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# *Attention-Deficit/ Hyperactivity Disorders*

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## OVERVIEW

Attention-deficit/hyperactivity disorder (ADHD) is one of the most well-studied child psychopathologies, and a tremendous amount of research has been published related to its etiology, primary problems and impact, demographic and contextual variability, and treatment methods. The label has also received heavy criticism as being an artificial U.S. construct for labeling normally exuberant children; however, early clinical descriptions of attention impairments date to 1798 (Barkley, 2006; Palmer & Finger, 2001). Attention-deficit/hyperactivity disorder symptoms are reported to occur in all countries in which ADHD has been studied (Polanczyk, de Lima, Horta, Biederman, & Rohde, 2007). Despite early conceptualization of the disorder as resulting from poor character or wayward parenting, ADHD is now seen as a neurologically based disorder (Barkley, 2006).

ADHD is one of the most common disorders of childhood, affecting an estimated 3% to 5% of children in the United States, and is the most common reason for clinical referral of children to psychiatric clinics (American Psychiatric Association, 2000). Children with ADHD display symptoms of inattention, impulsivity, and hyperactivity across multiple situations beginning at an

early age. The frequency of these behaviors is out of bounds with respect to normal development, and symptoms cause significant impairments in family and peer relationships, academic functioning, and emotional well-being (Barkley, 2006).

This chapter will provide an overview of the core symptoms and current diagnostic features of the disorder, describe its prevalence and epidemiology, impairments to daily life, comorbid disorders, and long-term outcomes. The next sections will describe various psychosocial treatments that have been empirically explored, and will review the most current research on treatment efficacy. The chapter concludes with a summary and list of evidence-based treatments for ADHD.

## CORE SYMPTOMS

### Inattention

Relative to children without ADHD, those with the disorder have difficulty maintaining attention or vigilance in responding to environmental demands. That is, they have trouble sustaining effort in tasks, particularly for activities that are tedious, difficult, or with little intrinsic appeal (Barkley, 2006). In the classroom setting, impairment in attention and task vigilance may be evident in inability to

complete independent assignments or listen to class instruction. In unstructured settings, inattention may be apparent in frequent shifts between play activities. Parents and teachers report that these children have difficulty focusing, are often forgetful, lose things, frequently daydream, fail to complete chores and schoolwork, and require more redirection and supervision than others the same age. Children with high levels of inattentive symptoms in the absence of hyperactive or impulsive symptoms may also have a different kind of attention problem marked by sluggish cognitive processing and deficiency in selective attention (Barkley, 2003).

### Hyperactivity and Impulsivity

Hyperactivity and impulsivity almost always co-occur and are therefore considered a single dimension of ADHD. The hyperactive-impulsive dimension of the disorder is often conceptualized as behavioral disinhibition. Hyperactivity is displayed in fidgeting, restlessness, loud and excessive talking, and excessive levels of motor activity. Impulsive behaviors include interrupting or intruding on others, difficulty waiting and taking turns, and blurting out without thinking. Children and adolescents with hyperactive-impulsive features are described by caregivers as reckless, irresponsible, rude, immature, squirmy, and on the go (APA, 2000; Barkley, 2006).

### Diagnostic Criteria and Subtypes

Diagnostic criteria for ADHD are defined by the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR)* as presence of several symptoms in inattention, hyperactivity-impulsivity, or both, as seen in Table 10.1 (APA, 2000). Individuals with symptoms in both domains are classified as having ADHD, combined type (ADHD-C). Those who manifest multiple symptoms of inattention but no or few hyperactive-impulsive characteristics are diagnosed with ADHD,

predominately inattentive type (ADHD-PI). The ADHD, predominately hyperactive-impulsive type (ADHD-PHI) describes individuals with behavioral disinhibition without significant symptoms of inattention. Table 10.1 contains the complete diagnostic contained in the *DSM-IV-TR*.

### PREVALENCE AND DEMOGRAPHIC VARIABLES

Nearly 5 million children in the United States are diagnosed with ADHD (Centers for Disease Control and Prevention [CDC], 2005). Prevalence rates of ADHD translate, on average, to one to two children in every classroom in America (APA, 2000). The most commonly diagnosed subtype is ADHD-C, representing about 50% to 75% of children diagnosed. Another 20% to 30% are classified with ADHD-PI, while fewer than 15% are diagnosed with ADHD-PHI. It is thought that ADHD-PHI may be a developmental precursor to the combined type, seen in preschool-age children who have not yet manifested symptoms of inattention.

Boys are 2 to 9 times more likely than girls to be diagnosed with ADHD (APA, 2000). The gender discrepancy is more pronounced in clinic referred than in community samples. Higher rates among males may be at least partially attributable to a stronger tendency for males to present ADHD-C and comorbid disruptive behavior disorders, which are more likely to rise to the level of clinical attention. Girls are more likely to have ADHD-PI and comorbid disorders are more likely to be internalizing disorders. Because symptoms of ADHD-PI and emotional disorders are more likely to go unnoticed, girls with ADHD may be underidentified and undertreated (Biederman, 2005).

ADHD is present among all socioeconomic levels and ethnic groups within the United States, though prevalence and symptoms vary by gender, age, and ethnicity (Barkley, 2003;

**TABLE 10.1 DSM-IV-TR Criteria for Attention-Deficit/Hyperactivity Disorder****I. Either A or B:**

- A. Six or more of the following symptoms of inattention have been present for at least 6 months to a point that is inappropriate for developmental level:

**Inattention**

1. Often does not give close attention to details or makes careless mistakes in schoolwork, work, or other activities.
2. Often has trouble keeping attention on tasks or play activities.
3. Often does not seem to listen when spoken to directly.
4. Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions).
5. Often has trouble organizing activities.
6. Often avoids, dislikes, or doesn't want to do things that take a lot of mental effort for a long period of time (such as schoolwork or homework).
7. Often loses things needed for tasks and activities (e.g., toys, school assignments, pencils, books, or tools).
8. Is often easily distracted.
9. Is often forgetful in daily activities.

- B. Six or more of the following symptoms of hyperactivity-impulsivity have been present for at least 6 months to an extent that is disruptive and inappropriate for developmental level:

**Hyperactivity**

1. Often fidgets with hands or feet or squirms in seat when sitting still is expected.
2. Often gets up from seat when remaining in seat is expected.
3. Often excessively runs about or climbs when and where it is not appropriate (adolescents or adults may feel very restless).
4. Often has trouble playing or doing leisure activities quietly.
5. Is often "on the go" or often acts as if "driven by a motor."
6. Often talks excessively.

**Impulsivity**

7. Often blurts out answers before questions have been finished.
8. Often has trouble waiting one's turn.
9. Often interrupts or intrudes on others (e.g., butts into conversations or games).

**II.** Some symptoms that cause impairment were present before age 7 years.

**III.** Some impairment from the symptoms is present in two or more settings (e.g., at school/work and at home).

**IV.** There must be clear evidence of clinically significant impairment in social, school, or work functioning.

**V.** The symptoms do not happen only during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder. The symptoms are not better accounted for by another mental disorder (e.g., Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder).

**Based on these criteria, three types of ADHD are identified:**

IA. ADHD, *Combined Type*: If both criteria IA and IB are met for the past 6 months.

