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A Two-site Randomized Clinical Trial of Integrated Psychosocial Treatment for ADHD-Inattentive Type

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Abstract

Objective—This study evaluated the efficacy of the Child Life and Attention Skills (CLAS) program, a behavioral psychosocial treatment integrated across home and school, for youth with Attention Deficit Hyperactivity Disorder-Inattentive Type (ADHD-I).

Method—In a two-site randomized controlled trial, 199 children (ages 7-11) were randomized to CLAS (N=74), parent-focused treatment (PFT, N=74), or treatment as usual (TAU, N=51). We compared groups on parent and teacher ratings of inattention symptoms, organizational skills, social skills, and global improvement at post-treatment, and also at follow-up during the subsequent school year.

Results—CLAS resulted in greater improvements in teacher-reported inattention, organizational skills, social skills, and global functioning relative to both PFT and TAU at post-treatment. Parents of children in CLAS reported greater improvement in organizational skills than PFT and greater improvements on all outcomes relative to TAU at post-treatment. Differences between CLAS and TAU were maintained at follow-up for most parent-reported measures but were not significant for teacher-reported outcomes.

Conclusions—These findings extend support for CLAS across two study sites, revealing that integrating parent, teacher, and child treatment components, specifically adapted for ADHD-I, is superior to parent training alone and to usual care. Direct involvement of teachers and children in CLAS appears to amplify effects at school and home and underscores the importance of coordinating parent, teacher, and child treatment components for cross-setting effects on symptoms and impairment associated with ADHD-I.

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Keywords

ADHD-Inattentive Type; behavioral intervention; school-home collaboration

Attention Deficit Hyperactivity Disorder, Predominantly Inattentive Type (ADHD-I) is the most common form of ADHD in community settings (Willcutt, 2012). It yields considerable and persistent impairment in daily functioning (Willcutt et al., 2012). The pattern of elevated inattention in the relative absence of hyperactivity and impulsivity for ADHD-I is associated with a unique combination of cognitive/attention deficits, academic and social impairments, comorbid disorders, and motivational features (Hinshaw, 2001; Milich, Balentine, & Lynam, 2001). Children with ADHD-I, relative to those with ADHD, Combined Type (ADHD-C), have more severe symptoms of sluggish cognitive tempo (such as daydreaming, sluggishness, drowsiness) and alertness/orientation problems (Garner et al., 2010: McBurnett et al., 2001) as well as greater difficulty with slow processing speed (Bauermeister et al., 2005). Whereas academic impairments are common for both forms of ADHD, longitudinal data suggest that the academic deficits associated with ADHD-I are more profound and persistent than those of ADHD-C (Massetti et al., 2008). Factors particularly relevant for ADHD-I, such as slow processing speed, low internal motivation for learning, lack of persistence, and being more easily discouraged—as well as factors common to both forms of ADHD such as disorganization and working memory deficits (Carlson, Boothe, Shin, & Canu, 2002; Huang-Pollock, Mikami, Pfiffner, & McBurnett, 2007; Willcutt et al., 2012)—are likely to contribute to academic performance problems often found in children with this diagnosis (Volpe et al., 2006). Although youth with ADHD-I tend to exhibit fewer comorbid disruptive behavior disorders and less aggression than the other ADHD subtypes, children with ADHD-I are less socially engaged, exhibit greater passivity and shyness, have fewer stable friendships, and appear to have social skill knowledge deficits rather than only performance problems (Bauermeister et al., 2005; Blachman & Hinshaw, 2002; Maedgen & Carlson, 2000).

Despite the high prevalence (over 5% in school-age samples, Willcutt, 2012) and serious outcomes for ADHD-I, treatments designed specifically for this subtype have been lacking. Most treatment research on ADHD is based almost exclusively on children having the combination of inattention and hyperactivity/impulsivity symptoms. For them, medication and behavioral/psychosocial interventions are well-documented evidence-based treatments (Hinshaw, Klein, & Abikoff, 2007; MTA Cooperative Group, 1999; Pelham & Fabiano, 2008). However, substantial differences between the subtypes suggest that existing treatment approaches may be more effective if tailored to the particular needs of the inattentive type.

In the case of medication, numerous studies show clear benefit for ADHD symptoms and several show benefit for children with ADHD-I in particular (Salee, Kollins, & Wigal, 2012; Solanto et al., 2009; Stein et al., 2003). However, the role of medication for ADHD-I is not as well-documented as for the combined type. First, benefits may not be as obvious for ADHD-I, given the lack of observable impulsive, disruptive behavior. Second, parents may be less inclined to medicate their children when externalizing symptoms are not present;

indeed, evidence points to a much later median age of onset and less frequent use of medication with ADHD-I: e.g., (Barbaresi et al., 2006; Hinshaw, 2002; Weiss, Worting, & Wasdell, 2003). In short, developing non-pharmacological treatments for ADHD-I is a priority.

