

Cognitive Behavioral Treatment Outcomes in Adolescent ADHD

Objective: To assess the efficacy of cognitive behavioral therapy (CBT) for managing adolescent ADHD.

Method: A total of 68 adolescents with ADHD and associated psychiatric comorbidities completed a manualized CBT treatment protocol. The intervention used in the study was a downward extension of the Saffren et al. program for adults with ADHD who have symptoms unresolved by medication. Outcome variables consisted of narrow band (ADHD) and broadband (e.g., mood, anxiety, conduct) symptom measures (Behavior Assessment System for Children–2nd edition and ADHD–Rating Scales) as well as functioning measures (parent/teacher ratings and several ecologically real-world measures).

Results: Treatment effects emerged on the medication dosage, parent rating of pharmacotherapy adherence, adolescent self-report of personal adjustment (e.g., self-esteem), parent and teacher ratings of inattentive symptoms, school attendance, school tardiness, parent report of peer, family and academic functioning and teacher report of adolescent relationship with teacher, academic progress, and adolescent self-esteem. Adolescents with ADHD with oppositional defiant disorder were rated by parents and teachers as benefiting less from the CBT intervention. Adolescents with ADHD and comorbid anxiety/depression were rated by parents and teachers as benefiting more from the CBT intervention. **Conclusion:** A downward extension of an empirically validated adult ADHD CBT protocol can benefit some adolescents with ADHD.

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ADHD is a psychiatric disorder affecting between 3% and 5% of the general population (American Psychiatric Association [APA], 2000; Kessler et al., 2006). The defining features of the disorder are inattention, impulsivity, and hyperactivity that impair functioning. There are three subtypes of ADHD: the predominately hyperactive-impulsive type, the predominantly inattentive type, and the combined type (APA, 2000). ADHD is most diagnosed during elementary school yet continues to persist into adolescence and adulthood for the majority (50%-70%) of individuals (Barkley, Murphy, & Fischer, 2007; Biederman et al., 1993, 2007; Faraone, Biederman, & Mick, 2006; Kessler et al., 2006). Like in children, ADHD in adolescents and adults is most often characterized by defining symptoms of hyperactivity/impulsivity and inattention (Faraone et al., 2006).

ADHD is very often comorbid with other forms of psychopathology. Comorbid anxiety, mood, disruptive behavior disorders, and substance use disorders are commonly reported in pediatric, adolescent, and adult ADHD (Barkley et al., 2007; Barkley, Murphy, & Kwasnik, 1996; Biederman et al., 1993; Borland

& Heckman, 1976; Group, 1999; Heiligenstein, Conyers, Berns, & Miller, 1998; Kessler et al., 2006; Murphy & Barkley, 1996; Shekim, Asarnow, Hess, Zaucha, & Wheeler, 1990; Thomson et al., 2005). In addition, ADHD diagnoses are often accompanied by increased risk for learning disabilities as well as impaired social relationships (Busch et al., 2002; Fischer, Barkley, Smallish, & Fletcher, 2002; Mannuzza, Klein, Bessler, Malloy, & Hynes, 1997).

ADOLESCENT ADHD

In the majority of children with ADHD (65%), impairing ADHD symptoms continue into adolescence (Ingram, Hechtman, & Morgenstern, 1999). The burden of illness arising from the persistence of ADHD is varied, pervasive, and significant in personal, familial, and economic costs (Fletcher & Wolfe, 2009; Minkoff, 2009; Nyden, Myren, & Gillberg, 2008; W. Pelham, Foster, & Robb, 2007). Adolescents with ADHD are at increased risk for a wide variety of functional impairments including lower academic and occupational achievement, lower

rates of high school graduation, a higher incidence of teenage pregnancy and sexually transmitted infections, driving impairments, a greater number of legal charges/arrests, and higher rates of substance abuse (Babinski et al., 2011; Barkley, Fischer, Smallish, & Fletcher, 2004, 2006; Biederman et al., 2009; Bussing, Mason, Bell, Porter, & Garvan, 2010; Fletcher & Wolfe, 2009; Langley et al., 2010; Molina et al., 2007, 2008, 2009; Monuteaux, Mick, Faraone, & Biederman, 2010; Realmuto et al., 2009). Thus, ADHD in adolescence is not a benign condition and requires intervention.

Treatment. The American Academy of Pediatrics and the American Academy of Child and Adolescent Psychiatry have treatment guidelines that specify how optimally to manage child and adolescent ADHD (American Academy of Pediatrics, 2001; Pliszka, 2007). Pharmacological management (i.e., stimulant medication) is the most widely explored and utilized form of treatment for children diagnosed with ADHD (DuPaul, Barkley, & Connor, 1998; Group, 1999; Solanto, Arnsten, & Castellanos, 2001). The use of stimulants appears to improve hyperactive symptoms, impulsivity, inattentiveness, and improve reaction time, task persistence, work productivity, and vigilance (DuPaul et al., 1998; Greenhill, Halperin, & Abikoff, 1999; Rapport & Kelly, 1993; Solanto et al., 2001).

Although the majority of children and adolescents respond favorably to stimulants, 20% to 30% of children and adolescents show no response (Swanson, McBurnett, Christian, & Wigal, 1995) or develop considerable enough side effects (e.g., weight loss, sleep disturbance, etc.) that the medication must be discontinued (Barkley, McMurray, Edelbrock, & Robbins, 1990; DuPaul et al., 1998; Findling, Short, & Manos, 2001; Gillberg et al., 1997).

Moreover, adherence to stimulant medications in ADHD wanes as a function of age (Charach, Ickowicz, & Schachar, 2004). The reason for the decline may be any of a number of factors including the following: (a) unlike in pediatric ADHD, where the parents are typically responsible for the child's adherence to treatment, ADHD treatment in a high school students requires far more involvement of the patient himself or herself (Pliszka, 2007) and (b) stimulant misuse or diversion is another potential cause of less robust treatment adherence in adolescents with ADHD. Although more likely to happen in high school students with ADHD and comorbid conduct disorder or substance abuse (Gordon, Tulak, & Troncale, 2004; Thiruchelvam, Charach, & Schachar, 2001), stimulant misuse/diversion is a real possibility in any adolescent receiving stimulant therapy for ADHD (Faraone & Wilens, 2007; Wilens et al., 2008).

Aside from medication, other empirically validated psychosocial treatments for children with ADHD include behavioral parent training and behavioral school interventions (Lonigan, Elbert, & Johnson, 1998; W. E. Pelham, Wheeler, & Chronis, 1998), academic interventions such as task and instruction modifications, strategy training, peer tutoring, and computer-assisted instruction (DuPaul & Eckert, 1998) and combined behavioral-pharmacological interventions (Group, 1999; Klein et al., 1997). Most psychosocial interventions for children with ADHD focus helping the adult caretakers of the child with ADHD to better manage the child (Pliszka, 2007).

Compared with the vast amounts of research on psychosocial interventions in children, far less research has been conducted on the efficacy of psychosocial interventions for adolescents with ADHD. This is puzzling given that parents of adolescents prefer psychosocial intervention to medication, yet are more likely to have access to medication (Bukstein, 2004; Jensen et al., 1999; McLeod, Fettes, Jensen, Pescosolido, & Martin, 2007). Furthermore, parent satisfaction ratings are higher when parents received psychosocial treatment than when they received medication alone (MTA Collaborative Group, 1999b), suggesting that despite the lack of research attention, psychosocial treatments may have a place in the treatment of ADHD.

COGNITIVE BEHAVIORAL THERAPY (CBT) AND ADHD

One of the most common psychosocial interventions in other forms of psychopathology is CBT. Used with both children and adults, CBT has a substantial research base supporting its efficacy for a wide variety of both medical and psychiatric conditions (especially internalizing disorders). For example, pediatric meta-analyses have documented medium-to-large effect sizes ($d > 0.5$) for CBT in the management of obsessive compulsive disorder (OCD; Watson & Rees, 2008) and depression (Chu & Harrison, 2007). Although CBT clearly has demonstrated efficacy in child and adolescent populations, it is generally accepted that CBT is more effective in adolescents relative to preadolescents (Holmbeck, Greenley, & Franks, 2003), implying that cognitive development may moderate the efficacy of CBT treatment.