IB. ADHD, *Predominantly Inattentive Type*: If criterion IA is met but criterion IB is not met for the past six months.

IC. ADHD, *Predominantly Hyperactive-Impulsive Type*: If criterion IB is met but criterion IA is not met for the past 6 months.

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Cuffe, Moore, & McKeown, 2005). World-wide prevalence estimates typically range from 3% to 8% of the world population. Estimates vary by geographic region, but this is thought to be primarily due to differences in diagnostic criteria and study methodologies (Biederman, 2005; Polanczyk et al., 2007).

Studies of current and lifetime prevalence rates in the United States indicate that Hispanics and Latinos have lower risk for ADHD than either African Americans or Caucasians. Some studies show a higher rate of ADHD diagnosed among African Americans than in Caucasians, but these differences are not always statistically significant (Breslau et al., 2006; Cuffe et al., 2005). Lower socioeconomic status is related to higher incidence of ADHD. This difference may be attributable to lower socioeconomic status being a risk factor for development of the disorder; additionally, parents of children with ADHD are likely to also have ADHD, and therefore may have low educational attainment and occupational difficulties (Barkley, 2003; Cuffe et al., 2005). Results of the 2003 National Survey of Children's Health (CDC, 2005) showed that ADHD was more commonly diagnosed among children whose parents had obtained a high school education than those whose parents had achieved more or less education. Children in ethnic minority populations and uninsured children were less likely than others to receive medication treatment. Finally, prevalence of reported ADHD increased with age and was greater for children 9 years and up than for younger children (CDC, 2005; Visser, Lesesne, & Perou, 2007).

## IMPACT OF ADHD

### Social

Children with ADHD experience a great deal of difficulty in their family and peer relationships. They tend to have more conflict with their

parents over issues like chores and homework. Parents are more likely to be harsh and inconsistent in their discipline, and children respond with greater hostility and avoidance of their parents than their non-ADHD peers. This pattern of negative interaction results in strained and distant parent-child relationships (Anastopoulos, Sommer, & Schatz, 2009; Wehmeier, Schacht, & Barkley, 2010).

Children and teens with ADHD also engage in more conflict with their siblings than do other children of the same age. Externalizing behavior problems seem to be one of the major sources of this conflict; when comorbid disruptive behavior disorders are present, conflict increases substantially. While children with ADHD generally do not rate their sibling relationships as less close than do other children, the presence of comorbid internalizing or externalizing disorders has been shown to relate to less warmth and closeness in these interactions (Mikami & Pfiffner, 2008).

Social skills deficits and conflictual interactions extend to peer relations as well. A majority (70%) of these children have been found to have serious problems in peer and friend relationships. Younger children with ADHD can be difficult playmates as they have a harder time waiting and taking turns, and paying attention to and following rules of games. Those with ADHD-C in particular tend to interact in an impulsive, intrusive manner, and are disruptive (Wehmeier et al., 2010). In contrast, children with ADHD-PI are often characterized as being socially passive, shy, and withdrawn (Barkley, 2006). As a result of these skill deficits, they tend to be less well-liked, experience more frequent rejection, and have fewer reciprocal friendships than their peers. Those with oppositional defiant disorder (ODD) or conduct disorder (CD) display the most serious social problems; for these youth, most do not develop any close friendships by the third grade, and in adolescence are more likely to become bullies or victims of bullies (Wehmeier et al., 2010). Treatment with psychostimulant medication frequently does

not improve social problems even when it decreases aggression and other negative behaviors (Pelham & Fabiano, 2008).

### Academic

The academic environment may be the most challenging context that students with ADHD have to navigate. Symptoms appear dramatically in the school setting, where children are required to remain vigilant to instruction and tasks at longer intervals than at home or in social settings (Barkley, 2003). Nearly all children with ADHD experience significant impairment in academic achievement throughout their school years, and on average score a full standard deviation below classmates on achievement tests (G. J. DuPaul & Stoner, 2003; Loe & Feldman, 2007). Problems with inattention manifest in increased off-task behavior, and increased time to return to an activity after being distracted, resulting in decreased productivity. Children with ADHD have difficulty completing homework and assignments, organizing materials and tasks, and planning completion for long-term projects. Hyperactivity and impulsivity appear in such behaviors as getting up without permission, disturbing others, talking noisily, and rule-breaking, which lead to punishments and negative interactions with teachers. They may spend less time in the classroom as a result of frequent disciplinary action, and thus miss out on instruction. It is not surprising that children with ADHD are at higher risk than their peers for grade retention, suspension, expulsion, and school drop out (Barkley, 2006; G. J. DuPaul et al., 2006).

### Emotional

Adolescents and children with ADHD experience rejection, failure, frustration, and conflict on a day-to-day basis. The ADHD-related impairments often take an emotional toll on these children as they navigate a variety of social and performance situations, often facing

criticism from all sides. They may learn to anticipate failure instead of success, developing a sense of learned helplessness and dejection (Wehmeier et al., 2010). They also tend to have poorer self-perception than their peers and rate themselves more negatively on social and communication skills (Klimkeit et al., 2006). Related to the impairment in behavioral inhibition, children with ADHD are less able to moderate or regulate their emotions and to suppress their external emotional reactions. Consequently, they may experience extreme emotional reactions to stressful situations (Barkley, 2006).

### COMORBID DISORDERS

Children with ADHD frequently have one or more comorbid psychiatric disorders. Recent studies suggest that around 80% of children and adolescents with ADHD have at least one comorbid disorder, and over half have two or more (Biederman, Petty, Evans, Small, & Faraone, 2010; Cuffe et al., 2005). The most common pattern of comorbidity seen in children with ADHD is that of ADHD-C with other externalizing behavior disorders. About half of youth diagnosed with ADHD also meet diagnostic criteria for ODD or CD. ODD is characterized by a pattern of defiant behavior and rule-breaking, including noncompliance with direct commands, denying responsibility for actions, and arguing. CD is more severe, defined by a pattern of aggression, destruction, lying, stealing, or truancy (APA, 2000).

Internalizing disorders also commonly co-occur with ADHD. About 30% of youth with ADHD have a comorbid anxiety disorder, and about 25% have a mood disorder (Biederman, 2005). Rates of anxiety disorders may be slightly higher in individuals with ADHD-PI. Anxiety disorders are found to reduce the risk of impulsiveness compared to ADHD without anxiety. As noted before, children with ADHD experience considerable rejection and failure;

it may be that high rates of comorbidity are related to such a negative learning history (Barkley, 2003; Wehmeier et al., 2010). ADHD and mood disorders may share a common genetic factor predisposing an individual to both disorders, but no genetic link or familial pattern has been found for comorbidity of anxiety disorders (Barkley, 2003; Biederman, 2005). Learning disabilities, tic disorders, and sleep disorders and disturbances are other problems frequently seen in children with ADHD (Barkley, 2003).

### DEVELOPMENTAL COURSE

Although usually diagnosed in childhood, ADHD is increasingly conceptualized as a chronic disorder, often persisting through adulthood. Hyperactivity and impulsivity tend to present in the preschool years, at around age 3 to 4 years, and symptoms of inattention typically appear slightly later at 5 or 6 years. Some evidence suggests that ADHD-PI has a slightly later onset than ADHD-C, and symptoms may not occur until age 8 or later. Almost all cases of ADHD have an onset prior to age 16 years (Barkley, 2003, 2006).