Although psychosocial treatments for ADHD also have a longstanding evidence base (Fabiano et al., 2009; Pelham & Fabiano, 2008), such treatments typically focus on disruptive, acting out problems seen among children with ADHD-C. In other words, the typical emphasis of many behavioral programs for ADHD (e.g., Barkley, 1987, MTA Cooperative Group, 1999) on reducing impulsivity and defiance is less relevant for children with ADHD-I. Applying such treatments without tailoring to ADHD-I could result in unnecessary treatment for problems not endorsed for ADHD-I as well as insufficient treatment for those problems that are endorsed. For the latter concern, a combination of strategies to improve attention/alertness, organization, persistence, productivity, social engagement and skill knowledge appears to be directly relevant. Direct skill training interventions for organizational skills (Abikoff et al., 2013; Langberg, Epstein, Urbanowicz, Simon, & Graham, 2008; Langberg, Epstein, Becker, Girio-Herrera, & Vaughn, in press) and social skills (Antshel & Remer, 2003; Pfiffner & McBurnett, 1997; Webster-Stratton, Reid, & Beauchaine, 2011) have yielded promising results, but these approaches are not tailored to the inattentive type of ADHD, do not address the full range of cross-setting impairments associated with the disorder, and/or do not integrate school and home treatment components to maximize generalization across settings.

To address these gaps in treatment specific to ADHD-I, we developed a novel integrated psychosocial treatment (Child Life and Attention Skills, CLAS) that is more closely tailored to the typical needs of children with ADHD-I than are existing behavioral treatments. CLAS combines three components to address the cross-setting impairments of ADHD-I: (a) group-based parent training that has been adapted for the specific problems related to ADHD-I; (b) group-based child life skills training (including organizational and social components, each of which again target ADHD-I impairments specifically); and (c) teacher consultation, including a daily report card. Across all components, CLAS incorporates skill-training and reinforcement-based approaches to address knowledge and performance deficits, supplemented with supportive approaches drawn from rehabilitation psychology, including implementation of routines and scaffolding for executive deficits. Existing parent training (e.g., Barkley, 1987, Forehand et al., 1981; Wells et al., 1996) and social skills interventions (e.g., Pfiffner & McBurnett, 1997) were adapted by emphasizing session content to address problems characteristic of ADHD-I, including strategies for improving homework, home routines, organization, independence in self-care, time management, friendship-making, and social assertion and by reducing session content related to impulse management. Unique to this intervention (although likely to be helpful for all types of ADHD) is the sharing of a positive reinforcement program and the use of common terminology across settings with parents, teachers, and children, to enhance generalization of treatment effects. By directly instructing children about skills and behavior change and by coordinating the language and rewards for behavior change across all of the child's relevant life settings, the components of CLAS are expected to work together. We also incorporated monthly booster sessions

following the core intervention period in order to facilitate maintenance of treatment gains and generalization of treatment effects into the subsequent school year.

Results from a pilot randomized controlled trial (N=66) comparing CLAS to usual care revealed significant treatment effects in the medium to large range on inattention symptoms and on organizational and social impairments, compared to controls who did not receive the intervention (Pfiffner, et al., 2007). In that study, gains made at post-treatment in the CLAS group were maintained at follow-up. These results also supported the feasibility and acceptability of the model.

In the present study we intended to provide a larger-scale, two-site test of CLAS in comparison to two control conditions: (a) typical community treatment (TAU), and (b) parent-focused treatment (PFT), the parent component of CLAS. The latter constitutes an active treatment control. We predicted that ADHD-I symptoms, organizational impairment, social impairment, and global psychosocial impairment as reported by parents and teachers would be significantly reduced in families receiving CLAS treatment relative to both TAU and PFT at post-treatment and follow-up during the Fall of the next school year. We also present results for comparisons between PFT and TAU. Although we expected PFT to generally provide more beneficial change than TAU on parent-reported measures, we did not formalize our expectations as a priori hypotheses since the study was not designed to address these comparisons as primary questions.

Method

Participants

One hundred ninety-nine children participated at one of two sites: (University of California San Francisco, n = 96), and (University of California, Berkeley, n=103). Most were recruited from schools via mailings to principals, school mental health providers, and learning specialists (65%). The remainder were recruited via mailings to offices of pediatricians, child psychiatrists, and psychologists (18%); postings in on-line parent networks or professional organizations (11%); or through word-of-mouth (6%). Inclusion criteria specified a primary DSM-IV diagnosis of ADHD-I (confirmed by the KSADS-PL; see below), IQ > 80 (confirmed with the Wechsler Intelligence Scale for Children, version IV [WISC-IV, Wechsler, 2003]), living with at least one parent for the past year, child age between 7-11 years (and grades 2-5), attending school full time in a regular classroom, ability to participate in our groups on the days scheduled, school proximity within 45 minutes of study site to allow for the clinician to conduct school meetings, and teacher consent to participate in a school-based treatment. Families of children who were taking non-stimulant psychoactive medication were excluded because of difficulty withholding medication to confirm ADHD-I symptoms, as were cases planning to initiate or change medication treatment (stimulant or otherwise) in the near term. Children with significant developmental disorders (e.g., pervasive developmental disorder) or neurological illnesses were also excluded.

