and data from participants of the control condition were not available for the follow-up analyses. As van der Oord and colleagues acknowledged, the finding of differences only on some parent ratings without any differences on teacher ratings raises questions about the validity of the reported effects. If the improved behaviors reported by the parents were not detected at school, then the clinical utility of this treatment is questionable. Namely, the demands on working memory are often greater at school than at home and teachers are frequently monitoring and measuring student functioning in ways related to working memory. Yet, similar to what was found by Beck et al., teachers did not notice improvements in symptoms or in behaviors related to executive functioning after children completed the treatment. As a result and consistent with the conclusions of other recent reviews (Shipstead, Redick & Engle, 2012), cognitive training must be considered an experimental treatment per the EBT Evaluation Criteria because although two randomized trials have been conducted, the results are equivocal.

**Neurofeedback training**—Since 2008, only one study that met all five EBT Evaluation Criteria evaluated neurofeedback training (Gevensleben et al., 2009). This randomized trial included 102 children with ADHD between the ages of 8 and 12 years. One group received neurofeedback training that was designed to help children acquire self-control of specific brain activity patterns to reduce ADHD symptoms and improve daily functioning. The other group completed a computerized attention training intervention. Participants completed 18, 50-minute computer sessions at a clinic over a 3-4 week period. Investigators reported benefits for the group receiving neurofeedback training on parent ratings of ADHD and ODD symptoms, aggression, and the total score of the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). In addition, significant benefits were also reported for teacher ratings of inattention, hyperactivity, and overall ADHD symptoms. The investigators also gathered parent and teacher ratings of social, academic and home functioning and there were no significant differences between the groups on any of these measures. Of note, parents and teachers were unaware of treatment condition, reducing the possibility of rater bias in the results. Given that the treatment led to reductions in levels of symptoms without significant gains in functioning, neurofeedback training meets task force criteria for a Level 3 treatment or one that is possibly efficacious treatment for ADHD.

## Organization Training

Investigators have developed and evaluated interventions that focus on training children with ADHD to overcome their difficulties organizing school materials. There were two studies of organization training that met all EBT Evaluation Criteria; one evaluating a clinic-based intervention for elementary school aged children (Abikoff et al., 2013) and one evaluating school-based interventions for young adolescents (Langberg, Epstein, Becker, Girio-Herrera, & Vaughn, 2012). The approach for training organization of materials and the tracking of assignments is similar across these two studies. Participants were taught organization rules and the organization of their materials was regularly measured against a checklist. Although contingent rewards were provided for organization and for participant self-correction during the training sessions, consistent with other studies of training interventions, there was minimal to no manipulation of contingencies in the environments outside of the training setting (i.e., classrooms and homes).

Abikoff and colleagues (2013) compared the Organization Skills Training (OST) intervention to a waitlist control condition. OST involved 20, hour-long sessions held at a clinic twice per week after school. Parents attended approximately 10 minutes of each session and, although they were encouraged to monitor their children's use of the skills, no explicit procedures for such monitoring were provided. Children learned techniques for tracking assignments and materials and received in-session prizes for the successful use of the techniques between sessions. The results indicated that, relative to the waitlist condition, OST produced significantly better parent and teacher ratings of organization, academic functioning, homework completion, and family conflict. Based on a similar model of training students to improve the organization of materials and time, Langberg and colleagues (2012) evaluated the Homework, Organization, and Planning System (HOPS) provided by school mental health professionals (SMHP) in middle schools. The intervention involved training students to organize their materials, track and monitor assignments, and plan evening homework completion. The SMHP met with students for sixteen, 20-minute sessions over 11 weeks. Results indicated that HOPS produced significantly better parent (but not teacher) ratings of organization, homework, and family conflict and these gains were maintained at three month follow-up. Measures of feasibility and integrity also indicated that the HOPS could feasibly be implemented with integrity by SMHPs.

Overall, the effects of organization training appears to vary as a function of sample characteristics. There are a number of noteworthy distinctions between the study conducted by Abikoff and colleagues (2013) and the one conducted by Langberg et al. (2012). First, Abikoff et al.'s sample comprised elementary school-aged children with a higher mean IQ (113), better educated parents with approximately one-third of parents having obtained a graduate or professional degree, and better resourced families who had the means to attend a clinic twice per week. Conversely, participants in Langberg and colleagues' study were middle school students with a mean IQ of 98 who attended the intervention sessions at school. Both studies evaluated treatments consisting solely of organization interventions. Thus, organization training has been evaluated by two independent research teams with both demonstrating statistically significant benefits over a waitlist or no treatment control condition. Thus, organization interventions meet criteria for a well-established treatment.

## Combined Training

The remaining two studies in this section conducted an evaluation of a combined training program (Challenging Horizons Program, CHP; Evans et al., 2011; Molina et al., 2008). The CHP is a school-based treatment program for adolescents with ADHD that targets impairment related to organization (see above), academic skills, and social functioning. It has been modified and evaluated as a mentoring program in a middle school setting (Evans, Serpell, Schultz & Pastor, 2007) and a coaching intervention in a high school setting (Sadler, Evans, Schultz & Zoromski, 2011), but most of the research including the two studies described here have evaluated it as an after-school program that operates in 2.5 hour sessions, two days per week at the participants' middle school. The study conducted by Molina et al. was a small trial (11 participants in CHP & 12 in community care) that evaluated the benefits of the CHP provided over a 10-week period of the school year. The study by Evans et al. study was slightly larger (31 participants in CHP & 18 in community care) and the intervention was provided over a 5-month period. Molina et al.'s results indicated significant improvements in parent ratings of internalizing symptoms, delinquency and school adjustment. The results obtained by Evans et al. revealed significant benefits in teacher ratings of academic and classroom functioning and parent ratings of hyperactivity/impulsivity symptoms. CHP has been evaluated in two randomized controlled studies since 2008, but not by two independent research teams. Both studies reported statistically significant parent and teacher reported benefits to the CHP. Given this level of evidence, we classified Combined Training (i.e., CHP) as meeting criteria for Level 2 or probably efficacious treatment.

## Discussion

The purpose of the current review was to critically evaluate the empirical literature published during the last five years to determine levels of evidence for psychosocial interventions for youth with ADHD (see Table 4) and to identify factors that may influence the outcomes of these treatments. Considering the EBT Evaluation Criteria, the conclusions of the 2008 review and the literature published in the last five years, we confidently conclude that Behavior Management interventions including BPT, BCM and BPI, as well as their use in combination, are well-established treatments. In addition, one of the Training Interventions, organization training, met these criteria. The other Training Interventions including cognitive training met criteria for Level 4 (Experimental Treatments), neurofeedback training met criteria for Level 3 (Possibly Efficacious), and the combined training program (Challenging Horizons Program) met criteria for Level 2 (Probably Efficacious). Below, we critically discuss factors that are important to consider when interpreting the outcomes of these treatments, including characteristics of the interventions, participants, and measurement, as well as the characteristics of the system for classifying interventions.