CBT has not been found to be particularly beneficial for children with ADHD (Abikoff & Gittelman, 1985; Baer & Nietzel, 1991; Bloomquist et al., 1991; DuPaul, & Eckert, 1997; Dush, Hirt, & Schroeder, 1989). Although there is a database suggesting that CBT may be more efficacious for adults

with ADHD (Safren et al., 2005, 2010), the literature on CBT for adolescent ADHD is scarce. In our exhaustive review of the literature, we were unable to find *any* data which have been published on the use of CBT in adolescent ADHD. Nonetheless, several adult ADHD treatment studies have employed CBT models as an intervention for reducing ADHD symptoms and associated impairments.

Ramsay and Rostain (2008) have also created a CBT program for adults with ADHD. This consists of 16 therapy sessions over a period of 6 months. The program focuses on developing and implementing coping strategies (e.g., organizational skills and time management) to manage ADHD-related symptoms, as well as identifying and modifying dysfunctional thoughts and beliefs. In an open study by Ramsay and Rostain, adults with ADHD were treated with a combination of pharmacotherapy and CBT (Rostain & Ramsay, 2006). The findings suggested that the combined treatment approach was efficacious across both symptom and functional parameters. Overall, 67% of the patients were rated by clinicians as much or very much improved in ADHD symptom severity.

Philipsen and colleagues (2007) developed a group CBT approach for managing adult ADHD. Over 13 weekly 2-hr sessions, adults with ADHD participated in groups covering various topics related to ADHD. Philipsen et al. studied 72 adult participants with ADHD (29 females, 43 males; M age = 36 years), most of whom (81.9%) had comorbid psychopathology (Philipsen et al., 2007). Forty-eight adults with ADHD entered the study already receiving medication and 24 were not receiving pharmacotherapy. The results indicated that ADHD and depressive symptoms decreased, both with large effect sizes. Individuals with and without medication improved similarly. Only six adults with ADHD failed to complete the 13-week program (Philipsen et al., 2007). Others (Bramham et al., 2009) have similarly studied group CBT approaches to managing adult ADHD with comparable results.

RATIONALE FOR PROJECT

Given this dearth in the literature as well as the clear need for the use of psychosocial interventions in adolescents with ADHD, we sought to assess the efficacy of a CBT treatment approach used in adult ADHD (Safren et al., 2005, 2010) in a sample of adolescents with ADHD.

Adolescence is a period marked by increased desire for independence and individuation from the family. Thus, rather than working primarily with parents (as exists in many child ADHD treatment paradigms), it makes clinical sense to involve adolescents in

treatment. We believe that this provides rationale for using CBT and incorporating a direct focus on including the adolescent in treatment.

Our *a priori* hypothesis was straightforward: Adolescents with ADHD who received CBT would have a significant reduction in parent- and teacher-rated ADHD symptoms and a significant improvement in functional outcomes related to academic, social, and family domains. In a more exploratory fashion, we sought to examine the effect of ADHD subtype, gender, and psychiatric comorbidity on clinical outcomes in our treated sample.

METHOD

PARTICIPANTS

Participants were recruited from the Adult ADHD Treatment and Research Program at State University of New York (SUNY)—Upstate Medical University. The “adult” program serves individuals high school age (9th–12th grade) and older. Referrals to the Adult ADHD program are primarily from primary care physicians (34%), educational settings (33%), and parents (20%). For the current study, only those adolescents currently in high school were included. High school students currently comprise approximately 45% of the total adult ADHD program population. The institutional review board approved the study and informed consent/assent was obtained from all participants.

Participating adolescents were selected from consecutive referrals to the Adult ADHD treatment program over a 4-year period (September 1, 2006–August 31, 2010). Although 127 adolescents were referred to the ADHD treatment program, only 82 met formal *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-IV*; APA, 1994) diagnostic criteria for ADHD (combined type: $n = 40$; inattentive type: $n = 42$). Adolescents with ADHD were primarily Caucasian (81%) with African American (13%) and Latino (3%) comprising the remaining participants. At the time of the evaluation, the mean age of the adolescent participants was 16.4 years ($SD = 1.3$ years; range = 14 years–18 years, 2 months) and consisted of more males ($n = 51$) than females ($n = 31$). There were no gender, $\chi^2 = 1.21$, $p = .543$, or age, $F(1, 80) = 0.56$, $p = .689$, differences between participants with ADHD—combined and ADHD—inattentive types (see Table 1 for complete background data).

Of the 82 adolescents with ADHD, 10 adolescents/parents of adolescents declined to participate in the treatment. The three primary reasons for declining treatment were low adolescent interest in the

Table 1. Mean (*SD*) Pre- and Posttreatment Data

Variable	Time 1—Pretreatment	Time 2—Posttreatment	Effect size
Background information			
Number	68	68	
Gender (percentage males)	66.2	66.2	
Age (years)	16.4 (1.3)	16.9 (1.4)	
Percentage prescribed ADHD medication	100	100	
Percentage receiving special education services	61	61	
WASI IQ estimate	97.2 (18.2)	—	
Extended release methylphenidate dose (mg)	45.8 (8.8)	38.6 (7.2)	0.89
Extended release mixed amphetamine salts dose (mg)	24.6 (4.4)	20.1 (4.1)	1.05
Atomoxetine dose (mg)	37.4 (5.3)	35.3 (3.9)	0.45
Pharmacotherapy adherence	1.4 (0.5)	1.7 (0.3)	0.73
Behavioral symptoms			
BASC-2 parent externalizing <i>T</i> -score	69.6 (7.8)	62.6 (8.7)	0.85
BASC-2 parent internalizing <i>T</i> -score	65.8 (9.7)	60.1 (7.8)	0.65
BASC-2 teacher externalizing <i>T</i> -score	67.5 (7.9)	62.4 (8.1)	0.64
BASC-2 teacher internalizing <i>T</i> -score	66.0 (8.3)	64.6 (9.2)	0.16
BASC-2 teacher learning problems <i>T</i> -score	70.4 (11.4)	61.8 (9.8)	0.81
BASC-2 adolescent SRP school problems <i>T</i> -score	72.6 (14.2)	65.2 (11.3)	0.58
BASC-2 adolescent SRP internalizing <i>T</i> -score	61.5 (11.0)	57.8 (8.6)	0.37
BASC-2 adolescent SRP inattention <i>T</i> -score	71.4 (8.3)	64.7 (8.8)	0.78
BASC-2 adolescent SRP hyperactivity <i>T</i> -score	67.5 (9.8)	64.8 (11.2)	0.26
BASC-2 adolescent SRP emotional symptoms <i>T</i> -score	63.0 (9.9)	59.8 (11.4)	0.30
BASC-2 adolescent SRP personal adjustment <i>T</i> -score	37.7 (6.9)	43.7 (7.0)	0.86
ADHD-RS parent hyperactivity raw score	14.4 (3.2)	13.3 (2.0)	0.41
ADHD-RS parent inattention raw score	18.2 (4.4)	14.0 (3.8)	1.02
ADHD-RS teacher hyperactivity raw score	20.0 (4.2)	16.9 (5.8)	0.61
ADHD-RS teacher inattention raw score	23.7 (3.1)	19.4 (3.1)	1.39
Functioning			
Cumulative grade point average	81.2 (6.9)	84.2 (5.4)	0.48
Average number of weekly class absences	1.8 (0.2)	0.3 (0.2)	7.50
Average number of weekly school tardiness	0.8 (0.2)	0.5 (0.2)	1.50
BASC-2 parent adaptive functioning <i>T</i> -score	32.7 (8.6)	38.0 (9.2)	0.60
BASC-2 teacher adaptive functioning <i>T</i> -score	33.7 (8.9)	38.9 (8.1)	0.61
IRS parent relationship with peers	4.2 (0.9)	3.1 (0.5)	1.51
IRS parent relationship with sibling	4.2 (1.1)	4.1 (1.0)	0.09
IRS parent relationship with parent	4.1 (0.6)	3.5 (0.9)	0.78
IRS parent academic progress	4.3 (1.0)	3.2 (0.8)	1.21
IRS parent self-esteem	3.7 (1.0)	3.2 (1.1)	0.48
IRS parent family functioning	4.2 (0.8)	3.4 (0.8)	1.00
IRS teacher relationship with peers	3.3 (0.8)	3.1 (0.4)	0.32
IRS teacher relationship with teacher	3.6 (1.2)	3.0 (0.8)	0.59
IRS teacher academic progress	4.5 (0.5)	3.5 (0.7)	1.64
IRS teacher self-esteem	3.3 (0.9)	2.8 (0.5)	0.69
IRS teacher influence on classroom functioning	4.3 (0.8)	3.7 (0.7)	0.79