Mean child age at randomization was 8.6 years (range 7 to 11), with 25.6% in 2nd grade, 31.2% in 3rd grade, 26.6% in 4th grade, and 16.6% in 5th grade. Boys comprised 58% of the

sample. Fifty-four percent were Caucasian, 17% were Latino, 8% were Asian American, 5% were African American, and 17% self-identified as mixed race. Total household income was below $50,000 for 14.1%, $50,000-100,000 for 28.3%, $100,000-150,000 for 28.8%, and more than $150,000 for 28.8% of families. 81.2% of the primary parents reported having graduated from college. Thirteen percent of the participants were living in single-parent homes. At randomization, 4.5% were taking medication (all but one received stimulant medication) to address ADHD-related symptoms. See Table 1 for demographic characteristics by treatment group status.

Screening and Diagnostic Procedures

Participant flow is depicted in Figure 1. Initial screenings included parent and teacher telephone interviews to assess eligibility for demographics, school, and medication status. Those who met basic screening criteria were sent parent and teacher packets containing the ADHD module of the *Child Symptom Inventory* (CSI-4; Gadow & Sprafkin, 2002) and the *Impairment Rating Scale* (IRS; Fabiano et al., 2006) to screen for subjects who were likely to meet full diagnostic criteria for ADHD-I. The small number of children taking stimulant medication completed a one-week wash-out to assess behavior and obtain ratings off-medication. On the CSI-4, a symptom was judged to be present if rated “often” or “very often” by either parent or teacher. Cases meeting the following guidelines were invited for a diagnostic clinic visit: (a) at least five independent symptoms of inattention endorsed on the CSI by parent or teacher, with at least 2 inattention symptoms endorsed by each informant; (b) five or fewer independent symptoms of hyperactivity and impulsivity endorsed on the CSI by parent or teacher; and (c) evidence of impairment due to inattention as rated by both parents and teachers on the IRS (i.e., at least one area of functioning had to be rated ≥3 by each informant; Fabiano et al., 2006). A small number of cases that narrowly missed this guideline but were otherwise significant for ADHD-I also were invited to a diagnostic visit. Screening guidelines were intentionally set low, in order not to exclude children who would ultimately meet symptom count and impairment criteria for ADHD-I. Please see Table 1 for parent- and teacher-reported inattention and hyperactivity-impulsivity symptom counts for participating children.

Parents provided informed written consent and children provided written assent; study procedures were approved by the Committee on Human Research at the University of California, San Francisco and the University of California, Berkeley.

To confirm diagnostic status, parents were interviewed by a licensed clinical psychologist and were asked about their child's clinical and developmental history and administered modules from the *Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children* (K-SADS-PL; see Kaufman, Birmaher, Brent, & Rao, 1997) assessing ADHD, oppositional defiant disorder, conduct disorder, anxiety disorders, major mood disorders, and psychoses. The K-SADS has good psychometric properties, including adequate test-retest reliability (Kaufman et al., 1997). All cases met full DSM-IV criteria for ADHD-I. Six or more inattention symptoms and fewer than 6 hyperactive-impulsive symptoms on the KSADS were required for study entry (KSADS inattention symptom count mean=7.6, SD=1.1; hyperactivity-impulsivity symptom count mean=1.2, SD=1.2). Twenty percent of

randomly selected audio-recorded K-SADS interviews were rated by an independent clinician with 100% agreement for an ADHD-I diagnosis (kappa =1.0). The vast majority of children were reported to have 2 or fewer hyperactivity-inattention symptoms per parent (79%) and teacher (83%) report on the Child Symptom Inventory, reflecting the predominantly inattentive symptom presentation of this sample. Parents also completed a battery of questionnaires over two visits, and children were administered the WISC-IV and a battery of tests and questionnaires. Those providing data for the current paper are described below. Parents were informed of their randomization status after they completed both visits.

Design

Across four years (2009-2012), six cohorts of children participated, with a mean number of 33 children in each cohort (range of 24 to 43). Children were randomized within site to the Child Life and Attention Skills Treatment (CLAS; 36 at site 1 and 38 at site 2; 74 total), Parent Focused Treatment (PFT; 36 at site 1 and 38 at site 2; 74 total), or treatment as usual (TAU; 24 at site 1 and 27 at site 2; 51 total). Treatment occurred over a 10- to 13-week period. Immediately following treatment, laboratory visits were scheduled with families and rating scales were sent to teachers. Five to seven months post-treatment (i.e., in October to November of the subsequent school year), children participated in a follow-up laboratory visit and their new teachers were asked to complete a set of rating scales assessing functioning in the current year's classroom setting.