### Characteristics of the Interventions

The addition of Training Interventions (TI) to the arsenal of psychosocial treatments has been an important shift in the focus of treatment development for youth with ADHD. Although early efforts at training, such as social skills training, were not successful, current

efforts focusing on organization and the development of other competencies are showing promise. For example, Gevensleben et al. (2009) reported beneficial effects of neurofeedback training that are equivalent to outcomes reported in studies of well-established behavioral treatments (e.g., Cohen's  $d$  range from .30 to .64). The obvious advantages of TIs are that such treatments do not necessitate reliance on adults in the home and school environments to consistently implement modified contingencies with integrity. Indeed, this aspect of TIs may render them particularly useful with adolescents. Given the numerous teachers encountered by adolescents over the course of the day, the fact that teens are monitored by adults less closely than younger children, and the challenges associated with identifying salient rewards for adolescents; it may be that training is the preferred treatment model for youth in this age group.

It is important to note that there is an assumption that training interventions produce change in competencies that will persist over time and across settings, given that these interventions are not context-specific as are traditional behavioral interventions. However, this potential generalization advantage has not been demonstrated. Given that Abikoff and colleagues (2013) reported success with their organization TI with elementary school aged children, and that both parents and teachers observed the success, there is some promising evidence in support of this assumption. If generalization of skills developed in TIs can be generalized across time and setting, then providing TI to youth early in their academic careers certainly has advantages.

Another novel characteristic of the recent treatment literature is that many studies that tested treatments previously identified as well-established, focused on improving access or increasing involvement of populations who do not usually use these interventions. Fabiano et al. (2009; 2012) modified BPT procedures to improve the engagement of fathers. Chacko and colleagues (2009) attempted to meet the needs of single mothers and McGrath et al. (2011) conducted BPT over the telephone to reduce travel demands on clients. In both the Fabiano et al. and Chacko et al. studies, modified BPT did not yield notably better outcomes than traditional BPT, but did result in better engagement and satisfaction of fathers and single mothers, respectively, than traditional BPT. Of note, although these studies of BPT reported outcomes better than no treatment or equivalent to traditional BPT with the same subgroup of participants, we cannot conclude whether the treatment effects were equivalent to those obtained by families who are not part of such subgroups. The modifications to BPT implemented in the study by McGrath and colleagues involved conducting the intervention over the telephone and with handbooks and videos provided to the families. Reports of satisfaction with "telephone coaches" indicated that providing BPT remotely may increase access to this well-established treatment for many families who may not obtain it otherwise. All three groups of investigators described implications for further modifications to BPT that may further enhance the efficacy of the intervention with the targeted subgroups. For example, Chacko and colleagues noted a need to enhance services for maternal personal problems and to help mothers with communicating with school staff. Continued investigation of parent and child characteristics that moderate response to BPT or engagement with BPT are warranted and can provide additional guidance for those working to extend the reach of these well-established services.



## Characteristics of Participants

As noted in the previous review (Pelham & Fabiano, 2008), very little research has been conducted with adolescents with ADHD. Of the well-established treatments, only the organization training included one study targeting adolescents and these were young adolescents (Langberg et al., 2012; ages 11 – 14). Given the developmental differences between children and adolescents and the large differences across these age groups in terms of school settings, peer relations, and relationships with parents; our conclusions about the levels of evidence for BM treatments are restricted to children between approximately 4 and 12 years of age. There continues to be a need to develop and evaluate treatments for adolescents.

There were two studies of combined BM treatments that included preschool aged children (Kern et al., 2007; Webster-Stratton et al., 2011). These investigators took very different approaches to children in this young age group. Kern and colleagues combined parent education and individualized home and preschool interventions based on the results of functional behavior analyses. This procedure was contrasted with parent education alone over 18 months. Although attendance at parent education was poor in both groups (mean percentages 37 & 29), both groups improved on 16 of the 18 primary outcome measures. There were no significant treatment advantages for those in the active treatment group relative to those in the control group. Given the poor attendance at the parent sessions it is unclear what led to improvement in the parent education only group that yielded improvements that were equivalent to those obtained by participants in the active treatment group. In contrast, Webster-Stratton and colleagues compared the combination of the Incredible Years Program (BPT) and a child focused group training intervention (TI) to a waitlist control and reported significant treatment effects for those receiving the combined treatment. Attendance at parent training sessions was much higher in this study than in the Kern and colleague's study (mean percentage attendance 93 [mothers] & 85 [fathers]) and the mean age of the sample was approximately 11 months older. There is an extensive literature demonstrating treatment effects for the Incredible Years Program, and little to no evidence supporting the efficacy of a child focused training intervention. Based on the extensive literature on BM approaches with young children prior to 2008, Pelham and Fabiano concluded that these approaches were well-established for this age group and these two studies add to that evidence.

Another difference between participants recruited for the studies reviewed above involves recruitment procedures. Participants recruited from clinic settings are likely to have parents attending the clinic with them and parental presence indicates a degree of involvement and resources that are not always present among families recruited from the community. For example, as noted previously, participants in the Abikoff et al. (2013) study were recruited at a clinic and had an average IQ estimate of 113. Participants in the Power et al. (2012) study were also recruited from a clinic and the socioeconomic status of 98% of the participants was in the middle to high range. These figures can be contrasted with those obtained by two studies wherein participants were recruited from schools (Evans et al., 2011; Langberg et al., 2012). In these studies the average IQ estimate was 95 and 98, respectively. The average family income was approximately \$45,000 in the Evans et al.

study and Langberg et al. reported that more than half of their families had incomes less than \$75,000 per year (15% had less than \$25,000). To the extent that cognitive ability and income may influence outcomes and/or parent involvement (e.g., Owens et al., 2003; Rieppi et al., 2002), these differences need to be noted when interpreting findings and explicitly explored in future studies. Indeed, only 3 of 21 studies included analyses examining moderators of treatment outcomes. Important differences in conclusions may be a function of participant characteristics that could be related to recruitment methods.

Finally, it is noteworthy that the reviewed research did not directly address questions relating treatment response to the racial and ethnic backgrounds of participants. Although there continues to be an emphasis on the importance of these research questions and funding agencies continue to require diverse samples, the science addressing these issues is very shallow.

### Characteristics of Measurement

There are two assessment-related issues that we believe should be considered when interpreting findings and these pertain to diagnostic decisions and measurement sources. First, as can be seen in Table 2, investigators of some studies based diagnoses on parent report only, whereas others used both parent and teacher report. Among those that based diagnoses on both parent and teacher report, some counted symptoms as present based on an “and” rule and others used an “or” rule. Many of the studies did not indicate the basis for deciding when symptoms were considered present. Two studies in the past five years have revealed that these subtle decisions can lead to important differences in terms of which children are diagnosed with ADHD and which are not (Rowland et al., 2008; Valo & Tannock, 2010). The results of treatment outcome studies may also be affected by these variations in how diagnoses are determined. It is unclear if these differences are important and whether variations in samples due to diagnostic procedures may influence the populations to whom findings might generalize.