Note: WASI = Wechsler Abbreviated Intelligence Scale; BASC-2 = Behavior Assessment Scales for Children—2nd edition; SRP = Self-Report of Personality; ADHD-RS = ADHD Rating Scale; IRS = Impairment Rating Scale.

treatment program ($n = 7$), lack of time ($n = 6$), and distance from the clinic ($n = 5$). The 10 adolescents with ADHD who declined treatment did not differ from the 72 adolescents with ADHD who elected to participate in the treatment on any demographic, clinical, or cognitive variable ($p > .20$).

Of the remaining 72 adolescents with ADHD who elected to participate in the treatment, 4 adolescents with ADHD failed to complete the entire CBT treatment protocol. Two of the 4 adolescents who failed to complete the protocol moved away from the area; the third adolescent was placed in a residential treatment facility, and the other adolescent refused to continue in therapy. These adolescents who failed to complete the treatment did not differ in age, gender, or other clinical variables ($p > .20$) from those 68 adolescents who did complete the entire protocol. All remaining data are from those 68 adolescents with ADHD who completed the treatment protocol.

As is common in ADHD, most adolescents ($n = 37$) met diagnostic criteria for comorbid oppositional defiant disorder. In addition, generalized anxiety disorder ($n = 27$), major depressive disorder ($n = 24$), substance abuse ($n = 20$), conduct disorder ($n = 12$), OCD ($n = 12$), and learning disabilities ($n = 5$) were the most common comorbid conditions. Most adolescents with ADHD had a comorbid condition; only 20% of adolescents had the single diagnosis of ADHD. Clinical-rated mean global assessment of functioning (GAF; APA, 2000) score was 52.2 ($SD = 11.5$), indicative of moderate to serious symptoms and impairment (APA, 2000).

All adolescents with ADHD who participated in the study also participated in concurrent pharmacotherapy. Fifty-nine of the adolescents were already prescribed stimulant ($n = 54$) or nonstimulant (atomoxetine; $n = 5$) medication at the time of referral. The remaining nine adolescents with ADHD began stimulant therapy shortly after the evaluation yet before CBT was initiated. Using a 3-item Likert-type scale (0 = *poor*, 1 = *satisfactory*, 2 = *good*), treatment adherence in the month prior to initiating the CBT program was estimated by parents to be between satisfactory and good ($M = 1.35$, $SD = 0.45$).

To increase the ecological validity of this study, no a priori decision was made to only include medication responders or medication nonresponders prior to initiating the CBT protocol. Regardless of medication responsiveness, all high school students who were referred to the Adult ADHD Treatment and Research Program and who met *DSM-IV* criteria for ADHD were invited to participate in the CBT trial.

Educationally, 61% of the adolescents with ADHD ($n = 41$) were served on some form of

special education plan, generally an Americans with Disabilities Act (ADA) 504 plan ($n = 27$) or an individualized Education Plan (IEP; $n = 14$). Although there were no specific study prohibitions against making changes to the educational plan, no changes were made to the special education plans or services during the treatment phase.

All 68 adolescents with ADHD included in the current study had prior pharmacological treatment for ADHD. Just over half of the adolescents ($n = 36$) had previously also received some form of psychosocial intervention including parent training ($n = 19$), family therapy ($n = 11$) or individual therapy for the child ($n = 18$). At the time of participation in the CBT, however, no adolescents with ADHD were also receiving concurrent psychosocial interventions.

MEASURES

Psychiatric/behavioral. Psychiatric assessments of adolescents relied on the Schedule for Affective Disorders and Schizophrenia, Epidemiologic version (K-SADS-E; Orvaschel & Puig-Antich, 1987). ADHD diagnoses were based on independent interviews with the parents/guardians (almost always a mother or stepmother) and direct interviews of adolescents. When the information from parent and adolescent was discrepant, the most severe report was utilized. For example, when one reporter endorsed a symptom and the other did not, we counted the symptom as present. For every ADHD diagnosis, information was also gathered regarding the ages at onset and offset of symptoms, functional impairments, and treatment history. Diagnoses were considered positive if, based on the interview results, *DSM-IV* criteria were unequivocally met to a clinically meaningful degree. Diagnoses were made for two points in time: lifetime and current (past month). All adolescents had positive histories for both child ADHD (during elementary school) and current ADHD (during high school). No adolescents received de novo ADHD diagnoses; all had preexisting diagnoses which were confirmed using the K-SADS-E. All K-SADS-E interviews were conducted by the first author, a licensed clinical psychologist who has extensive experience with the K-SADS-E. No interrater reliability statistics were computed. In addition to ADHD diagnoses, the K-SADS-E was employed to assess for psychiatric comorbidity, both past and current.

The Behavior Assessment System for Children—2nd edition (BASC-2; Reynolds & Kamphaus, 2006) was administered to assess adolescent behavioral functioning. The 126-item BASC parent rating scale was administered to parents, whereas the

138-item BASC teacher rating scale was administered to the teacher who “knew the adolescent the best.” Adolescents completed the Self-Report of Personality (SRP) form. The BASC scales yield composite *T*-scores on four dimensions: Externalizing Problems, Internalizing Problems, Behavior Symptoms, and Adaptive Skills. The teacher rating scale includes an additional school Problem Composite. Scores >65 indicate clinical significance. The BASC possesses adequate psychometric properties; validity has been demonstrated by associations with other measures of adolescent behavior and intervention studies (Reynolds & Kamphaus, 2006).

The ADHD–Rating Scales (ADHD-RS; DuPaul, Power, & Anastopoulos, 1998) was used as a measure of parent and teacher-rated ADHD symptoms. The ADHD-RS is an 18-item questionnaire requiring the respondent to rate the frequency of the *DSM-IV* symptoms of ADHD using a 4-point Likert-type scale (0 = *never or rarely*, 1 = *sometimes*, 2 = *often*, 3 = *very often*). This measure yields a total score and two subscale scores (Inattention and Hyperactivity-Impulsivity). The reliability and validity of the ADHD-RS are adequate (DuPaul et al., 1998). All adolescents who met *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; *DSM-IV-TR*; APA, 2000) diagnostic criteria for ADHD had an ADHD-RS score >1.5 *SD* above age and gender norms. Raw scores for all three scales were used as dependent measures.

Finally, the clinician-rated GAF (APA, 2000) was also used as a measure of clinical severity and functioning.

Cognitive. The Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999), which comprises four subtests: Vocabulary, Block Design, Similarities, and Matrix Reasoning, was administered to obtain a Full-Scale IQ estimate.