Treatment Conditions

Child Life and Attention Skills Treatment (CLAS)

Rationale for CLAS: CLAS was developed over several years in an attempt to maximize the efficacy of psychosocial treatment for the Inattentive Type of ADHD. It aggregates adaptations of several treatments that have individually shown efficacy for ADHD (parent training, teacher consultation/school-home notes, child skills training). Novel aspects of CLAS include:

a. Reliance on techniques drawn from rehabilitation psychology, such as scaffolding, reminders, and routinization, to help manage executive function problems. This is based on observations that many children with ADHD-I only partially respond to contingencies to improve behavioral deficits that are dependent on fully functioning executive processes. Executive dysfunction is viewed as being a chronic and non-volitional weakness requiring “work-arounds” as well as incentives.

b. Inclusion of child groups having the dual purposes of 1) providing direct training for children in strategies for managing executive function problems and social skills specific to ADHD-I and 2) providing a vehicle to introduce and support behavioral programs developed for the home and the classroom.

c. Decreased emphasis on contingency management for impulsivity and defiance given the lesser concerns in these areas for ADHD-I.

d. Saturation of the child's environment with treatment inputs given the cross-setting impairments associated with ADHD-I.

e. Reduced reliance on parents and teachers as exclusive agents for introducing and reinforcing behavioral programs. For example, in standard parent training, parents learn behavioral strategies from therapists and then are expected to explain procedures to children. In CLAS, children are introduced to the "skill of the week" directly from therapists in the child group, which has the effects of empowering children and increasing their engagement with treatment in other settings (home and classroom).

f. Maximization of synergistic effects across treatment components. Behaviors to change are targeted by multiple components; rewards are provided within and across settings; goals and terminology are shared across settings.

Structure of CLAS: CLAS included three manualized coordinated components (Pfiffner, 2014): (a) ten 90-minute parent group meetings, along with up to six 30-minute family meetings (parent, child, and therapist); (b) ten 90-minute child group meetings; and (c) teacher consultation, which included one 30-minute orientation meeting involving the teacher and therapist and up to five subsequent 30-minute meetings with the parent, child, teacher, and therapist and booster sessions (see below). Parent and child groups contained between five and eight families and were held in clinic offices. Individual meetings with families occurred in clinic offices, on the telephone, or in a private location on school grounds. Teacher consultation occurred on school grounds, or occasionally over the telephone.

Parent component: The curriculum for the parent component was adapted from existing parent training programs (Barkley, 1987; Forehand & McMahon, 1981; Wells et al., 1996). Parent groups began with an overview of ADHD-I and the social learning model, followed by a set of strategies for managing ADHD-I and associated impairments. Strategies covered included attending, using rewards and positive consequences such as praise, establishing daily routines, using effective directions and commands, using prudent negative consequences, avoiding power struggles, parent stress management, and organizing/ structuring the home and the child's broader environment to promote adaptive functioning and independence. To address executive functioning deficits (e.g., planning, working memory, multitasking, prioritizing), we taught parents to closely scaffold their child through use of routines across the day (e.g., morning, homework time, evening) and other cue-based reminders (e.g., lists of tasks to be completed), organizational strategies, and feedback and contingencies to reinforce successful implementation of day-to-day activities and tasks. All of the families developed a "Home Challenge" (token economy) with specific home target behaviors and rewards individualized for each family. Each parent group included a review and troubleshooting of homework assigned at the previous session and presentation of new content. Individual family meetings, which occurred approximately every two weeks, allowed therapists to further tailor content in order to meet the needs of individual children and to give personalized feedback on changes in parenting skills. Methods for shaping behavior and reducing the intensity of behavioral programs while maintaining behavioral gains were also reviewed. CLAS participants were also taught skills for interacting effectively with teachers as well as how best to develop, evaluate, and reinforce the classroom intervention (see below). In addition, modules covered in the child groups (see

below) were reviewed, and parents were taught methods to promote and reinforce their children's use of skills taught during the child sessions. Childcare was provided for siblings while the groups were held.

Child component: The child component, adapted from a social skills curriculum for ADHD (Pfiffner and McBurnett, 1997), was delivered in a group setting at the same time the parent group was conducted. Modules focused on skills for independence (academic, study, and organizational skills; self-care and daily living skills) and social skills (e.g., good sportsmanship, assertion, conversational skills, dealing with teasing, friendship-making, playdate skills). Both skill knowledge deficits and skill implementation deficits were targeted through didactic instruction, modeling of skills by group leaders, behavioral rehearsal, corrective feedback, and in vivo practice in the context of a reward-based contingency management program. Self-management of alertness was supported by group-reinforced “attention checks” (Pelham & Hoza, 1996). Children were taught strategies (e.g., problem-solving steps, self-cues, reminder lists) to promote attention, time management, and task completion. Specific plans were developed for morning, homework, and evening routines with tasks and activities clearly specified. Role plays of common problem scenarios for ADHD-I were covered as a part of each module (e.g., staying on task during homework, staying focused when getting ready in the morning, joining a game, responding to being teased). Children practiced new skills during play activities and mock school/home routines. For example, children rotated through mock homework stations and morning routine relay races and participated in backpack organization challenges. Each week, children brought in stars earned from their home and school challenges in exchange for group-based rewards (e.g., mid-treatment cookie party, pizza party at the last session) designed to facilitate generalization of behaviors. For children who were not meeting the behavioral demands of the child group (e.g., following directions), individualized reward programs were developed to reinforce appropriate behavior during the group. During the last 10 minutes of group, all parents and children met together to review the child “skill of the week” and to plan completion of joint parent-child treatment homework assignments for the week (e.g., developing a morning routine checklist, planning a playdate, etc.).