Second, the vast majority of the measures used to determine the level of evidence for the treatments were ratings completed by parents and/or teachers who were aware of the child's treatment condition. There is evidence indicating that awareness of treatment condition inflates effect sizes (Jadad et al. 1996). This factor alone may account for much of the difference between the conclusions of this review and the recent publication by Sonuga-Barke and colleagues (2013). Researchers conducting treatment development and evaluation research with behavioral treatments typically recruit the adults in a child's life to implement the modified contingencies in the natural settings where the child's problematic behavior occurs. As a result, it may not be possible to find knowledgeable sources for ratings who are unaware of treatment status. Further, research has demonstrated that a large portion of the variance in teacher ratings is due to rater-related effects as opposed to variability in child behavior (Briesch, Chafouleas & Riley-Tillman, 2010). Alternatives to ratings can be difficult to implement. For example, direct observations have many limitations including expense and time (see Pelham, Fabiano & Massetti, 2005). Briesch and colleagues (2010) reported that 3-5 observations either within or across days are needed to assess task engagement at school in order to obtain dependable estimates of the target behavior. Further

adding to the costs of direct observation, these authors conducted eight hours of training with their observers. Although raters can sometimes be unaware of treatment conditions, conducting enough observations to obtain valid indices of outcomes, tracking infrequent behavior, costs of observers, and measuring constructs that are not easily observable (e.g., reciprocal peer relationships) make it difficult to rely on observations. Tracking objective criteria related to a permanent product is another assessment option and was used in the organization and CHP studies. For example, staff tracked organization progress based on a set of objective criteria pertaining to the participants' school binders. Although staff completing the tracking forms were aware of the treatment condition, staff simply marked whether each criterion was met or not met. The items described concrete choices (e.g., an item is present or absent) and thus were less likely to be influenced by rater effects than items on parent and teacher rating scales. Nevertheless, systems like these used to track organization, may not be possible when assessing some of the constructs targeted in treatments for children with ADHD (e.g., social functioning). Last, school records (e.g., grades, office referrals) often offer ecological validity, but are not entirely immune from teacher bias, leading to limited reliability across teachers, school buildings, and time.

To counter some of these challenges in measurement, it has been recommended that investigators take a multi-source and multi-method approach to assessing the constructs that are intended to change as a function of a treatment (AAP, Subcommittee on ADHD, 2011); however, this approach creates other problems. As described by De Los Reyes and Kazdin (2006), there is no standard for identifying how many of the multiple measures and which ones need to indicate treatment effects in order for the study to be regarded as supporting the efficacy of the treatment. For many of the studies in this review and the two previous reviews completed by Pelham and colleagues (1998; 2008), relatively few of the possible outcomes measured indicated statistically significant differences between the treatment and comparison groups. Reliable and valid indices of both symptoms and impairment related to ADHD that are not compromised by sources aware of treatment conditions are sorely needed along with guidelines for interpreting findings from studies with multiple measures of outcomes.

### Method for Classifying Treatments

The substantial differences between this review and the meta-analysis published by Sonuga-Barke and colleagues (2013) underscore the lack of a clear consensus for how we determine levels of evidence for a treatment. The areas of inconsistency begin with the selection of studies to be considered in a review. The criteria for selection of studies in this review are listed as M1 to M5 in Table 1. Sonuga-Barke and colleagues eliminated studies that contrasted a treatment with another active treatment without a no-treatment control group. For example, the Fabiano and colleagues (2009) study compared the modified BPT program for fathers (COACHES) to a standard BPT condition and this study was excluded by Sonuga-Barke and colleagues due to "no appropriate control". The criteria used in the present review considers demonstrating equivalence to another well-established treatment as evidence supporting the efficacy of an intervention, whereas the criteria employed by Sonuga-Barke et al. did not in order to a need to keep a common outcome variable for their meta-analyses.

Another factor contributing to the selection of research studies to consider in a review pertains to the outcome measures selected and this choice pertains to another key difference between our findings and those of Sonuga-Barke and colleagues. The outcome measure criterion used in this study indicates that an outcome measure must be reliable, valid and gauge the problems targeted (see M4 in Table 1). As a result, the social functioning outcome measures used in the Mikami et al. (2010) study of a parent friendship coaching intervention were acceptable in our review because social impairment is a very common problem for youth with ADHD. Although they also noted that impairment may be a more relevant outcome for psychosocial interventions, Sonuga-Barke et al. excluded this study from their meta-analyses due to “no ADHD outcomes.” We included measures of symptoms and impairment and suggest that drawing conclusions about levels of evidence for psychosocial treatments based solely on symptoms is likely to seriously underestimate their effects. As noted by Pelham and Fabiano in their review, impairment predicts long-term outcomes better than symptoms (Mannuzza & Klein, 1999) and impairments are the primary reasons that parents pursue treatments for their child. Change in symptoms is related to change in impairment, but there are large differences when considering children improved on one or the other (Owens, Johannes & Karpenko, 2009). Furthermore, conclusions about treatment response based only on symptom changes (e.g., The MTA Cooperative Group, 1999) may end up misrepresenting the benefits of psychosocial treatments (Conners et al., 2001). Thus we consider the inclusion of measures assessing both symptoms and impairment related to ADHD as critical for assessing treatment response.

Finally, we were challenged during the review and classification of the TI studies with regards to determining levels of evidence when studies reported mixed outcomes. For example, as noted above, both studies of cognitive training (Beck et al., 2010; van der Oord, et al., in press) reported gains across parent ratings of symptoms, mixed improvements across parent ratings of executive functioning, and only one instance of improvement out of multiple comparisons of teacher ratings of symptoms and executive functioning. Although both studies met all of five EBT Evaluation Criteria, the lack of clarity in the larger literature regarding the necessary proportion of measures on which improvement is to be demonstrated (De Los Reyes & Kazdin, 2006; 2009) made classification difficult. This issue, along with many related limitations to our systems for classifying treatments according to their evidence base is described in very thoughtful articles by De Los Reyes and Kazdin (2006; 2009), who propose a classification system to address some of these limitations: the Range of Possible Changes Model. De Los Reyes and Kazdin (2006; 2009) describe the difficulties associated with comparing inconsistent findings obtained on the same outcome measure across studies, as well as inconsistent findings obtained within the same study across outcome measures and propose a process that considers a proportional index of findings that is to be contrasted with study hypotheses. Other tools for advancing our science of identifying evidence-based treatments may involve a diminished reliance on *p*-values and statistical significance. In fact, there has been an increased reliance on effect sizes during the last decade as well as on the use of indices of clinically significant change (Jacobson & Truax, 1991). Nine out of the 21 studies reviewed in this manuscript reported some indicator of clinically significant change. It may also be time to consider other alternatives for analyzing and conceptualizing response to treatment, including Bayesian

analyses that provide effect sizes indicating the odds of response between treatment conditions. In any event, methods for analyzing and interpreting outcome research need to advance if we are going to be able to identify reliable classification systems of treatments.