Functioning. In addition to the adaptive functioning scales included in the BASC-2, functional outcomes were assessed via parent and teacher report on the Impairment Rating Scale (IRS; Fabiano et al., 2006). The Parent IRS consists of 7-items (relationship with peers, relationship with siblings, relationship with parents, academic progress, self-esteem, influence on family functioning, and overall impairment). The Teacher IRS teacher version has six domains (relationship with peers, relationship with teacher, academic progress, self-esteem, influence on classroom functioning, and overall impairment). Parents and teachers are instructed to rate the severity of the adolescents problems in each domain and the need for treatment using a 7-point Likert-type scale (0 = *no problem/definitely does not need treatment*, 6 = *extreme problem/definitely*

needs treatment). The IRS has been demonstrated to have good validity and reliability (Fabiano et al., 2006).

In addition, several ecologically valid measures of realworld functioning were obtained. These measures included cumulative grade point average and number of school absences/tardies.

PROCEDURES

During the evaluation, all of the dependent measures utilized in the study were administered and scored. All 82 adolescents diagnosed with ADHD had a feedback session in which the diagnosis or diagnoses were described. During this meeting, all 82 adolescents and their families were encouraged to consider a combined treatment approach of CBT and pharmacotherapy. For the 72 adolescents who elected to participate in CBT, a therapy session was scheduled and treatment was initiated.

Teachers were mailed rating scales during the diagnostic process as well as at the end of treatment (on average, 5 months later). Teachers were blind to the child's CBT participation.

CBT INTERVENTION

The intervention used in the study was a downward extension of the Safren et al. (2005) program for adults with ADHD who have symptoms unresolved by medication. The Safren et al. CBT model involves components of motivational interviewing, practice, review, and repetition of learned skills and is comprised of three core modules in addition to three optional modules. In the current study, all participants received all six modules (core plus optional modules) and all sessions were led by a doctoral-level clinical psychologist.

The first four-session core module involved psychoeducation about ADHD as well as training in organization and planning skills. The second 3-session core module focused on the adolescent learning skills to reduce distractibility. The third core module used cognitive restructuring strategies described by Beck (1995) modified to account for an ADHD population. This module varied between two and five sessions ($M = 3.1$ session, $SD = 1.1$ sessions) depending on the particular adolescent. The Safren et al. (Safren et al., 2005) optional modules were also completed by the adolescents with ADHD. These modules included four sessions focused on reducing procrastination, improving communication skills (e.g., reducing interruptions, improving active listening, etc.) and improving anger/frustration management.

Handouts describing the topics covered were provided to the parent/adolescent at the conclusion of each session. The handouts were provided in an attempt to encourage generalizability of the strategies to the real world.

Parent involvement. Parents and guardians were actively included in the assessment and CBT treatment. Parents were in the therapy room during the first seven sessions (Core Modules 1 and 2) as well as the one optional procrastination module. Parents were not in therapy room during Core Module 3 or the communication skills or anger management optional modules. When parents were present in the therapy room, parents were instructed explicitly that they were present only to “improve generalizability of the strategies to the real world.” The therapist directed the vast majority of the session toward the adolescent with time for the parent to ask questions/seek clarification at the end of the 50-min session. When parents were not included in the therapy room, parents were informed of the topics discussed, yet not the specific content of the topics.

ADOLESCENT TREATMENT ADHERENCE

CBT adherence. All adolescents completed all modules (range = 13–16 sessions). Attendance was generally high with 55% of the adolescents never missing an appointment. The remaining 45% of adolescents missed between 1 and 3 appointments (missed appointments $M = 1.4$ appointments, $SD = 0.9$). Given that most of the adolescents were not yet of driving age or did not yet have their driver's permit, parental attendance at the sessions was highly consistent with adolescent attendance.

Medication adherence. In the first session, parents were instructed to monitor their child's medication adherence. At the beginning of each session, parents were asked to rate their child's adherence to the medication regimen during the last week (or 2 weeks if sessions were spaced 2 weeks apart) on a 3-item Likert-type scale (0 = *poor*, 1 = *satisfactory*, 2 = *good*). Mean treatment adherence during the CBT program was estimated by parents to be good ($M = 1.68$, $SD = 0.29$).

PLANNED ANALYSES

The study used a standard pre- and posttreatment design. Paired samples t tests were utilized to assess change. Scores at the pre- and posttreatment periods were calculated for outcome variables. Outcome variables consisted of both symptom measures (BASC-2 and ADHD-RS) as well as functioning measures (BASC-2, IRS, several ecologically real-world

measures). Cohen's effect size (Cohen's d) is also reported for pre- and posttreatment analyses.

Following these analyses, and in a more exploratory fashion, the role of ADHD subtypes (ADHD–inattentive vs. ADHD–combined), gender, and psychiatric comorbidity was investigated using repeated measures ANCOVA using pretreatment scores as the covariate. In the case of psychiatric comorbidity, many adolescents had 3+ comorbid conditions. In these cases, and only for the purpose statistical analyses, an a priori decision was made to consider the most impairing comorbid condition as the psychiatric comorbidity. This decision was made on the basis of clinical judgment and Parent BASC-2 scores. For example, if the Parent BASC-2 had higher T -scores for anxiety and the clinician agreed that the adolescent was more anxious than oppositional, depressed, and so on, then the anxiety disorder diagnosis was considered as the most impairing comorbid condition.

Due to the high number of comparisons, we applied the standard Bonferroni correction method to all significant analyses. Only those results significant at the $p \leq .008$ level can be considered statistically significant.

RESULTS

TREATMENT EFFICACY

As demonstrated in Table 1, pretreatment and posttreatment effects were found for several symptom and functional variables. The largest effect sizes were observed for number of weekly missed classes, school tardies, stimulant medication doses, parent-reported externalizing behaviors, parent-reported inattention symptoms, and teacher-reported inattention symptoms. Across all variables, participants had lower numbers at posttreatment relative to pretreatment.

As also noted in Table 1, the adolescents reported less pre- and posttreatment changes than parents and teachers (see Table 1 for complete results).

EXPLORATORY ANALYSES

In a more exploratory fashion, ADHD subtype, gender, and psychiatric comorbidity were considered as possible moderators of treatment outcomes. Using an ANCOVA with pretreatment scores as the covariate, no statistically significant interactions emerged between ADHD subtype or gender, time, and any of the dependent variables ($p > .20$). Thus, our adolescent CBT protocol does not appear to be

more effective with either of the subtypes or as a function of gender.

In regards to psychiatric comorbidity, four groups were created: ADHD only ($n = 14$), ADHD + ODD/CD ($n = 25$), ADHD + ANX ($n = 15$), and ADHD + DEP ($n = 14$). As demonstrated in Table 2, Time \times Psychiatric Comorbidity (F degrees of freedom = 3, 64) interactions were found on several parent-, teacher-, and adolescent-report measures of behavioral symptoms and functioning. Once Bonferroni corrections were applied, however, only several variables maintained statistical significance. Scheffé post hoc tests revealed that across all outcome variables, the group of adolescents with ADHD + ODD was rated by parents and teachers as benefiting less from the CBT intervention. Scheffé post hoc tests also revealed that the adolescents with ADHD + ANX and the adolescents with ADHD + DEP improved more than the ADHD only group on several variables.

DISCUSSION

ADHD is a well-studied psychiatric disorder in children. However, far less is known about adolescents with ADHD. Given that the majority of children with ADHD become adolescents with ADHD, this is an unfortunate dearth in the extant literature, especially when one considers the economic toll created by untreated or poorly treated ADHD (Biederman & Faraone, 2006). The most common of these treatments, pharmacotherapy, remains a mainstay of pediatric ADHD treatment. However, some children with ADHD do not respond to stimulants or cannot tolerate the stimulants. In addition, in adolescence, stimulant misuse and diversion can become challenges. All of the preceding suggest that there remains a clear need for effective psychosocial interventions in adolescents with ADHD.

These data suggest that a downward extension of an empirically validated adult ADHD CBT protocol (Safren et al., 2005) can benefit *some* adolescents with ADHD. Treatment outcomes were similar for males and females with ADHD as well as those with ADHD–inattentive type and ADHD–combined type. Nonetheless, those adolescents with comorbid ODD or CD benefited less than the adolescents with only ADHD or with comorbid anxiety disorders or depression. Adolescents with ADHD only, ADHD + ANX, and ADHD + DEP were rated by parents and teachers as improved across several symptoms and, more importantly, functional parameters including several ecologically valid “real-world” measures such as grades and attendance.