Teacher component: Content for this component included evidence-based classroom management strategies (Pfiffner, Barkley, & DuPaul, 2006; Fabiano et al., 2010; Pfiffner, 2011). Teachers were taught strategies to scaffold and support attention and use of skills taught in the child group in the classroom. At the teacher orientation meeting, teachers were provided with an overview of ADHD-I and the use of a school-home daily report card, which we termed the “Classroom Challenge” (CC), on which teachers rated students three times per day on up to four specific goal behaviors. Specific target behaviors for the CC, tailored to the specific needs of the child, were selected by the teacher, shaped by the CLAS clinician, and then discussed with the parent and child at the first CC meeting. Typical academic and organizational targets included “get started right away,” “finish work on time,” “ask for help when you need it,” or “turn in your homework.” Typical social targets included “play with a peer at recess” or “use Cool Craig (puppet character representing assertion) skills.” Subsequently, up to four additional CC meetings were offered, during which methods for increasing the effectiveness and success of the CC were discussed, along

with a broader range of accommodations (e.g., preferential seating, using a homework planner, timers and/or reminders) intended to improve attention and reduce classroom impairment. Skills taught in the child group were shared with teachers, in order that the child's use of these skills could be reinforced (sometimes as a target on the CC) in the classroom.

Parent Focused Treatment (PFT)—PFT included only the parent training group component described above (Pfiffner et al., 2014) which was adapted from existing parent training programs (Barkley, 1987; Forehand & McMahon, 1981; Wells et al., 1996). Parent skills taught were identical to those in the CLAS parent group (see description above). However, PFT families did not receive specific training in how to work with teachers and were not informed about the child skills taught in the CLAS condition. PFT families received the same number of parent groups and individual family meetings as CLAS families, although children did not attend the individual family meetings. Childcare was offered to families while the parent group was held. The PFT condition did not include a child skills group or direct teacher consultation. Instead, teachers were contacted by mail regarding the study, given written information about ADHD-I and suggested classroom accommodations, and invited to call the therapists with any questions. Telephone contact with PFT teachers was limited to only a few teachers who had general questions about the study or related materials.

Booster/Maintenance Treatment for CLAS and PFT—Following the 10- to 13-week core intervention between post-treatment and follow-up, all CLAS and PFT families were offered monthly treatment booster sessions (CLAS with parents and children and PFT with parents only). Booster session content was manualized and included review of material covered in the respective treatment conditions (CLAS: parenting skills, child skills and classroom challenge; PFT: parenting skills) and troubleshooting of current programs. CLAS families were also encouraged to contact their next year's teacher in September about their child's functioning. If problems were present or if the parents desired, their CLAS therapist offered to set up or attend a consultation meeting with teacher, parent and child as needed prior to follow-up.

Treatment as Usual (TAU)—TAU did not receive either study treatment. As with all other families, TAU families received a written diagnostic report based on the assessment conducted at baseline. Families in the TAU condition also received a list of community treatment providers but were not given specific treatment recommendations. After TAU families completed their follow-up treatment assessments in the fall, they were offered the opportunity to participate in a two-session parenting workshop focused on the strategies taught in the CLAS groups, with limited individual follow-up if needed. During the period between baseline and post-treatment, 14% received medication (all but one received stimulant medication), 33% received psychotherapy (family therapy, child therapy or parenting group), 51% received educational intervention (special education services at school, tutoring) and 53% received classroom accommodations (e.g., preferential seating modified homework, behavioral chart, extra time on tests). During the period between post-treatment and follow-up, 21% received medication (all but two received stimulant

medication), 38% received psychotherapy, 52% received educational intervention, and 55% received classroom accommodations.

Therapists, Supervision, and Treatment Integrity

For any given participant in the CLAS condition, the same therapist provided parent group and individual family sessions as well as teacher consultation. In PFT, the same therapist provided the parent group and individual family (only parents for PFT) sessions. Parent group leaders included four therapists (two at site 1, one at site 2, and one working alternately at both sites). Two therapists provided CLAS (6 groups each) and PFT (5 and 4 PFT groups respectively). An additional two therapists provided only PFT (1 and 2 groups respectively). Three were licensed clinical psychologists and one was a clinical psychology postdoctoral fellow. Child group leaders were B.A. or M.A. level clinicians (N=10); two co-led each group. Supervision was provided by licensed clinical psychologists during weekly cross-site conference calls and individually as needed. Joint supervision was conducted with parent and child group leaders for the CLAS condition to ensure integration across components.