Hyperactivity symptoms begin to decline in adolescence, and at this time take on a more internalized subjective sense of restlessness rather than external motor activity. For this reason, ADHD was previously thought to be a remitting disorder in which most children outgrew their symptoms; however, while hyperactivity tends to decline, symptoms of inattention typically do not, and most children with ADHD continue to have impairments as adolescents and as adults. Symptoms of ADHD decline in a similar manner for males and females (Monuteaux, Mick, Faraone, & Biederman, 2010). A longitudinal study that followed boys with ADHD showed that 78% of participants continued to experience clinically significant symptoms as young adults (Biederman et al., 2010). Adults with ADHD also continue to display high rates of

psychiatric comorbidity relative to comparisons, with higher lifetime prevalence for mood and anxiety disorders, substance use disorders, externalizing disorders, bulimia nervosa, Tourette's, and language disorders (Biederman et al., 2010; Kessler et al., 2006). For adults, anxiety disorders are the most common comorbid diagnoses; estimates suggest that around 50% of adults with ADHD also have an anxiety disorder (Biederman, 2005).

### TREATMENT APPROACHES

Treatments for ADHD proliferate and include such various approaches as behavioral parent training, academic interventions, classroom management, summer treatment programs, neurofeedback, psychostimulant medication, and cognitive behavior therapy, among others. The two most empirically tested interventions for ADHD are psychostimulants and behavior contingency management, which is usually delivered as parent or teacher training.

Administration of psychotropic medication, generally in the form of central nervous system stimulants, is the most commonly employed treatment method for ADHD. Evidence for the effectiveness of psychostimulant medication for ADHD is extensive; it is considered the gold standard of treatment as it results in large improvements in the short term for ADHD symptoms of inattention, hyperactivity, and impulsivity and in some related impairments, such as aggression, compliance, and productivity at school. About 80% of individuals treated with psychostimulants show some improvement in symptoms, but the remaining portion are considered nonresponders to medication. Among those who show a positive response, most do not achieve normalized functioning with medication alone. Still others experience significant adverse effects, such as dry mouth, loss of appetite, nausea, and insomnia and prefer not to take medications for those reasons. Parents commonly prefer

alternative treatment options. Additionally, psychostimulants may not be adequate in addressing all significant life impairments, such as parent–child relationships, social skills and peer relations, long-term academic achievement, and comorbid disorders. Because of these limitations, a number of psychosocial interventions for ADHD have been developed and investigated both as stand-alone therapies and as adjunctive treatments to psychostimulant medication (Biederman, 2005; Pelham & Fabiano, 2008).

The second most commonly implemented treatment is behavior modification, also known as contingency management, usually delivered as training in behavior techniques to parents and teachers. For this treatment, parents and teachers are instructed by a professional in methods to systematically administer consequences to reduce unwanted behavior and increase desired behavior. By contrast, direct contingency management is delivered directly to children by clinicians, and also involves shaping consequences to promote desired behavior. For children with ADHD, direct contingency management is delivered in summer treatment programs. A combination of these behavioral strategies is frequently used to maximize effectiveness and generalize gains.

### BEHAVIOR MODIFICATION

Behavior contingency management/behavior modification was initially used for children with hyperactive and inattentive symptoms because they had successfully been implemented with children with intellectual disabilities. Their use was originally driven by the idea that faulty learning or social contingencies were the cause of the disorder, and that correcting the contingencies by training the parents would produce lasting changes. Although social learning is not to blame for the symptoms and impairments that arise from ADHD, training parents and teachers to

manipulate antecedents and consequences is a technique that may serve to cue and motivate appropriate behavior (Antshel & Barkley, 2008). Antecedent modification involves using cues to prompt desired behavior (e.g., effective commands, visual reminders). Reinforcement contingencies are created to increase desired behaviors, such as compliance with commands, completion of schoolwork, and so forth, and are often implemented in the form of point systems or token economies. Punishments are applied to reduce inappropriate behaviors such as arguing and aggression; a common punishment for young children is time-out. Parents and teachers are trained in the use of operant conditioning techniques in the child's natural environment. Behavior management strategies are not likely to completely eliminate symptoms and impairments of such a strongly neurologically based disorder; however, if delivered consistently and appropriately, behavior management strategies that are focused on immediate and significant relationships and environmental settings often reduce some of the more devastating psychosocial consequences of ADHD through improving parent-child relationships, social functioning, academic achievement, and reducing or eliminating comorbid psychiatric problems. No one treatment approach is likely to be adequate in addressing every area of difficulty for a child with ADHD.

Behavioral parent training (BPT) is the most frequently implemented behavioral intervention for ADHD. Several manualized BPT programs have been effective in the treatment of ODD and have been used in children with ADHD and with comorbid ADHD and ODD. Barkley's (1987) Defiant Children program has been adapted for use with ADHD and is described here as a representation of a typical program; similar programs include Community Parent Education Program, and the Incredible Years Series (IYS) (Cunningham, Bremner, & Secord, 1997; Webster-Stratton, 1992).

Barkley's (1987) BPT program consists of 8–12 weekly training sessions taught by a



mental health professional either to groups or individual parents. Each session focuses on a different behavioral technique that parents then apply at home. Treatment begins with psychoeducation on ADHD, behavior problems, and basic learning/behavior principles. Parents are taught to increase positive attention by spending daily one-on-one special time with the child. Attention is used to reinforce compliance and independent play. Increasing compliance is one of the more important targets for children with ADHD (even those without ODD) because parents so often have to cue appropriate behavior (e.g., “stop at the curb,” “look at your homework”). The program incorporates the use of a token economy for increasing individualized target behaviors and teaches use of appropriate time-out as a mild punisher for misbehavior. A daily report card system between parents and teachers is implemented to generalize behavioral gains to the school environment. Table 10.2 provides an example sequence of steps in a BPT program.

### Consensus Panel Recommendations

Expert panels created among medical and psychiatric associations and government health organizations periodically review existing empirical research and develop guidelines to aid practitioners in choosing the most well-established, scientifically supported treatments

for ADHD. Published guidelines include recommendations of best practice for assessment, treatment, and treatment maintenance of ADHD. The American Academy of Child and Adolescent Psychiatry (2007) practice parameters for the assessment and treatment of ADHD recommend psychopharmacological treatment with an FDA-approved psychostimulant as the first line of treatment for most individuals with ADHD. Behavior therapy, including BPT and behavioral classroom management, is suggested as the first-line treatment option for cases in which ADHD symptoms are mild or in which parents reject treatment with psychostimulants. Behavior therapy is recommended as the second intervention alternative when an individual does not respond to an FDA-approved drug. A combination of treatment with medication and behavioral intervention is recommended for children with less than optimal response to medication and for those with comorbid psychiatric disorders or significant impairments in daily functioning. These recommendations include behavior therapy as treatment consideration for a considerable portion of children and adolescents with ADHD.