In addition, over the course of the CBT, lower doses of medication were needed to maintain the adolescent’s functional improvements. To our knowledge, this is the first psychosocial study of adolescents or adults with ADHD that has tracked medication doses as a function of treatment time. Given the concerns that some primary care physicians have with prescribing stimulant medications to adolescents (Wilens et al., 2008), the use of a CBT protocol may help to reduce the doses of the medications needed to improve functioning.

Despite the gains made by the adolescents with ADHD only, ADHD + ANX, and ADHD + DEP, many of these adolescents did not normalize their functioning and remained both symptomatic and functionally impaired (as rated by teachers and parents) in at least one domain. It is possible that the lower doses of medications were partly responsible for this finding. Alternatively, it is also possible that these adolescents with ADHD are continuing to function somewhat below average as a function of the reputation that each has developed over time with their parents, teachers, and peers. Future research should consider how best to explain why despite improvements, most adolescents with ADHD continued to function suboptimally.

Other research to consider in the future includes the role of the parents in the therapy session. As described earlier, parents were included for much of the direct work with the adolescent. Although this may have helped to improve generalizability of the strategies, it may also have worked against those adolescents with ODD or CD who may have come to view the therapist as simply another adult in their life who is “trying to fix” him or her.

Likewise, future research should also consider how best to explain that the parents and teachers reported far more appreciable improvements than the adolescents. A possible explanation for this finding include adolescent optimistic bias, often referred to as a positive illusory bias in the ADHD literature (Mikami, Calhoun, & Abikoff, 2010); across all assessed parameters, the adolescent with ADHD rated himself or herself as less symptomatic and higher functioning than the teacher and parent. Thus, by having an inflated self-perception, the adolescents had less room for improvement, hence lower effect sizes. Future research should consider the impact that adolescent self-perception has on treatment outcomes as well as the validity of such self-perceptions.

The current research project represents an initial foray toward furthering study of psychosocial interventions in adolescents with ADHD. These data represent data amassed from an ongoing clinical program designed to treat adolescents with ADHD.

Table 2. Treatment Outcomes as a Function of Psychiatric Comorbidity

Variable	Time 1—Pretreatment				Time 2—Posttreatment				Time * Condition <i>p</i>
	1	2	3	4	1	2	3	4	
Background information									
Number	14	25	15	14	14	25	15	14	.999
gender (number males)	7	16	9	9	7	16	9	9	.999
Age (years)	16.3 (1.3)	16.5 (1.2)	16.5 (1.2)	16.3 (1.4)	16.8 (1.3)	17.0 (1.2)	17.0 (1.2)	16.9 (1.4)	.984
Percentage prescribed ADHD medication	100	100	100	100	100	100	100	100	.999
Percentage receiving special education services	64	60	60	64	64	60	60	64	.999
WASI IQ estimate	96.1 (16.2)	97.3 (17.1)	98.9 (14.5)	96.8 (14.35)	—	—	—	—	—
Extended release methylphenidate dose (mg)	44.7 (5.3)	47.0 (5.6)	43.9 (4.2)	47.4 (7.4)	42.7 (5.3)	46.8 (5.6)	41.6 (4.0)	45.9 (7.2)	.104
Extended release mixed amphetamine salts dose (mg)	23.8 (4.0)	25.9 (3.4)	22.8 (3.0)	25.7 (3.0)	23.3 (4.2)	25.8 (3.0)	20.4 (2.1)	23.1 (1.9)	.085
Atomoxetine dose (mg)	36.1 (5.8)	38.7 (5.5)	38.3 (5.1)	37.2 (5.2)	34.7 (4.1)	38.6 (5.5)	36.2 (5.9)	35.8 (4.1)	.116
Pharmacotherapy adherence	1.3 (0.4)	1.1 (0.4)	1.4 (0.4)	1.4 (0.4)	1.8 (0.4)	1.2 (0.4)	1.8 (0.4)	1.8 (0.3)	.019
Behavioral symptoms									
BASC-2 parent externalizing <i>T</i> -score	66.6 (7.8)	71.2 (8.9)	67.7 (6.8)	69.2 (9.1)	62.8 (8.0)	69.3 (9.1)	60.5 (11.3)	65.7 (8.5)	.012
BASC-2 parent internalizing <i>T</i> -score	64.3 (9.6)	62.1 (9.0)	67.3 (6.9)	68.2 (5.9)	61.1 (8.4)	62.8 (6.8)	59.5 (7.8)	60.5 (7.7)	.005
BASC-2 teacher externalizing <i>T</i> -score	64.5 (7.6)	72.5 (9.9)	65.8 (10.0)	67.4 (6.7)	61.3 (7.9)	68.5 (6.9)	59.6 (7.5)	60.5 (9.0)	.033
BASC-2 teacher internalizing <i>T</i> -score	61.4 (8.0)	65.4 (7.7)	69.7 (7.3)	71.4 (9.9)	60.2 (7.8)	64.5 (6.7)	64.5 (6.7)	64.2 (9.0)	.004
BASC-2 teacher learning problems <i>T</i> -score	69.2 (9.0)	69.7 (10.0)	71.2 (11.7)	70.3 (11.9)	61.6 (9.4)	66.8 (9.8)	60.7 (9.7)	63.5 (9.6)	.001
BASC-2 adolescent SRP school problems <i>T</i> -score	72.8 (15.2)	74.4 (13.2)	71.8 (13.8)	73.9 (17.2)	64.8 (9.8)	72.2 (14.8)	64.7 (11.0)	64.7 (10.8)	.065
BASC-2 adolescent SRP internalizing <i>T</i> -score	60.7 (10.0)	59.8 (8.7)	65.7 (13.1)	66.2 (12.2)	59.9 (9.7)	59.9 (9.1)	57.1 (5.8)	57.2 (8.0)	.004
BASC-2 adolescent SRP inattention <i>T</i> -score	73.3 (7.8)	66.7 (9.0)	70.3 (6.6)	71.5 (8.2)	64.1 (8.9)	66.3 (9.9)	64.2 (7.9)	64.5 (8.3)	.001
BASC-2 adolescent SRP hyperactivity <i>T</i> -score	65.8 (9.6)	66.3 (10.0)	70.2 (14.2)	67.5 (8.1)	64.9 (10.2)	65.7 (6.9)	64.1 (10.4)	63.9 (14.2)	.103
BASC-2 adolescent SRP emotional symptoms <i>T</i> -score	62.2 (8.0)	61.8 (11.1)	66.4 (9.2)	66.9 (9.5)	58.9 (10.8)	62.0 (14.2)	58.2 (9.7)	58.9 (13.3)	.001
BASC-2 adolescent SRP personal adjustment <i>T</i> -score	38.9 (5.6)	40.6 (4.0)	36.3 (7.7)	36.1 (9.0)	43.8 (6.9)	41.8 (8.8)	45.0 (5.6)	44.1 (7.8)	.016
ADHD-RS parent hyperactivity raw score	14.6 (2.8)	15.2 (2.2)	15.4 (3.4)	13.9 (3.4)	13.5 (2.2)	14.9 (2.8)	13.0 (1.7)	13.3 (1.9)	.206
ADHD-RS parent inattention raw score	18.3 (4.1)	18.6 (5.0)	17.5 (4.0)	17.7 (3.9)	13.7 (3.4)	15.3 (5.0)	13.4 (4.1)	13.8 (2.9)	.017
ADHD-RS teacher hyperactivity raw score	19.4 (4.1)	22.3 (5.7)	19.9 (3.8)	19.8 (3.4)	15.4 (6.0)	18.2 (7.2)	15.3 (2.6)	15.8 (2.0)	.104
ADHD-RS teacher inattention raw score	23.9 (3.0)	24.1 (5.1)	23.8 (3.4)	24.4 (2.7)	19.3 (2.5)	22.5 (4.0)	19.0 (2.9)	19.0 (2.9)	.118
Functioning									
Cumulative grade point average	82.0 (5.6)	80.2 (7.8)	81.9 (6.0)	80.9 (6.7)	85.3 (4.5)	82.1 (6.9)	85.1 (5.6)	85.0 (4.9)	.027
Average number of weekly class absences	1.9 (0.2)	2.5 (0.5)	1.2 (0.3)	2.0 (0.1)	0.3 (0.2)	1.1 (0.4)	0.1 (0.1)	0.1 (0.1)	.007
Average number of weekly school tardiness	0.6 (0.2)	1.3 (0.2)	0.6 (0.2)	1.1 (0.3)	0.2 (0.1)	1.0 (0.4)	0.2 (0.1)	0.2 (0.1)	.001
BASC-2 parent adaptive functioning <i>T</i> -score	32.4 (8.0)	31.6 (10.3)	32.9 (8.9)	31.6 (7.0)	38.2 (9.0)	36.8 (14.2)	39.4 (5.6)	39.8 (5.8)	.218
BASC-2 teacher adaptive functioning <i>T</i> -score	33.0 (9.3)	32.7 (11.5)	34.4 (5.7)	33.7 (7.1)	38.1 (7.6)	36.8 (14.2)	40.2 (5.8)	38.7 (6.9)	.252
IRS parent relationship with peers	4.0 (0.4)	4.5 (0.9)	4.0 (0.7)	4.0 (1.0)	3.0 (0.3)	4.2 (0.7)	3.0 (0.3)	3.0 (0.4)	.001
IRS parent relationship with sibling	3.7 (1.0)	4.6 (0.5)	3.9 (0.8)	4.4 (0.8)	3.7 (0.9)	4.3 (1.2)	4.0 (0.7)	4.0 (0.9)	.858
IRS parent relationship with parent	3.7 (0.5)	4.5 (0.9)	3.8 (0.4)	4.2 (0.7)	3.4 (0.7)	4.2 (0.9)	3.4 (0.6)	3.4 (1.0)	.305
IRS parent academic progress	4.2 (0.9)	4.4 (1.4)	4.0 (0.5)	4.1 (1.2)	3.0 (1.0)	4.1 (1.3)	2.9 (0.8)	2.9 (0.8)	.001
IRS parent self-esteem	3.8 (0.8)	3.4 (0.6)	4.1 (0.9)	4.2 (1.2)	3.1 (0.9)	3.4 (0.9)	3.0 (0.9)	3.0 (1.3)	.001
IRS parent family functioning	4.2 (1.0)	4.2 (1.3)	4.0 (0.8)	4.2 (0.5)	3.5 (0.5)	3.9 (1.1)	3.3 (0.5)	3.3 (1.0)	.092
IRS teacher relationship with peers	3.2 (0.7)	3.4 (1.0)	3.3 (0.9)	3.4 (0.8)	2.6 (0.3)	3.4 (0.7)	2.8 (0.4)	2.7 (0.5)	.001
IRS teacher relationship with teacher	3.4 (0.7)	3.8 (1.3)	3.1 (0.4)	3.5 (0.5)	2.9 (0.6)	3.7 (1.0)	2.6 (0.8)	2.9 (1.0)	.001
IRS teacher academic progress	4.4 (0.7)	4.2 (0.8)	4.5 (0.4)	4.7 (0.9)	3.6 (0.4)	4.0 (0.9)	3.4 (0.7)	3.4 (0.6)	.001
IRS teacher self-esteem	3.6 (0.7)	3.0 (0.8)	3.8 (1.1)	3.9 (0.7)	2.7 (0.6)	3.0 (0.9)	2.5 (1.1)	2.6 (0.8)	.001
IRS teacher influence on classroom functioning	3.8 (0.8)	4.6 (1.0)	3.9 (0.7)	4.0 (0.6)	3.3 (0.7)	4.4 (0.6)	3.4 (0.7)	3.2 (0.7)	.117