### Implications for Practice

If practitioners are going to begin prioritizing the use of well-established treatments, dramatic transformations are needed in two areas within our systems of care. The first involves the integration of training protocols for students in graduate programs who have the potential to become mental health practitioners in schools and clinics. The evidence suggests that many of the professional mental health practitioners are not being trained in evidence-based practices (Kelly, Berzin, Frey, Alvarez, Shaffer & O'Brien, 2010; Shernoff, Kratochwill & Stoiber, 2003). This lack of training may be related to the lack of accountability for practitioners to provide evidence-based practices. In many systems of care, including schools and clinics, there is no direct accountability on individual clinicians to provide evidence-based practices with integrity. Instead the focus of accountability is often on patient quotas and billable units (regardless of quality of care). Studies show that without supervision and accountability, clinicians drift and adherence to best practices diminish (Schoenwald, Henggeler, Brondino & Rowland, 2000). Thus, without a quality assurance system that trains, monitors, supervises and incentivizes use of evidence-based practices, there may be little likelihood of widespread adoption.

Although the gap between science and practice has been thoroughly discussed in both the research and practice settings of many disciplines, we are not aware of evidence that the gap is meaningfully shrinking. For example, when we conduct treatment development and evaluation research in schools, we are frequently introducing school mental health professionals (counselors and social workers) to the basic techniques involved in cognitive behavioral therapy and behavioral parent training, for the first time. Conducting treatment research in the settings intended for implementation will force investigators to continue to face some of these challenging implementation issues and some of the studies considered in this review provide examples of this research practice. However, it may be that the professional silos providing the greatest obstacle to consistent implementation of evidence-based practices are those between science, policy and practice and not necessarily those between disciplines.

In summary, this review provides an update on the state of the science for psychosocial interventions for youth with ADHD. It highlights the innovations that have occurred in the last five years including innovations to existing well-established treatments to reach new populations, an increase in research on adolescents and preschool children with ADHD, and the development of a new category of interventions (i.e., Training Interventions). We also highlighted several critical issues to be incorporated into the next generation of research, such as attention to characteristics of participants, diagnostic procedures, outcome measures, and the system classifying levels of evidence. We look forward to observing and participating in advancements that take place in the next five years and the impact that those scientific advances may have on practice and policy.

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**Table 1****Evidence Base Treatment (EBT) Updates Evaluation Criteria****Methods criteria**

- M.1. Group design: Study involved a randomized controlled design
- M.2. Independent variable defined: Treatment manuals or logical equivalent were used for the treatment
- M.3. Population clarified: Conducted with a population, treated for specified problems, for whom inclusion criteria have been clearly delineated
- M.4. Outcomes assessed: Reliable and valid outcome assessment measures gauging the problems targeted (at a minimum) were used
- M.5. Analysis adequacy: Appropriate data analyses were used & sample size was sufficient to detect expected effects

**Level 1: Well-Established Treatments**

1.1 Efficacy demonstrated for the treatment in at least two (2) independent research settings and by two (2) independent investigatory teams demonstrating efficacy by showing the treatment to be either:

- 1.1.a. Statistically significantly superior to pill or psychological placebo or to another active treatment

OR

- 1.1.b. Equivalent (or not significantly different) to an already well-established treatment in experiments

AND

- 1.2. All five (5) of the Methods Criteria

**Level 2: Probably Efficacious Treatments**

- 2.1 There must be at least two good experiments showing the treatment is superior (statistically significantly so) to a wait-list control group

OR

- 2.2 One or more good experiments meeting the Well-Established Treatment level with the one exception of having been conducted in at least two independent research settings and by independent investigatory teams

AND

- 2.3 All five (5) of the Methods Criteria

**Level 3: Possibly Efficacious Treatments**

- 3.1 At least one good randomized controlled trial showing the treatment to be superior to a wait list or no-treatment control group

AND

- 3.2 All five (5) of the Methods Criteria

OR

- 3.3 Two or more clinical studies showing the treatment to be efficacious, with two or more meeting the last four (of five) Methods Criteria, but none being randomized controlled trials

**Level 4: Experimental Treatments**

- 4.1. Not yet tested in a randomized controlled trial

OR

- 4.2. Tested in 1 or more clinical studies but not sufficient to meet level 3 criteria.

**Level 5: Treatments of Questionable Efficacy**

- 5.1. Tested in good group-design experiments and found to be inferior to other treatment group and/or wait-list control group; i.e., only evidence available from experimental studies suggests the treatment produces no beneficial effect.

*Note.* Adapted from Silverman and Hinshaw (2008) and Division 12 Task Force on Psychological Interventions' reports (Chambless et al., 1996, 1998), from Chambless and Hollon (1998), and from Chambless and Ollendick (2001).

Table 2

Descriptive Information about Studies Included in Review

Study Authors, Year (N, Age Range)	Ethnicity/Race	Gender (% Male)	Diagnostic assessment measures	And/Or Rule for Diagnosis	Outcome Measures	Nathan & Gorman; WWC Type
<b>Behavior Management (BM)</b>						
<b>Behavioral Parent Training (BPT) Studies</b>						
Chacko et al., 2009 (120, 5-12)	52% C; 21% AA, 14% L, 13% O	71%	1,2,3,4,5,6	Unclear	1a,3a,4ac,5ac	2b
Fabiano et al., 2009 (75, 6-12)	84% C, 11% AA, 6% As, 3% L, 3% O	85%	2,3,4,5,6	Or Rule	1a,3a,4a,5a	2a
Fabiano et al., 2012 (55, 6-12)	87% C, 11% AA, 2% O	87%	1,2,3,4,5,6	Or Rule	4c, 5ac	2a
McGrath et al., 2011 (72, 8-12)	Not reported	75%	1,2,6	Parent Only	1a	1a
Meyer & Kelley, 2008 (42, 11-14)	93% C	86%	1, 2,4,6		1ab, 2abc,	2a
van den Hoofdakker et al., 2007 (94, 4-12)	95% C, 2% AA, 2% As, 1% Unknown	81%	1,2,3,6	Parent Only	1a,4a,5a	2a
<b>Behavioral Classroom Management (BCM) Studies</b>						
Fabiano et al., 2010 (63, 5-12)	79% C, 13% AA, 8% O	86%	1,2,3,4,5,6	Or Rule	1b, 2b, 5bc	1a
Mikami et al., 2012 (137, 6.8-9.8)	81% C, 3% AA, 6% As, 2% L, 8% O	48%	1,2,3,4,5,6	And Rule	1b, 3bc, 5bc	1b
<b>Behavioral Peer Interventions (BPT) Studies</b>						
Mikami et al., 2010 (124, 6-10)	85% C, 5% AA, 2% As, 1% L, 7% O	68%	1,2,3,6	Unclear	3ab, 4c	2a
<b>Combined BM Treatment Studies</b>						
Abikoff et al., 2013 (158, 8-11)	70% C, 15% AA, 15% O	65%	1,2,3,4,5,6	Unclear	2ab, 4a	2a
Kem et al., 2007 (135, 3-5)	71.4% C, 14.3% H, 3% AA, 11.3% O, 1.5% Unspecified	78.4%	1	Parent Only	1ab, 2c, 3ab, 5ab	2a
Langberg et al., 2010 (579, 7-9.9)	61% C, 20% AA, 8% H, 11% O	80%	1,2,4,6	Or Rule	2a	2a
Pfiffner et al., 2007 (69, 7-11)	51% C, 6% AA, 10% H, 16% As, 17% O	67%	1,2,4,6	Or Rule	1ab, 2abd, 3abd,	2a
Power et al., 2012 (199, 2 <sup>nd</sup> -6 <sup>th</sup> grade)	72% C, 22% AA, 2% As, 4% O	68%	1,2,3,4,5,6	Unclear	1ab, 2ab, 4a	2a
Webster-Stratton et al., 2011 (94, 4-12)	27% Minority	75%	1,2,6	Parent Only	1ab, 2ab, 4c, 5c	1a
<b>Training Interventions (TI)</b>						