The National Institute for Health and Clinical Excellence (NICE) of the United Kingdom guidelines for assessment and treatment of ADHD (NICE, 2009) endorse behavioral treatments for all children and adolescents diagnosed with ADHD. Group parent training

**TABLE 10.2** Sequence of Sessions for Behavioral Parent Training

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1. Overview of ADHD and ODD and behavior management principles
  2. Establishing special time, increasing positive attention
  3. Attending to appropriate behavior (e.g., compliance) and ignoring minor, inappropriate behaviors (e.g., whining)
  4. Giving effective commands and reprimands
  5. Establishing and enforcing rules and contingencies
  6. Teaching effective time-out procedures
  7. Home token economy system for rewards and sometimes response costs
  8. Enforcing contingencies in public places; planning ahead for misbehavior outside the home
  9. Implementing a daily school behavior report card
  10. Troubleshooting techniques, managing future misconduct
  11. One month booster session
-

programs are recommended as the first-line treatment for all preschool-age children. For school-age children and adolescents with moderate levels of symptoms and psychosocial impairments, the NICE guidelines recommend a combination of a parent training program and behavioral interventions implemented in the classroom. Medication is recommended as an adjunctive therapy when school-age children and adolescents do not show adequate response to behavioral and psychological interventions. In instances in which symptoms and impairments are severe, the guidelines recommend a combination of psychostimulant medication, parent training, and classroom behavior management. The NICE guidelines state that pharmacological ADHD treatments should always be accompanied by a comprehensive treatment plan that includes behavioral, psychological, educational, and interventions.

### Randomized Controlled Trials

Development of clinical practice guidelines is based upon a review of empirical studies of various treatment methods and comparison of cumulative support of each therapy. Particular weight is given to randomized controlled trials (RCTs), which compare a particular treatment method with control groups and alternative treatments. A number of early RCTs that compared BPT to wait-list controls established a base of empirical support for BPT in the treatment of children with ADHD (Gittelman-Klein et al., 1980; Horn, Ialongo, Greenberg, Packard, & Smith-Winberry, 1990; Horn et al., 1991; Pisterman et al., 1989). These studies generally showed BPT to reduce problem behaviors in children as rated by parents, improve parent-child interactions, and decrease parental stress (Chronis, Chacko, Fabiano, Wymbs, & Pelham, 2004).

For example, one early study examined the effectiveness of BPT for ADHD symptoms and parental stress among families of school-aged children randomly assigned to either a

BPT group or wait-list control. The BPT group received nine sessions of BPT training. Pre- and postmeasures of parent and child functioning were taken. The BPT participants showed significant gains in comparison to the control group on measures of parent-reported child ADHD symptoms, parenting stress, and parenting self-esteem. These gains were shown to be maintained in a 2-month follow-up measure (Anastopoulos, Shelton, DuPaul, & Guevremont, 1993).

A more recent study compared the effectiveness of BPT as adjunct to routine care with routine care alone (treatment as usual). Children ages 4 through 12 years receiving care in an outpatient clinic for treatment of ADHD were randomly assigned to either 5 months of BPT in conjunction with routine clinical care ( $N = 47$ ) or to routine care alone, which consisted of family support and medication treatment as indicated (BPT consisted of 12 group training sessions). Parent-reported ADHD symptoms, conduct problems, internalizing symptoms, and parenting stress were assessed for both groups pre- and posttreatment, and a follow-up assessment of the BPT group was conducted 25 weeks after treatment. Both treatment groups improved on all measures. The BPT group showed larger improvements for conduct problems and internalizing symptoms than the routine care group, but no group differences were found for either parenting stress or ADHD symptoms. Results were equivalent for children receiving medication and not receiving medication, although those in the BPT treatment received less medication treatment. The researchers suggested that BPT enhances the effectiveness of routine clinical treatment for children with ADHD for behavioral and internalizing problems, but not for ADHD symptoms or parenting stress. They also suggest that BPT may limit the need for medication treatment (Van den Hoofdakker et al., 2007).

As a result of consistent positive findings regarding the effectiveness of BPT for enhancing parent behavior management skills and

reducing child externalizing behavior, attention has increasingly focused on enhancing BPT programs to increase effectiveness for core ADHD symptoms and to address correlates associated with poor treatment response, such as low socioeconomic status, parental psychopathology, and single-parenting. For example, single mothers of children with ADHD face special challenges and barriers to receiving treatment, and tend to show decreased treatment response to BPT. In response to this special need, an enhanced version of BPT was created, including additional treatment components addressing treatment influences identified in this population (e.g., low-intensity, didactic format). In order to evaluate the efficacy of the program, 120 single mothers of 5- to 12-year-old children with ADHD were randomly assigned to a wait-list control group, a traditional behavioral parent training program, or an enhanced behavioral parent training program—the Strategies to Enhance Positive Parenting (STEPP) program. Both traditional BPT and STEPP resulted in significant improvements in several areas of functioning, including oppositional behavior, and parent-child relations. While both treatments were superior to the control group, the STEPP group demonstrated superior outcomes to the standard BPT group for these domains (overall mean effect sizes were 0.36 and 0.44 across all outcomes). Participants in the STEPP program attended more frequently, were more engaged, and were more satisfied with treatment compared to single mothers in the traditional BPT program. Similar to other studies of BPT, the BPT and STEPP programs in this study did not significantly improve core ADHD symptoms and improvements were not maintained at 3-month follow-up (Chacko et al., 2009).

A similar BPT program was designed to increase fathers' engagement in BPT. Fathers of 6- to 12-year-old children with *DSM* diagnoses of ADHD were randomly assigned to attend either a standard BPT program or the

Coaching Our Acting-Out Children: Heightening Essential Skills (COACHES) program. The COACHES program included BPT plus sports skills training for the children and parent-child interactions in which the fathers practiced parenting techniques in the context of a soccer game. Children's ADHD and ODD symptoms were similarly improved across groups, but fathers who participated in the COACHES program were significantly more engaged in the treatment process, as demonstrated by more frequent punctuality and attendance of sessions, increased compliance with homework assignments, and greater consumer satisfaction on posttreatment measures (Fabiano et al., 2009). The studies demonstrating benefits of enhanced BPT programs indicates the possibility that tailoring psychosocial treatments to meet individual client needs may be an effective means of increasing treatment compliance and may result in larger treatment gains for children targeted in the interventions.

A number of studies have shown BPT to result in greater improvement for conduct problems and internalizing problems than for core ADHD symptoms (inattention, hyperactivity) among school-aged children (Barkley et al., 2000; Chacko et al., 2009; Corcoran and Dattalo, 2006; MTA, 1999; Van den Hoofdakker et al., 2007). A handful of enhanced BPT programs have shown more favorable results on both ADHD symptoms and related impairments for preschool-aged children. The New Forest Parenting Package (NFPP) (Weeks, Thompson, & Laver-Bradbury, 1999) is a BPT intervention that was evaluated in a community sample of 78 three-year-olds diagnosed with ADHD. Participants were randomized to NFPP, parent counseling and support, or a waiting-list control group. The NFPP group received directive coaching in child management techniques while the counseling group received only nondirective support and counseling. The management techniques were not geared only toward oppositional behavior, but also trained parents

to help children self-regulate through a variety of activities. Pre-, post-, and follow-up measures of child ADHD symptoms and mother's sense of well-being were obtained. The BPT group proved superior to the counseling and wait-list groups for both ADHD symptom reduction and increased maternal well-being. The ADHD symptom improvement was clinically significant for 53% of children in the BPT group, and treatment effects were maintained at the 15-week posttreatment follow-up. Authors concluded that BPT is a valuable treatment option for preschoolers with ADHD, and that constructive training in parenting strategies is an essential component of BPT over and above therapist contact and support (Sonuga-Barke, Daley, Thompson, Laver-Bradbury, & Weeks, 2001).