Therapists followed highly detailed manuals describing the sequence and content of topics for the teacher, parent, and child treatment components. Weekly cross-site conference calls concerning previous group and individual sessions, upcoming sessions, and clinical issues were also held to optimize cross-site fidelity. After each group or individual session, therapists completed fidelity checklists listing the major topics covered. Clinician reports of the percentage of content they covered were uniformly high: CLAS parent group: 94%; PFT parent group: 98%; CLAS child group: 96%. In addition, groups were observed and fidelity checklists completed by independent raters for 65% of CLAS parent groups, 84% of PFT groups, and 82% of CLAS child groups. Inter-rater reliability for these ratings was above 97%. Note that content not covered during one session was covered in the subsequent session. Thus, close to 100% of session content was covered in both conditions. As a measure of potential treatment contamination, raters also monitored whether PFT therapists covered the CLAS content related to school consultation or child skills. No instance of such treatment contamination was observed.

Attendance—CLAS parents attended an average of 9.3 group meetings and 4.2 individual family meetings. Teachers attended an average of 4.0 meetings (including the orientation). PFT parents attended an average of 8.8 group meetings and 3.9 individual parent meetings. Participants in CLAS and PFT did not differ significantly in the number of individual parent meetings attended; however, PFT parents participated in slightly fewer group meetings (8.8) compared to CLAS parents (9.3), $p = .023$ ($d = .38$). Participation in the booster sessions varied across individuals, with a mean of 2.1 sessions for CLAS families (range of 0-6) and a mean of 2.1 sessions for PFT families (range of 0-7). Clinicians met with teachers of 11 (9 met once, 2 met twice) of the 74 children (15%) in the CLAS condition during the subsequent school year as an extension of treatment to the new classroom setting.

Measures

DSM-IV Inattention Symptoms—The Inattention items from the Child Symptom Inventory (CSI) (Gadow & Sprafkin, 1994), completed by parents and teachers, correspond to DSM-IV inattention symptoms and are rated on a 4-point scale (0=never to 3=very often). The Inattention Scale has normative data, acceptable test-retest reliability, and acceptable predictive validity for categorical diagnosis of ADHD (Gadow & Sprafkin, 1997).

Organization—Teachers and parents completed the Children's Organizational Skills Scale (COSS) (Abikoff & Gallagher, 2009). Items are rated on a 4-point scale (hardly ever/never to just about all the time); those assessing organizational skills, management of materials/ supplies, and task planning skills (parent=58 items, teacher=35 items) are totaled for analyses. The parent and teacher versions both have adequate psychometric properties, including excellent internal consistency (alphas =.98 and .97, respectively), test-retest reliability (*rs* = .99 and .94, respectively), and evidence of structural, convergent, and discriminant validity. Both teacher and parent versions assess organizational skills pertinent to successful academic functioning.

Social Skills—Teachers and parents completed the Social Skills Improvement Scale (SSIS) (Gresham & Elliott, 2008). The SSIS has excellent psychometric properties, including high internal consistency for the parent and teacher versions (.94 and .95, respectively) and evidence for convergent and discriminant validity (see Gresham and Elliott, 2008). Test-retest reliability is adequate (.84 and .81 for teacher and parent versions respectively). In this study, we analyzed the total social skills subscale, which reflects communication, cooperation, assertion, responsibility, empathy, and self-control skills.

Functional Impairment—Teachers and parents completed the Impairment Rating Scale (IRS; Fabiano et al., 2006), which measures impairment in 6 (teacher) or 7 (parent) domains on a 7-point scale ranging from 0 (*No problem, no need for special services*) to 6 (*Extreme problem, great need for special services*) and has evidence of reliability and validity (Fabiano et al., 2006). This measure was used at baseline to confirm cross-setting impairment (i.e., minimum of one domain scored 3 or above at school and at home).

Global Psychosocial Functioning—Global ratings of the severity of psychosocial functioning were captured using the 7-point Clinical Global Impression Scale (National Institute of Mental Health, 1985), Severity version (CGI-S) (1=no impairment to 7=maximal impairment). The 7-point Clinical Global Impressions Scale, Improvement version (CGI-I) was administered at post-treatment to parents and teachers and follow-up to parents (1=much worse to 7=much improved); the CGI-S version was administered to teachers at follow-up, as they did not know the children previously. We adapted the scales for completion by parents and teachers. The CGI has been widely used to measure treatment response in clinical trials for ADHD and has been shown to be sensitive to medication treatment for ADHD-I (Solanto et al., 2009).

Satisfaction—Parents and teachers completed a measure, developed for this study, to assess their general impressions of the treatment they received. A subset of items (4 from the

CLAS parent and teacher measures; 3 from the PFT parent measure) pertaining to the usefulness and appropriateness of the skills taught and their satisfaction with the program were evaluated. Items were rated on a 5-point scale, with higher scores indicating greater satisfaction/utility and lower scores indicating greater dissatisfaction/utility. PFT parents were also queried about whether they would or would not have preferred having the teacher and child components as part of the treatment.