Study Authors, Year (N, Age Range)	Ethnicity/Race	Gender (% Male)	Diagnostic assessment measures	And/Or Rule for Diagnosis	Outcome Measures	Nathan & Gorman; WWC Type
<b>Cognitive Training Studies</b>						
Beck et al., 2010 (52, 7-17)	96% C	69%	1,2,3,6	Parent Only	1ab, 2ab	2b
van der Oord et al., in press (40, 8-12)	Not Reported	83%	1,6	Parent Only	1ab, 2a	2b
<b>Neurofeedback Training Studies</b>						
Gevensleben et al., 2009 (102, 8-12)	Not Reported	82%	1,2,6	Parent Only	1ab, 3ab, 4a, 5ab, 6	2a
<b>Organization Training Studies</b>						
Langberg et al., 2012 (47, 11-14)	72% C	77%	1,3,6	And Rule	1a, 2abc, 4a	2b
Abikoff et al., 2013 (158, 8-11)	70% C, 15% AA 15% O	65%	1,2,3,4,5,6	Unclear	2ab, 4a	2a
<b>Combined Training Studies</b>						
Evans et al., 2011 (49, 10-13)	70% C, 14% AA 12% L, 4% As	71%	1,2,3,4,5,6	Unclear	1ab,2abc,3ab,4a,5ab	2a
Molina et al., 2008 (23, 6 <sup>th</sup> - 8 <sup>th</sup> grade)	52% C	74%	1,2,6	Parent Only	2c, 3d, 5ad	2b

Note. Race/Ethnicity is as reported by the authors; C = Caucasian, AA = African American, As = Asian, L = Latino, H = Hispanic, O = other

Diagnostic Assessment Measures: 1 = structured parent interview; 2 = parent symptom ratings; 3 = parent impairment ratings; 4 = teacher symptom ratings; 5 = teacher impairment ratings; 6 = age of onset  
 Outcome Measures: 1 = ADHD symptoms; 2 = academic functioning; 3 = peer relations; 4 = family functioning; 5 = behavioral functioning; 6 = neurological or physiological performance; a = parent report; b = teacher report; c = objective indicator; d = child report; e = clinician/summer counselor or summer teacher report

Nathan & Gorman (2002) Type: 1 = type 1; 2 = type 2

WWC = What Works Clearinghouse Standards: a = meets evidence standards; b = meets evidence standards with reservations

**Table 3**

Measures and Results of Studies Included in Review

Study Authors, Year (N, Age Range)	Treatment Evaluated (Bold indicates that comparison is well-established treatment)	Outcome Measures	ES BI vs. No Treatment	ES BI vs. Alternative Treatment	Clinical Significance	
<b>Behavior Management (BM)</b>						
<b>Behavioral Parent Training (BPT) Studies</b>						
Chacko et al., 2009 (120, 5-12)	1. Waitlist (WL)	Par DBD-Inattention	.00	-.16	Reported % below clinical cutoff on each measure by group	
	<b>2. BPT</b>	Par DBD-Hyp/Imp	.11	-.16		
	3. Enhanced BPT (STEPP)	Par DBD-ODD	.44*	.75*		
		Par IRS-Peer	.31	.37		
		Par IRS-Parent	.45*	.50*		
		Par IRS-Family	.59*	.58*		
		Par IRS-Overall	.68*	.52*		
		DPICS-PP	.60*	.81*		
		DPICS-NP	.19*	.68*		
		BDI	.07	.16		
		PSI	.29*	.37*		
				Combined BPTs vs. WL (M = .36)	STEPP vs. BPT (M = .44)	
	<b>Behavior Management (BM)</b>					
Fabiano et al., 2009 (75, 6-12)	<b>1. BPT</b>	F DBD ADHD factor	NA	.02	Not Reported	
	2. Enhanced BPT (COACHES)	F DBD ODD factor		.09		
		F SNAP Peer factor		.05		
		F IRS - Average		-.15		
		F Improve ratings		.49* (FM = .10)		
		M DBD ADHD factor		-.03		
		M DBD ODD factor		.01		
		M SNAP Peer factor		-.15		
		M IRS - Average		-.17		
		M Improve ratings		.22 (M = .05)		

Study Authors, Year (N, Age Range)	Treatment Evaluated (Bold indicates that comparison is well-established treatment)	Outcome Measures	ES BI vs. No Treatment	ES BI vs. Alternative Treatment	Clinical Significance	
Fabiano et al., 2012 (55, 6-12)	3. Waitlist	F ECBI Problem	.12 <sup>g</sup>	NA	Not Reported	
		F ECBI Intensity	.55 <sup>g*</sup>			
	4. Enhanced BPT (COACHES)	M ECBI Problem	.36 <sup>g</sup>			
		M ECBI Intensity	.53 <sup>g</sup>			
		F DPICS Commands	-.10 <sup>g</sup>			
		F DPICS Praise	.54 <sup>g*</sup>			
		F DPICS Negative Talk	.57 <sup>g*</sup>			
		M DPICS Commands	.20 <sup>g</sup>			
		M DPICS Praise	.31 <sup>g</sup>			
		M DPICS Negative Talk	.36 <sup>g</sup>			
McGrath et al., 2011 (72, 8-12)	1. Waitlist	Odds of successful outcome (defined as not meeting criteria for ADHD diagnosis at 120, 240, and 365 days of treatment)	2.16		Report % who no longer meet diagnostic criteria	
			2.18 <sup>*</sup>			
	2. BPT	OR for ADHD- 120 days	2.74 <sup>*</sup>			
		OR for ADHD- 240 days				
		OR for ADHD- 365 days				
	Meyer & Kelley, 2008 (42, 11-14)	1. Waitlist (WL)	Par HPC	5.55 <sup>d*</sup> SM	.42 (PM>SM)	Not Reported
				5.35 <sup>d*</sup> PM		
		2. Self-Monitoring (SM)		1.48 <sup>d</sup> SM	-.18 (SM>PM)	
				1.36 <sup>d</sup> PM		
		3. Parent-Monitoring (PM)	Homework-% turned in	2.23 <sup>d*</sup> SM	-.33 (PM>SM)	
			2.35 <sup>d*</sup> PM			