A more recent study of the NFPP program showed similarly positive outcomes. Forty-one preschoolers were randomly assigned to either NFPP or treatment as usual conditions. Measures of ADHD and ODD symptoms, mothers' mental health, and the quality of mother-child interactions were taken pre- and posttreatment, and at a 9-week follow-up. The ADHD symptoms were significantly lower for the treatment groups versus control group (effect size  $> 1$ ) and were maintained at a 9-week follow-up measure. Improvement in ODD symptoms was more moderate but favored the treatment group. No improvements were seen in maternal mental health or parenting behavior during mother-child interactions, although mothers spoke more positively of their children in a speech sample following treatment. The authors concluded that results support efficacy of the NFPP program, though replication with a larger sample size is needed (Thompson et al., 2009).

Similar evaluations of the IYS and the Triple P Positive Parenting Program with preschool children have shown reductions in ADHD and disruptive behavior problems for families randomized to BPT compared to wait-list conditions (Jones, Daley, Hutchings, Bywater, & Eames, 2007; Bor, Sanders, &

Markie-Dadds, 2002). The IYS participants showed maintenance in treatment gains at 18-month follow-up (Jones, Daley, Hutchings, Bywater, & Eames, 2008). Other RCTs evaluating the Triple P program have shown clinically significant reductions in conduct problems in preschoolers, though these studies were not specific to children with ADHD (Sanders, Markie-Dadds, Tully, & Bor, 2000). Such positive findings from BPT with preschoolers are especially encouraging considering the potential long-term outcomes associated with the disorder.

Parent training for adolescents with ADHD has been studied far less than for younger children. The BPT programs that were developed for younger children are modified for use with a teenage population. Behavior targets for adolescents are decided on by child and parent, and privilege loss (grounding) is used in place of time-out. Positive reinforcement and token economies are adjusted to be appropriate with teenagers (Antshel & Barkley, 2008; Young & Myanathi Amarasinghe, 2010). A few uncontrolled studies have shown BPT to be modestly beneficial for this age group, but no controlled studies have been conducted to date demonstrating superiority of BPT to other treatment options (Young & Myanathi Amarasinghe, 2010).

Barkley, Edwards, Laneri, Fletcher, and Metevia (2001) compared two family-based psychosocial therapies for adolescents with ADHD. Families ( $N=97$ ) were assigned to either 18 sessions of problem-solving communication training or behavior management training for nine sessions followed by PSCT for nine sessions. Posttreatment, both groups were equally improved on ratings and observations of parent-teen conflicts, although significantly more families dropped out of PSCT alone than out of BMT/PSCT. For both treatment groups, only about one fourth demonstrated reliable, clinically significant improvement, and some families worsened in their degree of conflict. Thus the verdict is out regarding parent training with adolescent ADHD.

Improvements at home resulting from BPT are not likely to generalize to the school environment because the structure and contingencies created by the parent are not immediately present for the child at school. In order to improve behavior and performance at school, antecedent modification and contingency management need to be implemented there as well (Abramowitz & O'Leary, 1991). Some school-based behavioral programs have focused on school-wide training of teachers and programs that are inclusive of many children in the school with ADHD (e.g., Piffner et al., 2007). More commonly, mental health professionals are contacted as consultants for individual children when ADHD symptoms create behavioral disruptions in the classroom and interfere with academic progress (Abramowitz & O'Leary, 1991; G. J. DuPaul et al., 2006; Fabiano & Pelham, 2003). Behavioral training procedures used with parents are generally very similar to those used to help teachers manage ADHD in the classroom. Behavioral classroom management is a parallel form of behavior modification treatment in which the child's classroom teacher is trained in the use of effective commands, time-out, token systems, immediate feedback, and increased positive reinforcement (Antshel & Barkley, 2008).

As with BPT, a frequent behavioral target in classroom management is increasing compliance with commands. A recent study focused on the effectiveness of Barkley's method of reducing repetition of commands to increase compliance within the school setting. Elementary school teachers were randomly assigned to either a treatment group (which received instruction on reducing repetition and increasing effectiveness of commands) or to a nontreatment control group. Students whose teachers received the training significantly reduced noncompliance while students in the control group did not. The author concluded that this method is effective in the classroom setting and should be implemented for students with ADHD (Kapalka, 2005).

One study examined the effects of an intensive classroom treatment in 158 kindergartners identified as having high levels of hyperactive, inattentive, impulsive, and aggressive behaviors. Participants were randomly assigned to one of four treatment groups: no treatment, parent training, classroom behavioral treatment, or a combination of classroom and parent training treatments. Unfortunately, parents assigned to the BPT-only group showed very poor attendance and this group did not demonstrate treatment gains; however, the classroom management treatment condition resulted in improvements in objective observations of externalizing behavior in the classroom, teacher ratings of attention, social skills, self-control, and aggression, as well as parent ratings of adaptive behavior. Behavior improvements in the classroom did not generalize to the home environment per parent ratings. Additionally, while externalizing behaviors improved, no gains were seen in academic achievement or laboratory-based measures of attention (i.e., Continuous Performance Test). The intervention was conducted for one school year only (Barkley et al., 2000). A 2-year follow-up of the intervention indicated no difference between those treated in the classroom condition and those not treated, and the children continued to display high levels of ADHD and ODD symptoms compared to peers (Shelton et al., 2000). These results again demonstrate that behavioral gains resulting from contingency management in one setting are not likely to generalize to other settings or to persist once the contingencies have been removed; therefore, it is important that contingency management be implemented across settings.

Several other investigation teams have found beneficial results in both home and school settings, as indicated by parent and teacher ratings when incorporating parent training and classroom management into the same treatment package. Corkum, McKinnon, and Mullane (2005) demonstrated superior results when adding a behavioral training intervention

with children's teachers to the behavior training provided to parents alone. Similarly, Owens et al. (2005) reported treatment gains across contexts from a small-scale RCT of a behavioral package that included parent and teacher behavior contingency management strategies. A study that compared a behavioral package to medication found superior results for the medication group, although the behavioral group showed gains at home and at school (Van der Oord, Prins, Oosterlaan, & Emmelkamp, 2008).

### Meta-Analyses of Group Designs

Corcoran and Dattalo (2006) examined a small set of studies examining BPT published between 1980 and 2003. Studies that compared BPT to control or comparison groups were included. The overall effect size (Cohen's *d*) of BPT on ADHD symptoms was relatively low (0.40), as was the effect size (0.36) on externalizing symptoms. A moderate effect was observed for family functioning (0.67) and internalizing symptoms (0.64). This finding is also consistent with those of individual RCTs; however, an effect size of 8.2 was reported for academic performance. This finding is not consistent with data from RCTs, which failed to show generalization of treatment gains to the school environment. This discrepancy may be at least partially attributable to inclusion of only two studies that reported this outcome. Consistent with a number of studies the effects of BPT on social functioning were near zero. Similar to individual RCTs described earlier, the findings indicate that BPT produces some change in ADHD symptoms of inattention and hyperactivity, and results in more substantial improvements in family relationships and internalizing symptoms.