Note: 1 = ADHD only; 2 = ADHD + ODD/CD; 3 = ADHD + ANX; 4 = ADHD + DEP; CBT = Cognitive Behavioral Therapy; WASI = Wechsler Abbreviated Intelligence Scale; BASC-2 = Behavior Assessment Scales for Children—2nd edition; ADHD-RS = ADHD Rating Scale; IRS = Impairment Rating Scale; ODD/CD = Oppositional defiant disorder / conduct disorder; ANX = Anxiety disorder; DEP = Depressive disorder.

These data are not from an artificial research study which may not approximate what clinicians can manage in an Health Maintenance Organization (HMO)-driven reality. As such, these clinical data need to be considered in light of several methodological limitations that may not have been present in a tightly controlled research study. First and foremost, our treatment group was self-selected for accepting CBT therapy. This group may differ systematically in traits (e.g., motivation) that could have confounded our results. Second, our outcome assessments were not blinded to group status. Finally, given that the study was conducted in a natural clinical setting, with limited resources, rather than a designated research clinic, interrater reliability on psychiatric diagnoses and treatment integrity were not formally measured by the investigators. Given these considerations, it is essential that a well-controlled efficacy trial be conducted to compare CBT therapy with an appropriate placebo control.

Despite our methodological limitations, these data represent the clinical reality in which most mental health professionals working with adolescents with ADHD exist. For example, few parents of functionally impaired adolescents with an ADHD are willing to have their child wait for treatment for several months simply to participate in a research study. In addition, although consultation with schools is clearly an important component of pediatric mental health treatment, having the resources to be able to provide ongoing in-service training to teachers as was done in the MTA study (MTA Collaborative Group, 1999a) is also likely beyond the means of the clinician working in a managed care environment.

Although this work must be considered preliminary due to its methodological limitations, it suggests that large, well-controlled trials of CBT for adolescent ADHD are warranted. Although CBT has not been extensively used within the adolescent ADHD domain, there exists a vast literature in the adolescent depression and anxiety domains which detail the effectiveness of CBT (Chu & Harrison, 2007; Watson & Rees, 2008). This is promising yet awaits replication in more carefully controlled trials before similar conclusions can be drawn about CBT in adolescent ADHD.

In addition, the long-term maintenance of these treatment gains remains an open question. Future research should continue to follow adolescents with ADHD over time to gauge the impact that the interventions have as a function of time. Although short-term gains are promising and encourage future research, the long-term maintenance of this CBT intervention is presently unclear.