Study Authors, Year (N, Age Range)	Treatment Evaluated (Bold indicates that comparison is well-established treatment)	Outcome Measures	ES BI vs. No Treatment	ES BI vs. Alternative Treatment	Clinical Significance
van den Hooflakker et al., 2007 (94, 4 – 12)	1. Routine Care (RC) 2. BPT + RC	Indiv. target behaviors			Not Reported
		Par CBCL Externalizing	.50 <sup>d*</sup>		
		Par CPRS-R:S ADHD	.06 <sup>d*</sup>		
		Par CBCL Internalizing*	-.04 <sup>d</sup>		
		PSI Parent Domain	.36 <sup>d*</sup>		
		PSI Child Domain	-.04		
<b>Behavioral Classroom Management (BCM) Studies</b>					
Fabiano et al., 2010 (63, 5-12)	1. Business as Usual in SPED 2. BCM: Daily Report Card in SPED	Classroom Rule Violations	NA	.20 <sup>c*</sup>	Reported % below clinical cutoff on each measure by group
		WJ-Reading		.02 <sup>c</sup>	
		WJ-Math		.08 <sup>c</sup>	
		Tch DBD ADHD		.20 <sup>c</sup>	
		Tch DBD ODD/CD		.43 <sup>c*</sup>	
		Tch IRS Average		.44 <sup>c</sup>	
		Tch APRS Success		.37 <sup>c*</sup>	
		Tch APRS Productivity		.55 <sup>c*</sup>	
		Tch Improvement Rating		.69 <sup>c*</sup>	
		Tch Student-Tch Relationship		.50 <sup>c</sup>	
Mikami et al., 2012 (137, 6.8– 9.8)	1. Active Control (COMET) 2. BCM: MOSAIC	Positive peer nominations	NA	.05 <sup>e</sup>	Reported % within typically developing range on sociometric measures
		Negative peer nominations		.54 <sup>e*</sup>	
		Reciprocated friendships		.71 <sup>e*</sup>	
		Sociometric ratings		.52 <sup>e*</sup>	
		Peer interactions		.11 <sup>e</sup>	
		Messages from peers		.48 <sup>e*</sup>	



Study Authors, Year (N, Age Range)	Treatment Evaluated (Bold indicates that comparison is well-established treatment)	Outcome Measures	ES BI vs. No Treatment	ES BI vs. Alternative Treatment	Clinical Significance	
<b>Behavioral Peer Intervention (BPI) Studies</b>						
Mikami et al., 2010 (124, 6- 10)	1. No Treatment	Summer Tch Internalizing		.02 <sup>e</sup>		
		Summer Tch Hyperactivity		.03 <sup>e</sup>		
	2. Parental Friendship Coaching	Summer Tch Inattention		.07 <sup>e</sup>		
		Summer Tch ODD behavior		.02 <sup>e</sup>		
	Par SSRS	Summer Tch Off-task behavior		.32 <sup>e</sup>		
		Summer Tch		.27 <sup>e</sup>		
	Par Quality of Play – Conflict	Aggress/noncomp				
		Par Quality of Play – Disengagement		.38 <sup>*</sup>	NA	Reported % falling within normative range on the SSRS at pre and post-treatment
	Tch SSRS	Par Quality of Play – Disengagement		.33 <sup>*</sup>		
		Tch DSAS Like & Accept		.59 <sup>*</sup>		
Tch DSAS Dislike & Reject	Tch DSAS Like & Accept		.16			
	Tch DSAS Dislike & Reject		.42 <sup>*</sup>			
Tch DSAS Dislike & Reject	Tch DSAS Dislike & Reject		.25 <sup>*</sup>			
<b>Combined BM Treatment Studies</b>						
Abikoff et al., 2013 (158, 8-11)	1. Waitlist Control	Tch COSS	1.21 <sup>*</sup>	NA	Report % no longer meeting criteria for organization, time management, and planning impairment	
		Par COSS	2.13 <sup>*</sup>			
	2. PATHKO	Child COSS	.47			
		Tch APRS	.82 <sup>*</sup>			
	Par HIPCL	Tch APS	.19			
		Par FES	1.51 <sup>*</sup>			
	Par COSS Conflict	Par COSS Conflict	.54 <sup>*</sup>			
		Child BASC	1.03 <sup>*</sup>			
				Not Reported		

Study Authors, Year (N, Age Range)	Treatment Evaluated (Bold indicates that comparison is well-established treatment)	Outcome Measures	ES BI vs. No Treatment	ES BI vs. Alternative Treatment	Clinical Significance	
Kem et al., 2007 (135, 3-5)	1. Parent Education	SSIS Parent	NA	-.01 <sup>d</sup>	Not Reported	
		SSIS Teacher		-.27 <sup>d</sup>		
	2. Multicomponent Intervention	Bracken			-.52 <sup>d</sup>	
		DIBELS Sound Fluency			-.07 <sup>d</sup>	
		DIBELS Letter Naming			-.28 <sup>d</sup>	
		CBCL Aggressive			-.41 <sup>d</sup>	
		CBCL Delinquent			-.70 <sup>d</sup>	
		CBCL ADHD			-.14 <sup>d</sup>	
		CBCL ODD			-.41 <sup>d</sup>	
		CBCL CD			-.35 <sup>d</sup>	
		CPRS-R-L ODD			-.52 <sup>d</sup>	
		TRF Aggressive			-.34 <sup>d</sup>	
		TRF Delinquent			-.15 <sup>d</sup>	
		TRF ADHD			-.04 <sup>d</sup>	
		TRF ODD			-.22 <sup>d</sup>	
		TRF CD			-.25 <sup>d</sup>	
CTRS-R-L ODD			-.33 <sup>d</sup>			
Langberg et al., 2010	1. Community Control (CC)	Par HPC-Inattention	.39*	-.02	Not Reported	
		Par HPC-Poor Productivity	.29	.16		
	2. MED	Par HPC-Total	.39*	.05		
Pfiffner et al., 2007 (69, 7-11)	1. No Treatment Control	Par/Tch Inattention Count	.18 <sup>b*</sup>	NA	Report % within the normative range for selected rating scales	
		Par/Tch Inattention Severity	.19 <sup>b*</sup>			

Study Authors, Year (N, Age Range)	Treatment Evaluated (Bold indicates that comparison is well-established treatment)	Outcome Measures	ES BI vs. No Treatment	ES BI vs. Alternative Treatment	Clinical Significance
Power et al., 2012 (199, 2 <sup>nd</sup> – 6 <sup>th</sup> grade)	1. Active control (CARE)	Par/Tch SCT Scale	.22 <sup>b*</sup>	NA	Not Reported
	2. BPT + BCM (FSS)	Par/Tch SSRS	.11 <sup>b*</sup>	0.37 <sup>*</sup>	
		Par/Tch COSS	.17 <sup>b*</sup>	0.29 <sup>*</sup>	
		Par/Tch Life Skills Knowledge	.64 <sup>b*</sup>	0.52 <sup>*</sup>	
Webster-Stratton et al., 2011 (94, 4– 6)	1. Waitlist 2. BPT (Incredible Years) + Child group (Dinosaur School)	Par HPC–Inattention	0.06	0.34 <sup>*</sup>	
		Par HPC–Poor Productivity	0.04	0.04	
		Tch HPQ	0.04	0.59 <sup>*</sup>	
		Par PCRQ–Parent Involvement	0.16	0.16	
		Par PCRQ–Negative Discipline	0.07	0.07	
		Par SNAP	0.24	0.24	
		Tch SNAP	NA	NA	
		Tch APRS	NA	NA	
		M CBCL Externalizing	.06 <sup>a*</sup>	NA	Not Reported
		M CBCL Aggression	.04 <sup>a*</sup>		
M CBCL Attention	.04 <sup>a*</sup>				
M CPRS–R ODD	.11 <sup>a*</sup>				
M CPRS–R Inattent	.07 <sup>a*</sup>				
M CPRS–R Hyper	.13 <sup>a*</sup>				
M ECBI Intensity	.22 <sup>a*</sup>				
M ECBI Problem	.24 <sup>a*</sup>				
M CBCL Internalizing	.02 <sup>a</sup>				