A meta-analytic review of BPT studies to identify effective components of BPT programs examined 77 published evaluations of BPT outcomes for children up to age 7 years. Component analysis was conducted by using content and delivery methods of training

programs to predict effect sizes on measures of children's externalizing behavior and parenting behaviors, controlling for differences among research designs. Components of BPT programs consistently associated with larger effect sizes were teaching parents the use of time-out and the value of consistency, increasing positive parent-child interactions, enhancing emotional communication skills, and incorporating practice of new skills with their children during training sessions. Program components consistently associated with smaller effects included teaching parents problem solving; teaching parents to promote children's cognitive, academic, or social skills; and providing various additional services (Kaminski, Valle, Filelne, & Boyle, 2008).

G. DuPaul and Eckert (1997) conducted a meta-analysis examining the effects of school-based interventions for children and teenagers with ADHD. Studies included were those based on either contingency management, academic interventions that use antecedent modification (such as adding structure to a task), or cognitive behavior therapy (which includes teaching of strategies such as reflective problem solving). Behavior effect sizes (weighted least squares) for within-subject and between-subject designs were computed for all three types of interventions. For within-subjects design studies, behavior effect sizes were greater for contingency management (0.94) and academic interventions (0.69) than for cognitive behavioral interventions (0.19). Behavior effect sizes for between-subjects designs were not different among the three types of interventions. Academic outcome effect sizes for within-subjects designs were small among all three interventions types; the effect size for contingency management was 0.11. Academic effect sizes were not available for between-subjects designs. The authors concluded that behavior modification techniques are more effective than cognitive techniques in improving behavioral outcomes for children with ADHD.

### Single-Subject Experimental Analyses

Between-group design studies evaluating behavior modification techniques are based on positive findings from earlier work using single-case designs. Results of single-subject studies demonstrate effectiveness of behavioral principles in managing ADHD. For example, in a study of a 6-year-old girl with ADHD, a system of positive reinforcement and response costs was implemented in the classroom. The teacher was trained to implement the class-wide management system. An ABA reversal design was used in order to determine effectiveness of the behavioral interventions used in combination. Direct behavioral observations were made to determine baseline levels of appropriate versus oppositional and on-task versus off-task behaviors. Preintervention, the child displayed appropriate behavior for 61% of observed intervals. During the intervention phase, her appropriate behavior increased to 79%, and when the treatment was withdrawn, appropriate behavior decreased, though not to baseline level (71%). On-task behavior increased from 76% at baseline to 88% during the treatment interval, and dropped to 82% when the treatment was withdrawn (Anhalt, McNeil, & Bahl, 1998).

Similarly, McGoey and DuPaul (2000) used a single-subject withdrawal design to compare the effects of a token reinforcement and a response cost intervention in improving classroom behavior for four preschool-age children with ADHD. A reversal design was used to compare behavior at baseline (A), with implementation of a token economy system (B), and with a response cost intervention (C). Two participants received the ABACABAC intervention, and the other two received treatments in the opposite order. The results of behavior observations and teacher rating scales showed that both interventions were effective in improving behavior for all four children. Three of the children improved to levels equal to their peers. The teachers found the response cost procedures to be easier to administer in a large group setting.

An 8-year-old boy attending the third grade was the subject of a consultant directed behavior modification program. John was in a general education classroom and received remediation in math and reading in a small group special education setting. John received special education services because ADHD significantly impaired his academic progress. His disruptive behaviors at the start of treatment included interrupting others, poor academic work, being out of his seat without permission, talking back when corrected, teasing peers, and noncompliance. John's teachers expressed frustration with his behavior and his peers did not want to be seated next to him. In addition to small group instruction, John also received a behavioral intervention that involved a behavior tracking sheet through which John could earn biweekly rewards. Five behavior goals were identified for John, and he met with his teacher at the end of each academic period to determine whether he had achieved his goals. With this intervention in place for several weeks, John had not earned a reinforcer. The behavioral consultant observed John and his classmates in the morning and afternoon for a few weeks in order to gather baseline data on the frequency of John's disruptive and off-task behavior in relation to that of his classmates. In order to make his behavioral targets more objective and clear for John, and to provide him with immediate feedback when he was violating a rule, John's teacher was instructed to issue a reprimand when he was violating a rule (i.e., off-task or disruptive). In order to receive reinforcement, John had to have fewer than three violations of each objective. Instead of receiving a delayed reinforcer, John earned the opportunity to play a video game for a few minutes after each academic period in which he met his behavioral targets (fewer than three violations). John's off-task behavior declined immediately with the implementation of the new plan. Over a few weeks, both off-task behavior and classroom disruptions were brought to the level of the average for his class. Unfortunately, the authors did not report on academic

achievement or work productivity gains as a result of the intervention. It was not possible to follow-up with John's progress because the school year ended (Fabiano & Pelham, 2003).

### Meta-Analyses of Single-Subject Experiments

Although behavioral interventions were developed based on findings and methods of small *N* experiment, few meta-analytic reviews have been devoted to single-subject designs. Thirty-eight single-case designs were included within a larger meta-analysis (G. DuPaul & Eckert, 1997) of school-based interventions for ADHD. Both published and unpublished studies that used behavioral (contingency management or antecedent modification) or cognitive behavioral interventions were included. The overall weighted least squares effect size for behavioral outcomes was 1.16 with a median of 0.80. Interventions using contingency management ( $ES = 1.44$ ) and antecedent modification (academic intervention) ( $ES = 1.61$ ) were significantly more effective than cognitive behavioral treatments ( $ES = 0.80$ ). Interestingly, interventions based in public school settings were significantly more effective than those implemented in private schools. Effect sizes from cases in special education settings ( $ES = 1.52$ ) were significantly greater than those obtained in general education or combined general education/special education programs (0.96; 1.30). The mean effect size for academic outcomes was 0.82 with a median of 0.30 for all treatment interventions. No differences were found among types of treatment on academic outcomes. For both behavioral and academic outcomes, effect sizes from published studies were significantly greater than those from unpublished studies.

### Conclusions

Results of RCTs, single-subject studies, and meta-analyses show that stand-alone behavior

modification interventions are effective treatments for ADHD. They are not as effective as psychostimulant medication for core symptoms of ADHD (inattention and hyperactivity), but are especially helpful in targeting specific impairments including oppositional behavior, parent-child relationships, externalizing behavior, and internalizing disorders. Many programs are based on treatments originally developed for ODD and tend to focus on conduct or externalizing problems more so than attention impairments; this is a major limitation on the part of behavior management. Many studies do not address academic performance, inattention symptoms, or organization and time management, but more recently developed programs are beginning to include strategies targeting these areas (Piffner et al., 2007). Parents tend to prefer behavioral interventions over stimulant medication as a first line of treatment, which is important to consider when deciding how beneficial contingency management strategies are in comparison to medication. These treatments tend to be time consuming in comparison to stimulant medication, but if offered in community mental health settings or in public schools, they may be provided in a more cost-effective manner. A major limitation of behavioral modification strategies is that treatment gains are usually not maintained postintervention and do not generalize across settings in which contingencies are not implemented (Antshel & Barkley, 2008; Barkley et al., 2000; Kaiser, Hoza, & Hurt, 2008; MTA, 1999). Psychostimulants also do not result in lasting gains and are not effective on days when the child does not take them (Biederman, 2005). Common impediments to both treatments include single-parent household, low socioeconomic status, and ethnic minority status (Chronis et al., 2004). While behavior modification improves areas of functioning not affected by medication, neither intervention has consistently shown enhancement of academic achievement, although some of the more recent school-based treatments have begun to focus more intensely on this



area (Evans, Serpell, Schultz, & Pastor, 2007). Overall, behavior contingency management would likely be beneficial for nearly all children who have ADHD, as they result in some gains in ADHD symptoms and larger gains in family functioning, academic productivity, and symptom improvement for internalizing and externalizing disorders. In order for lasting effects to occur, treatment boosters should be delivered and contingencies maintained across settings.