REFERENCES

- Abikoff H, Gittelman R. (1985). Hyperactive children treated with stimulants: Is cognitive training a useful adjunct? *Archives of General Psychiatry*, 42, 953–961.
- American Academy of Pediatrics. (2001). Clinical practice guideline: Treatment of the school-aged child with attention-deficit/hyperactivity disorder. *Pediatrics*, 108, 1033–1044.
- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington DC: Author.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington DC: Author.
- Babinski D. E., Pelham W. E. Jr., Molina B. S., Gnagy E. M., Waschbusch D. A., Yu J., ... Karch, K. M. (2011). Late adolescent and young adult outcomes of girls diagnosed with ADHD in childhood: An exploratory investigation. *Journal of Attention Disorders*, 15(3), 204–214.
- Baer R. A., Nietzel M. T. (1991). Cognitive and behavioral treatment of impulsivity in children: A meta-analytic review of the outcome literature. *Journal of Clinical Child Psychology*, 20, 400–412.
- Barkley R. A., Fischer M., Smallish L., Fletcher K. (2004). Young adult follow-up of hyperactive children: Antisocial activities and drug use. *Journal of Child Psychology and Psychiatry*, 45, 195–211.
- Barkley R. A., Fischer M., Smallish L., Fletcher K. (2006). Young adult outcome of hyperactive children: Adaptive functioning in major life activities. *Journal of the American Academy of Child and Adolescent Psychiatry*, 45, 192–202.
- Barkley R. A., McMurray M. B., Edelbrock C. S., Robbins K. (1990). The side effects of Ritalin: A systematic placebo controlled evaluation of two doses. *Pediatrics*, 86, 184–192.
- Barkley R. A., Murphy K., Fischer M. (2007). *ADHD in adults: What the science says*. New York, NY: Guilford.
- Barkley R. A., Murphy K. R., Kwasnik D. (1996). Motor vehicle driving competencies and risks in teens and young adults with attention deficit hyperactivity disorder. *Pediatrics*, 98, 1089–1095.
- Beck J. (1995). *Cognitive therapy: basics and beyond*. New York: Guilford Press.
- Biederman J., Faraone S. V. (2006). The effects of attention-deficit/hyperactivity disorder on employment and household income. *Medscape General Medicine*, 8, 12.
- Biederman J., Faraone S. V., Spencer T., Wilens T., Norman D., Lapey K. A., ... Doyle, A. (1993). Patterns of psychiatric comorbidity, cognition, and psychosocial functioning in adults with attention deficit hyperactivity disorder. *American Journal of Psychiatry*, 150, 1792–1798.
- Biederman J., Petty C. R., Ball S. W., Fried R., Doyle A. E., Cohen D., ... Faraone, S. V. (2009). Are cognitive deficits in attention deficit/hyperactivity disorder related to the course of the disorder? A prospective controlled follow-up study of grown up boys with persistent and remitting course. *Psychiatry Research*, 170, 177–182.
- Biederman J., Petty C. R., Fried R., Doyle A. E., Spencer T., Seidman L. J., ... Faraone, S. V. (2007). Stability of executive function deficits into young adult years: A prospective longitudinal follow-up study of grown up males with ADHD. *Acta Psychiatrica Scandinavica*, 116, 129–136.
- Bloomquist M. L., August G. J., Ostrander R. (1991). Effects of a school-based cognitive-behavioral intervention for ADHD children. *Journal of Abnormal Child Psychology*, 19, 591–605.
- Borland B. L., Heckman H. K. (1976). Hyperactive boys and their brothers: A 25-year follow-up study. *Archives of General Psychiatry*, 33, 669–675.
- Bramham J., Young S., Bickerdike A., Spain D., McCartan D., Xenitidis K. (2009). Evaluation of group cognitive behavioral therapy for adults with ADHD. *Journal of Attention Disorders*, 12, 434–441.
- Bukstein O. G. (2004). Satisfaction with treatment for attention deficit/hyperactivity disorder. *American Journal of Managed Care*, 10, S107–S116.
- Busch B., Biederman J., Cohen L. G., Sayer J. M., Monuteaux M. C., Mick E., ... Faraone, S. V. (2002). Correlates of ADHD among children in pediatric and psychiatric clinics. *Psychiatric Services*, 53, 1103–1111.
- Bussing R., Mason D. M., Bell L., Porter P., Garvan C. (2010). Adolescent outcomes of childhood attention-deficit/hyperactivity disorder in a diverse community sample. *Journal of the American Academy of Child & Adolescent Psychiatry*, 49, 595–605.
- Charach A., Ickowicz A., Schachar R. (2004). Stimulant treatment over five years: Adherence, effectiveness, and adverse effects. *Journal of the American Academy of Child & Adolescent Psychiatry*, 43, 559–567.
- Chu B. C., Harrison T. L. (2007). Disorder-specific effects of CBT for anxious and depressed youth: A meta-analysis of candidate mediators of change. *Clinical Child and Family Psychology Review*, 10, 352–372.
- DuPaul G. J., Barkley R. A., Connor D. F. (1998). Stimulants. In Barkley R. A. (Ed.), *Attention deficit hyperactivity disorder: A handbook for diagnosis and treatment* (pp. 510–551). New York, NY: Guilford.
- DuPaul G. J., Eckert T. L. (1997). The effects of school-based interventions for attention deficit hyperactivity disorder: A meta-analysis. *School Psychology Digest*, 26, 5–27.