Study Authors, Year (N, Age Range)	Treatment Evaluated (Bold indicates that comparison is well-established treatment)	Outcome Measures	ES BI vs. No Treatment	ES BI vs. Alternative Treatment	Clinical Significance
		M Emotion Reg	.22 <sup>a*</sup>		
		M Social Comp	.17 <sup>a*</sup>		
		F CBCL Externalizing	.06 <sup>a*</sup>		
		F CBCL Aggression	.05 <sup>a</sup>		
		F CBCL Attention	.03		
		F CPRS-R ODD	.05 <sup>a*</sup>		
		F CPRS-R Inatten	.06 <sup>a*</sup>		
		F CPRS-R Hyper	.06 <sup>a*</sup>		
		F ECBI Intensity	.16 <sup>a*</sup>		
		F ECBI Problem	.16 <sup>a*</sup>		
		F CBCL Internalizing	<.01 <sup>a</sup>		
		F Emotion Reg	.24 <sup>a*</sup>		
		F Social Comp	.12 <sup>a*</sup>		
		Tch TRF Externalizing	.04 <sup>a*</sup>		
		Tch CTRS-R ODD	.01 <sup>a</sup>		
		Tch CTRS-R Inatten	<.01 <sup>a</sup>		
		Tch CTRS-R Hyper	.01 <sup>a</sup>		
		Tch TRF Internalizing	.03 <sup>a</sup>		
		<u>Free Play</u>			
		DPICS Negative Statements	<.01 <sup>a</sup>		
		DPICS Praise	.12 <sup>a*</sup>		
		DPICS Coaching	.15 <sup>a*</sup>		
		DPICS Child Deviance	.01 <sup>a</sup>		

Study Authors, Year (N, Age Range)	Treatment Evaluated (Bold indicates that comparison is well-established treatment)	Outcome Measures	ES BI vs. No Treatment	ES BI vs. Alternative Treatment	Clinical Significance
		DPICS Child Positives	<.01 <sup>a</sup>		
		<u>Task Time</u>			
		DPICS Negative Statements	.06 <sup>a*</sup>		
		DPICS Praise	.03 <sup>a</sup>		
		DPICS Coaching	.04 <sup>a</sup>		
		DPICS Child Deviance	.06 <sup>a*</sup>		
		DPICS Child Positives	.01 <sup>a</sup>		
		<u>School Peer Observations</u>			
		COCA Cog. Comp	.02 <sup>a</sup>		
		COCA Author. Accept	<.01 <sup>a</sup>		
		COCA Social Contact	.08 <sup>a*</sup>		
<b>Training Interventions (TI)</b>					
<b>Cognitive Training Studies</b>					
Beck et al., 2010 (52, 7-17)	1. Waitlist Control	Par Conners' ADHD Index	.76 <sup>*</sup>	NA	Reported % meeting CS change and RCI on all measures
	2. Working Memory Training	Par Conners' Inattention	.79 <sup>*</sup>		
		Par Conners' Hyperactivity	.36 <sup>*</sup>		
		Par Conners' Oppositional	.29		
		Par Conners' DSM-IV Inattent.	1.49 <sup>*</sup>		
		Par BRIEF Metacognition	.91 <sup>*</sup>		
		Par BRIEF Working Memory	.85 <sup>*</sup>		
		Par BRIEF Initiate	.94 <sup>*</sup>		
		Par BRIEF Monitor	.20		
		Par BRIEF Organization	.42		
		Par BRIEF Planning	.92 <sup>*</sup>		

Study Authors, Year (N, Age Range)	Treatment Evaluated (Bold indicates that comparison is well-established treatment)	Outcome Measures	ES BI vs. No Treatment	ES BI vs. Alternative Treatment	Clinical Significance
van der Oord et al., in press (40, 8-12)	1. Waitlist 2. Executive Functioning Training	Tch Conners' ADHD Index	.17		
		Tch Conners' Inattention	.22		
		Tch Conners' Hyperactivity	.26		
		Tch Conners' Oppositional	.13		
		Tch BRIEF Metacognition	.19		
		Tch BRIEF Working Memory	.20		
		Tch BRIEF Initiate	.42*		
		Tch BRIEF Monitor	.19		
		Tch BRIEF Organization	.05		
		Tch BRIEF Planning	.06		
		Par Inattention	.25 <sup>b*</sup>	NA	Not Reported
		Par Hyp/Imp	.22 <sup>b*</sup>		
		Par ODD	.09 <sup>b</sup>		
		Par CD	.00 <sup>b</sup>		
Neurofeedback Training Studies Gevensleben et al., 2009a (102, 8 - 12)	3. Attention Skills Training	Par BRIEF Inhibition	.09 <sup>b</sup>		
		Par BRIEF Cog Flex	.03 <sup>b</sup>		
		Par BRIEF WM	.05 <sup>b</sup>		
		Par BRIEF Metacot	.16 <sup>b*</sup>		
		Par BRIEF Total	.16 <sup>b*</sup>		
		Tch Inattention	.11 <sup>b</sup>		
		Tch Hyp/Imp	.07 <sup>b</sup>		
		Tch ODD	.06 <sup>b</sup>		
		Tch CD	.14 <sup>b</sup>		
		Par ADHD Total	NA	.60*	Not Reported

Study Authors, Year (N, Age Range)	Treatment Evaluated (Bold indicates that comparison is well-established treatment)	Outcome Measures	ES BI vs. No Treatment	ES BI vs. Alternative Treatment	Clinical Significance
	2. Neurofeedback Training	Par Inattention		.57*	
		Par Hyperactive/Impulsive		.45*	
		Par ODD		.38*	
		Par Delinquent/Aggression		.37*	
		Par SDQ Total		.51*	
		Par SDQ Emotions		Insufficient Data	
		Par SDQ Conduct		Insufficient Data	
		Par SDQ Hyperactivity		.60*	
		Par SDQ Peer		.30	
		Par SDQ Prosocial		Insufficient Data	
		Par Home Situation Q.		Insufficient Data	
		Par Homework Problems		Insufficient Data	
		Tch ADHD Total		.64*	
		Tch Inattention		.50*	
		Tch Hyperactive/Impulsive		.40	
		Tch ODD		.34	
		Tch Delinquent/Aggression		Insufficient Data	
		Tch SDQ Total		Insufficient Data	
		Tch SDQ Emotions		Insufficient Data	
		Tch SDQ Conduct		Insufficient Data	
		Tch SDQ Hyperactivity		.48*	
		Tch SDQ Peer		Insufficient Data	
		Tch SDQ Prosocial		Insufficient Data	