Participant Compensation

Families were compensated for completion of post-treatment (CLAS and PFT: $50, TAU: $150) and follow-up assessments (CLAS and PFT: $100, TAU: $150). Teachers also were compensated for completing measures at each timepoint: baseline: $50, post-treatment: $75, follow-up: $75. CLAS condition teachers also received a total of $100 for their participation in the teacher consultation meetings. Therapy was provided at no cost to families.

Data Analytic Plan

All statistical analyses were performed with SPSS for Windows, Version 20 (SPSS, Inc. 2011). Preliminary analyses involved investigation of missing data and assessment of baseline characteristics by treatment group (Table 1).

We analyzed outcomes in the four domains that were the primary focus of our intervention: (a) total number of nine possible DSM-IV inattentive symptoms (separate reports from parent and teacher on the CSI), with symptom presence corresponding to ratings of “often” or “very often”; (b) organizational skills (separate reports from parent and teacher on the COSS, using the mean of all items); (c) social skills (separate reports from parent and teacher on the SSIS, using the Social Skills Scale standard score); and (d) overall improvement (separate parent and teacher ratings on a 1-7 scale, where 1 = “much worse,” 4 = “unchanged,” and 7 = “much improved”). Our primary analyses involved treatment group comparisons (ANCOVAs) on these eight post-treatment outcome measures (one parent and one teacher report for each of the four domains) (Table 2)[1]. In the first set of ANCOVAs we controlled for pre-treatment score; in the second set we controlled for pre-treatment score and five relevant covariates (cohort, sex, child IQ, medication status at randomization, and education level of primary parent). In order to assess maintenance of treatment effects, these ANCOVAs were repeated using follow-up outcomes (Table 3), and within-group post treatment and follow-up scores were compared. ANCOVAs employing covariates beyond pre-treatment score were computed only when the initial ANCOVA, employing pre-treatment score, was significant. In Tables 2 and 3 we display effect sizes (Cohen's *d*), with the difference between estimated means (adjusted for pre-treatment score) as the numerator and the pooled standard deviation as the denominator (Cohen, 1988). In order to control Type I error rate, a Benjamini-Hochberg False Discovery Rate (FDR) (Benjamini & Hochberg, 1995) was applied within domain. The FDR exerts more powerful control over

[1]ICCs and Design Effects were examined for each outcome to determine whether or not variance at the therapy group level should be accounted for. The ICCs for parent-reported ADHD symptoms exceeded the limit (>.05) at post-treatment and follow-up, but the Design Effect only exceeded the limit (> 2) at follow-up. CLAS vs. PFT group differences were tested for each of these outcomes using two-level models in order to account for the therapy group-level variance and the results followed the same pattern as the results presented here (i.e., not significant). As a result, we present the findings without accounting for clustering effects.

wrongly rejecting the null compared to procedures that control the familywise error rate (e.g., the Bonferroni correction). Specifically, using this method, each *p*-value below the a priori family-wise alpha level of .05 (*i*) is ranked in ascending order, *i* thru *M*, where *M* is the rank of the largest (least significant) *p*-value. These *p*-values are then compared iteratively to an adjusted alpha level of $i(\alpha)/M$, until one of the *p*-values (*k)* is larger than the adjusted alpha level. When this occurs, *k* and all *p*-values ranked after *k* are considered nonsignificant. Finally, in order to judge clinical significance, we compared the percentage of cases with CSI symptom severity scores within the normative range (within one SD of the population mean) at post-treatment and follow-up, separately for parents and teachers.

Results

Very few data were missing at pre-treatment (19 values, 0.8%) or post-treatment (53 values, 3.3%), so none were imputed. Across the 1592 follow-up outcome values, 168 were missing (10.6%). Most of the missing data related to attrition. As reported in Figure 1, four families dropped from treatment prior to post-assessment and an additional eight families dropped after post-assessments but prior to follow-up. For the parent and teacher CSI, COSS, and SSIS, and parent global improvement variables, we carried forward values from post-treatment. We did not do so for the teacher global improvement variable because at follow-up (in the year subsequent to the study), we asked the new teacher about impairment rather than improvement from pre-treatment. Furthermore, impairment scores were not collected from teachers at follow up for Cohort 1, meaning that the n's for those groups are somewhat lower (see Table 3). Of note, follow-up results were at the same level of significance with and without missing data carried forward.

As noted earlier, Table 1 presents pre-treatment characteristics by treatment assignment. Only medication status at randomization differed across the treatment groups ($p = .035$), with significantly more CLAS children reporting medication use (9.5%) than PFT (1.4%), but not compared to TAU (2.0%). Thus, medication status at randomization was used as a covariate in the secondary ANCOVAs. Additionally, gender, child IQ, cohort, and education level of primary parent were related to at least one post-treatment outcome and were included as covariates in the secondary ANCOVAs. By design, site was not related to randomization and it was not related to any post-treatment outcome. We also examined site-by-treatment effects on the primary outcome measures and none were significant. Therefore, we did not covary site in our analyses.