- DuPaul G. J., Eckert T. (1998). Academic interventions for students with attention-deficit/hyperactivity disorder: A review of the literature. *Reading and Writing Quarterly*, 14, 59–82.
- DuPaul G. J., Power T., Anastopoulos A. (1998). *ADHD Rating Scale-IV: Checklists, norms, and clinical interpretation*. New York, NY: Guilford.
- Dush D. M., Hirt M. L., Schroeder H. E. (1989). Self-statement modification in the treatment of child behavior disorders: A meta-analysis. *Psychological Bulletin*, 106, 97–106.
- Fabiano G. A., Pelham W., Waschbusch D. A., Gnagy E. M., Lahey B. B., Chronis A. M., ... Burrows-Maclean, L. (2006). A practical measure of impairment: Psychometric properties of the impairment rating scale in samples of children with attention deficit hyperactivity disorder and two school-based samples. *Journal of Clinical Child and Adolescent Psychology*, 35, 369–385.
- Faraone S. V., Biederman J., Mick E. (2006). The age-dependent decline of attention deficit hyperactivity disorder: A meta-analysis of follow-up studies. *Psychological Medicine*, 36, 159–165.
- Faraone S. V., Wilens T. E. (2007). Effect of stimulant medications for attention-deficit/hyperactivity disorder on later substance use and the potential for stimulant misuse, abuse, and diversion. *Journal of Clinical Psychiatry*, 68, 15–22.
- Findling R. L., Short E. J., Manos M. J. (2001). Developmental aspects of psychostimulant treatment in children and adolescents with attention-deficit/hyperactivity disorder. *Journal of the American Academy of Child & Adolescent Psychiatry*, 40, 1441–1447.
- Fischer M., Barkley R. A., Smallish L., Fletcher K. (2002). Young adult follow-up of hyperactive children: Self-reported psychiatric disorders, comorbidity, and the role of childhood conduct problems and teen CD. *Journal of Abnormal Child Psychology*, 30, 463–475.
- Fletcher J., Wolfe B. (2009). Long-term consequences of childhood ADHD on criminal activities. *Journal of Mental Health Policy and Economics*, 12, 119–138.
- Gillberg C., Melander H., von Knorring A. L., Janols L. O., Thernlund G., Hagglof B., ... Kopp, S. (1997). Long-term stimulant treatment of children with attention-deficit hyperactivity disorder symptoms. A randomized, double-blind, placebo-controlled trial. *Archives of General Psychiatry*, 54, 857–864.
- Gordon S. M., Tulak F., Troncale J. (2004). Prevalence and characteristics of adolescents patients with co-occurring ADHD and substance dependence. *Journal of Addictive Diseases*, 23, 31–40.
- Greenhill L. L., Halperin J. M., Abikoff H. (1999). Stimulant medications. *Journal of the American Academy of Child & Adolescent Psychiatry*, 38, 503–512.
- Group M. C. (1999). A 14-month randomized clinical trial of treatment strategies for attention-deficit/hyperactivity disorder. *Archives of General Psychiatry*, 56, 1073–1086.
- Heiligenstein E., Conyers L. M., Berns A. R., Miller M. A. (1998). Preliminary normative data on DSM-IV attention deficit hyperactivity disorder in college students. *Journal of American College Health*, 46, 185–188.
- Holmbeck G. E., Greenley R. N., Franks E. A. (2003). Developmental issues and considerations in research and practice. In Kazdin A., Weisz J. R. (Eds.), *Evidence-based psychotherapies for children and adolescents* (pp. 103–144). New York, NY: Guilford.
- Ingram S., Hechtman L., Morgenstern G. (1999). Outcome issues in ADHD: Adolescent and adult long-term outcome. *Mental Retardation and Developmental Disabilities Research Reviews*, 5, 243–250.
- Jensen P. S., Kettle L., Roper M. T., Sloan M. T., Dulcan M. K., Hoven C., ... Payne, J. D. (1999). Are stimulants overprescribed? Treatment of ADHD in four U.S. communities. *Journal of the American Academy of Child & Adolescent Psychiatry*, 38, 797–804.
- Kessler R. C., Adler L., Barkley R., Biederman J., Conners C. K., Demler O., ... Zaslavsky, A. M. (2006). The prevalence and correlates of adult ADHD in the United States: Results from the National Comorbidity Survey Replication. *American Journal of Psychiatry*, 163, 716–723.
- Klein R. G., Abikoff H., Klass E., Ganeles D., Seese L. M., Pollack S. (1997). Clinical efficacy of methylphenidate in conduct disorder with and without attention deficit hyperactivity disorder. *Archives of General Psychiatry*, 54, 1073–1080.
- Langley K., Fowler T., Ford T., Thapar A. K., van den Bree M., Harold G., ... Thapar, A. (2010). Adolescent clinical outcomes for young people with attention-deficit hyperactivity disorder. *British Journal of Psychiatry*, 196, 235–240.
- Lonigan C. J., Elbert J. C., Johnson S. B. (1998). Empirically supported psychosocial interventions for children: An overview. *Journal of Clinical Child & Adolescent Psychology*, 27, 138–145.
- Mannuzza S., Klein R. G., Bessler A., Malloy P., Hynes M. E. (1997). Educational and occupational outcome of hyperactive boys grown up. *Journal of the American Academy of Child & Adolescent Psychiatry*, 36, 1222–1227.
- McLeod J. D., Fettes D. L., Jensen P. S., Pescosolido B. A., Martin J. K. (2007). Public knowledge, beliefs, and treatment preferences concerning attention-deficit hyperactivity disorder. *Psychiatric Services*, 58, 626–631.
- Mikami A. Y., Calhoun C. D., Abikoff H. B. (2010). Positive illusory bias and response to behavioral treatment among children with attention-deficit/hyperactivity disorder. *Journal of Clinical Child & Adolescent Psychology*, 39, 373–385.
- Minkoff N. B. (2009). ADHD in managed care: An assessment of the burden of illness and proposed initiatives to improve outcomes. *American Journal of Managed Care*, 15, S151–S159.
- Molina B. S., Flory K., Bukstein O. G., Greiner A. R., Baker J. L., Krug V., ... Evans, S. W. (2008). Feasibility and preliminary efficacy of an after-school program for middle schoolers with ADHD: A randomized trial in a large public middle school. *Journal of Attention Disorders*, 12, 207–217.
- Molina B. S., Flory K., Hinshaw S. P., Greiner A. R., Arnold L. E., Swanson J. M., ... Wigal, T. (2007). Delinquent behavior and emerging substance use in the MTA at 36 months: Prevalence, course, and treatment effects. *Journal of the American Academy of Child & Adolescent Psychiatry*, 46, 1028–1040.
- Molina B. S., Hinshaw S. P., Swanson J. M., Arnold L. E., Vitiello B., Jensen P. S., ... MTA Cooperative Group. (2009). The MTA at 8 years: Prospective follow-up of children treated for combined-type ADHD in a multisite study. *Journal of the American Academy of Child & Adolescent Psychiatry*, 48, 484–500.
- Monuteaux M. C., Mick E., Faraone S. V., Biederman J. (2010). The influence of sex on the course and psychiatric correlates of ADHD from childhood to adolescence: A longitudinal study. *Journal of Child Psychology and Psychiatry*, 51, 233–241.
- MTA Collaborative Group. (1999a). A 14-month randomized clinical trial of treatment strategies for attention-deficit/hyperactivity disorder: The MTA Cooperative Group. Multimodal Treatment Study of Children with ADHD. *Archives of General Psychiatry*, 56, 1073–1086.
- MTA Collaborative Group. (1999b). Moderators and mediators of treatment response for children with attention-deficit/hyperactivity disorder: The Multimodal Treatment Study of children with Attention-deficit/hyperactivity disorder. *Archives of General Psychiatry*, 56, 1088–1096.
- Murphy K., Barkley R. A. (1996). Attention deficit hyperactivity disorder adults: Comorbidities and adaptive impairments. *Comprehensive Psychiatry*, 37, 393–401.
- Nyden A., Myren K. J., Gillberg C. (2008). Long-term psychosocial and health economy consequences of ADHD, autism, and reading-writing disorder: A prospective service evaluation project. *Journal of Attention Disorders*, 12, 141–148.
- Orvaschel H., Puig-Antich J. (1987). Schedule for affective disorders and schizophrenia for school-age children: Epidemiologic version. *Lauderdale, FL: Nova University, Fort*.
- Pelham W., Foster E. M., Robb J. A. (2007). The economic impact of attention-deficit/hyperactivity disorder in children and adolescents. *Journal of Pediatric Psychology*, 32, 711–727.
- Pelham W. E. Jr., Wheeler T., Chronis A. (1998). Empirically supported psychosocial treatments for attention deficit hyperactivity disorder. *Journal of Clinical Child Psychology*, 27, 190–205.
- Philipsen A., Richter H., Peters J., Alm B., Sobanski E., Colla M., ... Hesslinger, B. (2007). Structured group psychotherapy in adults with attention deficit hyperactivity disorder: Results of an open multicentre study. *Journal of Nervous and Mental Disease*, 195, 1013–1019.
- Pliszka S. (2007). Practice parameter for the assessment and treatment of children and adolescents with attention-deficit/hyperactivity disorder. *Journal of the American Academy of Child & Adolescent Psychiatry*, 46, 894–921.
- Ramsay J. R., Rostain A. L. (2008). *Cognitive-behavioral therapy for adult ADHD: An integrative psychosocial and medical approach*. New York, NY: Routledge.
- Rapport M. D., Kelly K. L. (1993). Psychostimulant effects on learning and cognitive functioning. In Matson J. L. (Ed.), *Handbook of hyperactivity in children* (pp. 97–136). Boston, MA: Allyn & Bacon.
- Realmuto G. M., Winters K. C., August G. J., Lee S., Fahnhorst T., Botzet A. (2009). Drug use and psychosocial functioning of a community derived sample of adolescents with childhood ADHD. *Journal of Child & Adolescent Substance Abuse*, 18, 172–192.
- Reynolds C. R., Kamphaus R. W. (2006). *Behavior assessment scales for children* (2nd ed.). Circle Pines, MN: American Guidance Services.
- Rostain A. L., Ramsay J. R. (2006). A combined treatment approach for adults with ADHD—Results of an open study of 43 patients. *Journal of Attention Disorders*, 10, 150–159.
- Safren S. A., Otto M. W., Sprich S., Winett C. L., Wilens T. E., Biederman J. (2005). Cognitive-behavioral therapy for ADHD in medication-treated adults with continued symptoms. *Behaviour Research and Therapy*, 43, 831–842.
- Safren S. A., Sprich S., Mimiaga M. J., Surman C., Knouse L., Groves M., ... Otto, M. S. (2010). Cognitive behavioral therapy vs. relaxation with educational support for medication-treated adults with ADHD and persistent symptoms: A randomized controlled trial. *Journal of the American Medical Association*, 304, 875–880.
- Shekim W. O., Asarnow R. F., Hess E., Zaucha K., Wheeler N. (1990). A clinical and demographic profile of a sample of adults with attention deficit hyperactivity disorder, residual state. *Comprehensive Psychiatry*, 31, 416–425.
- Solanto M. V., Arnsten A. F. T., Castellanos F. X. (2001). *Stimulant drugs and ADHD: Basic and clinical neuroscience*. New York, NY: Oxford University Press.
- Swanson J. M., McBurnett K., Christian D. L., Wigal T. (1995). Stimulant medication and treatment of children with ADHD. In Ollendick T. H., Prinz R. J. (Eds.),

Wilens T. E., Adler L. A., Adams J., Sgambati S., Rotrosen J., Sawtelle R., ... Fusillo, S. (2008). Misuse and diversion of stimulants prescribed for ADHD: A systematic review of the literature. *Journal of the American Academy of Child & Adolescent Psychiatry*, 47, 21–31.

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