Organization Training Studies	ES BI vs. No Treatment	ES BI vs. Alternative Treatment	Clinical Significance
Abikoff et al., 2013 (158, 8-11)	1.18* OST	-.02	Report % no longer meeting criteria for impairment in organization, time management and planning.
	2.77* OST	.63* (OST>PATHKO)	
	3. OST		

Study Authors, Year (N, Age Range)	Treatment Evaluated (Bold indicates that comparison is well-established treatment)	Outcome Measures	ES BI vs. No Treatment	ES BI vs. Alternative Treatment	Clinical Significance
Langberg et al., 2012 (47, 11–14)	1. Waitlist Control 2. HOPS Program	Child COSS	.69* OST	.22	
		Tch APRS	.76* OST	-.08	
		Tch APS	.42* OST	.23	
		Par HPCL	1.37* OST	-.14	
		Par FES	.47* OST	.07	
		Par COSS Conflict	1.26* OST	.22	
		Child BASC	Not Reported	Not Reported	
		Par COSS Planning	1.05*	NA	Not Reported
		Par COSS Organization	.88*		
		Par COSS Materials Mgt	.63*		
		Par COSS Life Interference	.69*		
Evans et al., 2011 (49, 10-13)	1. Community Care 2. Challenging Horizons Program	Par COSS Family Conflict	.79*		
		Par HPC Homework Complete	.85*		
		Par HPC Materials Mgt	.82*		
		Par VADPRS Inattention	.52*		
		PAR VADPRS Hyp/Imp	.06		
		Math Tch COSS Planning	.26		
		Math Tch COSS Organization	.27		
		Math Tch COSS Materials Mgt	.47		
		LA Tch COSS Planning	.61		
		LA Tch COSS Organization	.60		
		LA Tch COSS Materials Mgt	.87		
Combined Training Studies	1. Community Care 2. Challenging Horizons Program	Par DBD – Inattention	.42 <sup>h</sup>	NA	Not Reported
		Par DBD – Hyp/Imp	.90 <sup>h*</sup>		



Study Authors, Year (N, Age Range)	Treatment Evaluated (Bold indicates that comparison is well-established treatment)	Outcome Measures	ES BI vs. No Treatment	ES BI vs. Alternative Treatment	Clinical Significance
		Par IRS – Parent Relationship	.65 <sup>h</sup>		
		Tch DBD – Inattention	.17 <sup>h</sup>		
		Tch DBD – Hyp/Imp	.20 <sup>h</sup>		
		Tch IRS – Teacher Relations	.36 <sup>h</sup>		
		Tch IRS – Academic	.25 <sup>h*</sup>		
		Tch CPS	.26		
		Grades	.27 <sup>d</sup>		
Molina et al., 2008 (23, 6 <sup>th</sup> – 8 <sup>th</sup> grade)	1. Community Care	Par BASC Externalizing	.20 <sup>h</sup>	NA	Not Reported
	2. Challenging Horizons Program	Par BASC Internalizing	.47 <sup>h*</sup>		
		Par Overall Impairment	-.37 <sup>h</sup>		
		Adol BASC Delinquency	.57 <sup>h*</sup>		
		Adol BASC School	.79 <sup>h*</sup>		
		Maladjust			
		Adol BASC Emotions	.72 <sup>h</sup>		
		Percent Grades (A,B,C)	.52		
		Percent Passing Grades	.45		

Note:

APRS = Academic Performance Rating Scale; BASC = Behavior Assessment Scale for Children; BCM = behavioral classroom management; BDI = Beck depression inventory; BPT = behavioral parenting training; Bracken = Bracken Basic Concepts Scale—Revised; CBT = cognitive behavioral treatment; COSS = Children’s Organizational Skills Scale; CPRS-R:S = Conners Parent Rating Scale-Revised; Short Form; CPRS-R-L = Conners Parent Rating Scales - Revised Long Form; CPS = Classroom Performance Survey; CS = clinically significant; CTRS-R-L = Conners Teacher Rating Scales - Revised Long Form; DBD = disruptive behavior disorders rating scale; DIBELS = Dynamic Indicators of Basic Early Literacy Skills; DPICS = Dyadic Parent-Child Interaction System; DPICSPP = Dyadic Parent-Child Interaction Coding System – Positive Parenting; DPICSNP = Dyadic Parent-Child Interaction Coding System – Negative Parenting; DSAS = Dishion Social Acceptance Scale; ECBI = Eyberg Child Behavior Inventory; ES = effect sizes as reported by the study’s authors; Cohen’s d unless otherwise noted by a superscript; and positive ES indicates that the primary treatment being tested is superior); F = Father ratings; HPC = Homework Problem Checklist; ; HPQ = Homework Performance Questionnaire; IRS = impairment rating scale; LA = Language Arts; M = Mother ratings; NS = nonsignificant with insufficient data to calculate an effect size; OR = Odds ratio; Par = parent; PCRQ-PI; Parent-Child Relationship Questionnaire; PSI = parenting stress index; PTIQ Parent-Teacher Involvement Questionnaire; RCI – reliable change index; SPED = special education; SSRS = Social Skills Rating System; STP= summer treatment program; SNAP = Swanson, Nolan, and Pelham ADHD rating scale; Tch = teacher; VADPRS = Vanderbilt ADHD Diagnostic Parent Rating Scale. Because of the different metric used to calculate effect sizes, effect sizes should not be compared across studies. They simply indicate the magnitude of a given treatment within the conditions of that given study.

<sup>f</sup> We used the highest dose of medication in the context of no behavior modification as the alternative treatment against which to compare the high behavior modification only (i.e., placebo) treatment.

\* indicates a significant effect of treatment, as defined by the analyses for that study

<sup>a</sup> Effect size is  $\eta_p^2$

<sup>b</sup> Effect size is  $\eta^2$

<sup>c</sup> Effect size is  $f^2$

<sup>d</sup> Effect size is Cohen's  $d$  as calculated by the authors of the current article (post-treatment treatment mean – post-treatment control mean/square root of the pooled standard deviations at post treatment)

<sup>e</sup> Effect size is Hedge's unbiased  $g$  as calculated by the authors of the current article.

<sup>h</sup> Due to non-equivalence of groups at baseline, effect sizes for this article are calculated by the authors of the current article using the following equation (baseline to post-treatment change in treatment group – baseline to post-treatment change in control group/pooled baseline standard deviation)

<sup>g</sup> Effect sizes were calculated using the  $t$  statistic from the assessment point by group parameter estimate.

**Table 4**

Summary Table of Levels of Evidence

<b>Level 1: Well-established</b>	<b>Level 2: Probably efficacious</b>	<b>Level 3: Possibly efficacious</b>	<b>Level 4: Experimental</b>	<b>Level 5: Not effective</b>
Behavioral Parent Training	Combined Training Interventions	Neurofeedback Training	Cognitive Training	Social Skills Training
Behavioral Classroom Management				
Behavioral Peer Intervention				
Organization Training				
Combined Behavior Management Interventions				