### SUMMER TREATMENT PROGRAM

Summer treatment programs (STPs) were developed in order to provide a comprehensive treatment model for children and teenagers with ADHD in a camp-like recreational setting. The STPs do not focus directly on ADHD symptoms as listed in the *DSM-IV-TR*, but instead focuses on social, academic, and parenting functional impairments that are theorized to moderate long-term outcomes for children with ADHD. Goals of treatment are to improve peer relationships, interactions with adults, academic performance, and self-efficacy, each of which is related to long-term functioning (Pelham et al., 2010).

The STPs are held in the summer months during school breaks. Programs generally are conducted for 7 to 8 weeks, 5 days per week, 8 or 9 hours per day. The STPs are designed for children between the ages of 5 and 15 years. Small groups of 12 to 16 youth matched by age are created at the beginning of the program and are led by trained interns. Treatment components include social reinforcement for appropriate behavior, teaching the use of effective commands, a reward/response cost point system, social skills training, daily report cards to parents, sports training, time-out, and academic instruction. Camp participants spend 3 hours per day in a classroom setting that employs a point system for managing behavior and encouraging work completion. Much of the remainder of each day is devoted to

recreational activities (Pelham et al., 2010; Pelham, Greiner, & Gnagy, 1997).

Social skills training is delivered in 10-minute group sessions, and appropriate social behavior is prompted and reinforced throughout the day. While clinic-based social skills training has not been shown to be effective, developers of the STP system argue that social skills can be targeted more directly in STP. Sports skills training is also included in order to promote social interaction and to enhance motor skills, which are typically poor in children with ADHD. Parents attend weekly BPT sessions in order to acquire management skills for facilitating generalization and maintenance of treatment gains. Many children involved in STPs also take stimulant medication; optional placebo-controlled evaluations are provided in order to find the most effective dose or to determine whether medication provides benefits beyond those produced by the program (Pelham et al., 2010; Pelham, Greiner, & Gnagy, 1997).

This intensive, multicomponent treatment is based on conceptualization of ADHD as a chronic disorder with long-lasting psychosocial consequences. Developers argue that in order to be effective in improving quality of life and produce meaningful changes, intensive long-term psychosocial interventions need to be implemented across settings. The STP also includes intensive monitoring through the daily point system, academic work, and daily ratings by adults (Pelham et al., 2010).

### Consensus Panel Recommendations

The APA Task Force (Brown et al., 2007) review of behavioral, pharmacological, and combined treatments recommended behavioral treatments as the first-line intervention and medication as an adjunct treatment for those who need it. The panel concluded that behavioral, pharmacological, and combined treatments are each effective interventions. Considering side effects of medication and consumer preference for psychosocial

treatment, a cost-benefit analysis favored behavioral treatment.

The American Academy of Pediatrics (AAP) guidelines are less clear concerning which treatments to try first but recommend stimulant medication and/or behavior therapy as appropriate treatments. Further, the guidelines suggest establishing a treatment program that recognizes ADHD as a chronic condition, collaboration among the clinician, parents, child, and school to specify target outcomes, and continued monitoring of progress with information from parents, teachers, and the child. Evaluation of the treatment plan, original diagnosis, and possibility of comorbid disorders is recommended when target outcomes are not reached (American Academy of Pediatrics [AAP], 2001).

Although not specifically endorsed, STPs are consistent with AAP practice guidelines. The STP allows for easy identification of target outcomes, collaboration with parents, clinician, school, and child, and systematic monitoring of treatment outcomes. Maintenance of parent and school contingency strategies through the school year addresses the chronic nature of the disorder. In the clinical setting, such intensive management is impractical if not impossible. Inclusion of the placebo-controlled medication trials and communication with parents and teachers helps to meet individual treatment needs and maximize positive outcomes.

### Randomized Controlled Trials

No between-group RCTs have been published for STPs as a stand-alone treatment; however, RCTs have been published that demonstrate the efficacy of individual components of STPs. Additionally, the Multimodal Treatment Study of Children with ADHD (MTA) included STP as part of a multicomponent behavioral treatment package along with BPT and classroom contingency management. While the MTA did not evaluate the effectiveness of STP as a stand-alone treatment, examining the results of

the study is beneficial in determining the potential for STPs.

The MTA is the largest, multisite RCT to date. Based on research supporting psychostimulants and behavior therapy as efficacious treatments, the MTA study compared the two treatments, their combination, and treatment as usual regarding efficacy, generalizeability, and sustained improvement. Participants were 579 children ages 7–9.9 years in grades one to four who met *DSM-IV* criteria for ADHD-C. Children with comorbid disorders were included in the study. All were randomly assigned to one of four treatment strategies: (1) medication management carefully monitored and titrated by the research group; (2) behavioral treatment package including behavioral parent training based on Barkley's and Forehand and McMahon's procedures, the summer treatment program developed by Pelham, and school-based contingency management; (3) combined medication and behavioral interventions; or (4) treatment as usual (community care). Most of the participants (67.4%) in the treatment as usual group were on medication but did not receive treatment from the study group. Participants were assessed and monitored before, during, and after 14 months of treatment on outcomes including core ADHD symptoms and impairment domains related to ADHD. All treatment groups showed clinically meaningful symptom reduction. Medication management and combined treatment were superior to community care and behavioral treatments for core ADHD symptom reduction and did not differ from one another. Those in the combined group required significantly lower doses of medication than those in the medication management group. Combined treatment was superior to treatment as usual and behavioral treatments for internalizing symptoms, opposition/aggression, teacher-rated social skills, parent-child relations, and reading achievement score, while medication management was not. Behavior treatment outperformed treatment as usual in improving

parent–child relations. Parents of children in the behavioral and combined treatment groups rated treatments with greater satisfaction than the medication management group; the study group suggested that behavioral treatment components likely benefitted family functioning. Using success rates, a significantly higher success rate is reported for the combined treatment condition (67%) compared to the methylphenidate treatment condition (55%) (Swanson et al., 2001).

Overall, results suggest that medication management and combination treatment are efficacious treatments for reducing ADHD symptoms, and that a combination of intensive behavioral treatments and medication are most effective in improving secondary impairments. Thus for pure ADHD-C, medication alone may be adequate to treat symptoms, but for those with comorbid disorders or significant family disruption, combination treatment provides incremental improvement in functioning. The authors note that these findings cannot be generalized to other subtypes (ADHD-PI) or age groups. Additionally, the authors caution that results do not suggest that behavioral treatment was ineffective, as those in the treatment condition showed significant improvements in the course of treatment (MTA Cooperative Group, 1999).

The lack of greater impact of the intensive behavioral intervention in the absence of medication and on ADHD/ODD symptoms generally was unexpected. A limitation of the study is that posttreatment measures were gathered after the behavioral interventions were discontinued and were no longer implemented at their highest intensity, while medication was still being used at its most effective dose. The absence of maintenance of treatment gains following the cessation of behavioral interventions has been a significant problem. As noted before, return to baseline levels of problem behavior is also reported when individuals with ADHD discontinue taking medication.

Secondary analyses for the MTA study derived a composite score of treatment

outcome across measures and showed that the combination treatment was significantly better than the other treatments on the composite. For children with a comorbid anxiety disorder, behavioral treatment was as effective as the medication management, and the combination condition proved superior to other conditions, particularly when a disruptive behavior disorder was also present. This finding is particularly noteworthy when considering that nearly 40% of the sample had a comorbid anxiety disorder, and nearly one fourth had both an anxiety and disruptive behavior disorder (Jensen et al., 2001). Also noteworthy is the finding that 8 years after completion of the study, the MTA treatment groups did not differ significantly from one another on repeated measures or newly analyzed variables including hospitalizations and academic achievement. Despite having received intensive intervention, the adolescents fared more poorly than their non-ADHD peers on 91% of measures. Neither the type nor intensity of treatment delivered in the 14-month trial predicted functioning for the teenagers (Molina et al., 2009).

### Meta-Analyses of Group Designs

In order to provide an updated quantitative account of the magnitude of the effectiveness of behavioral interventions for ADHD, a comprehensive meta-analysis of behavioral treatment reports was conducted using 174 studies identified in the literature (Fabiano et al., 2009). Authors aimed to incorporate all behavioral treatment studies conducted to date, across type of intervention (BPT, Summer Treatment Program, Classroom Contingency Management) and study design. Effect sizes varied by study design. Effect sizes in pre-post studies (0.70), between-group studies (0.83), and within-group studies (2.64) demonstrate effectiveness. Authors concluded that results add to an existing body of strong evidence that behavioral treatments are effective for treating ADHD.

Van der Oord et al. (2008) conducted a meta-analysis of group design studies comparing medication, behavioral, and combination medication and behavioral interventions for ADHD in order to evaluate the relative effectiveness of each. Analyses were conducted using RCTs published from 1985–2006 with children ages 6–12 years. Medication and combined treatments yielded large effect sizes for ADHD symptoms, ODD, and conduct problems. By contrast, behavioral treatments had moderate effect sizes for these outcomes. All treatment modalities had a moderate effect size for social behavior and small effect size for academic functioning. Efficacy rates of combined conditions were larger than medication on all outcome domains, but these differences were not statistically significant. Based on these results, researchers concluded that behavioral treatments are less effective than medication and do not appear to have additive treatment effects when used in combination with medication. The researchers also noted that children who are nonresponders to medication or who take low doses would likely benefit from behavioral interventions.

### Single-Subject Experimental Analyses

In order to evaluate individual response to behavior modification within the STP, four children aged 11–12 years participated in a treatment withdrawal study. The comprehensive behavioral treatment package was delivered and withdrawn in a BABAB reversal design over the course of the 8-week program. Measures were frequency of negative behaviors, counts of rule violations in recreational and classroom settings, and accuracy and completion in academic work. Behavioral intervention was effective for each of the children, as demonstrated by rapid increase in rule violations and negative behavior, and decrease in accuracy and completion of academic work when the treatment was withdrawn. Behavior worsened increasingly over the course of the withdrawal weeks.

Following the second withdrawal, behaviors took longer to return to levels seen in the initial treatment condition. In general, behavior worsened progressively during the withdrawal period (Coles et al., 2005).

### Meta-Analyses of Single-Subject Experiments

Fabiano et. al (2009) recently reported on single-case experiments within a larger meta-analysis of behavioral interventions of ADHD that included group designs (described earlier). A total of 100 single-case studies for ADHD published from 1968–2006 were included in the analysis. Outcomes were based on parent observations of ADHD symptoms, direct observations of child behavior, and academic productivity. Effect sizes were large across these domains. The unweighted effect size for behavioral treatments averaged 3.78.

### Conclusions

STPs offer numerous advantages compared to other behavioral interventions, including the direct administration of intensive behavior therapy, combination of multiple well-established treatment components, and collaboration among treatment providers, teachers, and parents. STPs also demonstrate high attendance and low dropout rate compared to other psychosocial interventions. Parents and children rate STPs very favorably. The recreational setting seems to make STPs a particularly palatable treatment option. Additionally, children who attend STPs have shown decreased need for stimulants, an important outcome considering incremental adverse effects with increased doses of psychostimulants (Pelham et al., 2010).

Research support for the efficacy of STP comes primarily from the laboratory of the original developers. Chambless and Hollon (1998) require independent replication of treatment effects in a randomized controlled design by more than one investigation team in

order for a treatment to be considered efficacious and specific. No published studies have yet compared STP as a stand-alone treatment with a nontreatment control group in a randomized trial, although several crossover designs have shown efficacy. Existing research including multiple single-case studies and within-group designs have shown promising results. Additionally, while the MTA study incorporated multiple behavior treatments into the behavior treatment condition, two out of those three treatments are delivered in STPs: STP and BPT.

As with other treatment for ADHD, much of the treatment gains made during the STP disappear almost immediately upon removal of treatment (Coles et al., 2005). While direct contingency management demonstrates results, it is not feasible for clinicians and STP staff to follow children through their daily routines year-round. Therefore, following direct contingency management as delivered in STP with parent and teacher training in contingency management is critical to maintain improvements gained during the summer weeks.

## EVIDENCE-BASED PRACTICES

BPT is the most widely implemented and thoroughly researched behavioral treatment for ADHD. BPT, classroom management, and STPs have strong support. None of these psychosocial treatments is as effective as psychostimulant medication for ADHD symptoms (inattention, hyperactivity), but each is more efficacious in reducing secondary functional impairments, though only while treatment is in place (MTA, 1999; Molina et al., 2009). Multimodal treatment includes a combination of behavior contingency modification at home and at school, STP, and psychostimulant medication, and is the most effective mode of addressing ADHD and its secondary impairments.

BPT and classroom management are relatively costly and time-consuming compared to stimulant medication, and STP is the most expensive and time-intensive intervention available. Evaluation of the long-term cost-effectiveness of STPs when delivered across multiple consecutive summers could provide crucial information in selecting the best treatments; if STPs result in long-term benefits to psychosocial functioning, it may be that they serve as an investment preventing significant future costs. Some evidence supports the notion that BPT programs developed specifically for preschoolers with ADHD may be effective in curtailing ADHD symptoms and result in lasting gains, though longitudinal analyses of such programs are needed. More research is needed in areas of dissemination and implementation of evidence-based practices in general and specifically in ADHD. Also of concern is how to tailor treatments to meet the individual needs of the child and family, and how to gain generalization and maintenance of treatment effects.

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