Post-Treatment Effects

As seen in Table 2, significant effects at post-treatment, controlling for pre-treatment score, were found for each measure in every domain, as follows: for parent CSI $F_{2,190} = 6.88$, $p = .001$; for teacher CSI $F_{2,190} = 9.39$, $p = .000$; for parent COSS $F_{2,189} = 12.09$, $p = .000$; for teacher COSS $F_{2,189} = 8.87$, $p = .000$; for parent SSIS $F_{2,184} = 3.31$, $p = .039$; for teacher SSIS $F_{2,183} = 4.19$, $p = .017$; for parent overall improvement $F_{2,190} = 21.10$, $p = .000$; for teacher overall improvement $F_{2,189} = 12.34$, $p = .000$. We note that the same significant effects were also obtained when, in addition to pre-treatment score, we covaried a set of

potentially confounding baseline characteristic scores (cohort, sex, child IQ, medication status at randomization, and education level of primary parent).

All post-hoc comparisons between CLAS and TAU were significant after the Benjamini-Hochberg FDR correction. CLAS children showed significantly fewer parent-rated and teacher-rated inattention symptoms than TAU children. CLAS children showed significantly greater parent-rated and teacher-rated organizational and social skills compared to TAU children. They also showed greater overall improvement by parent and teacher report compared to TAU children. In five of eight instances, effect sizes for these comparisons were medium to very large (*d*s= .64 to 1.07); for one (teacher COSS) the effect size was small-to-medium (*d* = .46) and for two (parent and teacher SSIS) the effect size was small (*d*s = .36, .34). Thus, according to both parent and teacher report, children randomized to the integrative, psychosocial treatment condition showed a positive treatment response compared to children in the control (TAU) group.

Five of the eight post-hoc comparisons between CLAS and PFT were significant after the Benjamini-Hochberg FDR correction. According to teacher report at post-treatment, CLAS children showed lower levels of inattention symptoms compared to PFT children, greater organizational and social skills at school than PFT children, and greater overall improvement than PFT children. In three instances (teacher-rated inattention, organizational skills, and overall improvement) effect sizes were near-medium or medium (*ds* = .42, .44, .57), and in one instance (teacher-rated social skills), the effect size was small (*d* = .31). On the other hand, PFT parents viewed their children as showing similar gains to CLAS children in terms of reduction of inattention symptoms, increases in social skills, and overall improvement. Yet PFT parents reported fewer child organizational skills at home at post-treatment than did CLAS parents, with a small effect size (*d* = .40). Overall, the difference in treatment response between children in the integrative psychosocial treatment and the parent-focused treatment was small to medium in size and visible primarily at school.

Regarding the PFT versus TAU comparisons, three were significant. At post-treatment parents of PFT children reported significantly fewer inattention symptoms (*d* =.38), greater organizational skills (*d* =.34), and greater overall improvement (d =.86) than TAU children. No significant effects were found when teachers were informants. Thus, according to parents, but not to teachers, children in the parent-focused treatment clearly showed positive treatment responses on 3 of 4 outcomes, ranging from small to large in size, compared to children in the control group.

Follow-up Effects

Group differences at follow-up, 6-to-7 months after treatment concluded, are seen in Table 3 and were significant only according to parent report (CSI $F_{2,190}$ = 8.01, p = .000; COSS $F_{2,190}$ = 5.08, p = .007; overall change $F_{2,190}$ = 6.94, p = .001). These significant effects were maintained when, in addition to pre-treatment score, we covaried a set of potentially confounding baseline characteristics scores (cohort, sex, child IQ, medication status at randomization, and education level of primary parent). At follow-up, teachers did not report differences across groups regarding level of inattention symptoms, organization at school, social skills or overall impairment.

Post-hoc comparisons revealed treatment effects favoring CLAS over TAU. In these conditions, parent-reported differences were medium or near-medium in size (.68 for the CSI, .46 for the COSS, .67 for global improvement) and were significant after the Benjamini-Hochberg FDR correction. In addition, CLAS parents reported significantly greater organizational skills at post-treatment than did PFT parents after the Benjamini-Hochberg FDR correction, with a small effect size (d = .35). The comparison between CLAS and PFT for inattention was not significant for inattention after the Benjamini-Hochberg FDR correction. PFT parents continued to report significantly greater overall improvement than TAU (d=.45), but other PFT-TAU comparisons were small and not significant.

We conducted exploratory within-group analyses between post-treatment and follow-up as a means of uncovering which group(s) changed across this interval. Tests were not significant for any contrast with two exceptions: parents in the CLAS group reported decreased inattention symptoms from post-treatment to follow-up (t = -2.09, p = .04), and TAU parents reported improved organization from post-treatment to follow-up (t =-2.97, p = .005). These within-group comparisons indicate that gains made at post-treatment across all measures per parent and teacher report were maintained at follow-up.

Clinically Meaningful Response Rates

We examined the percentages of clinically meaningful, or positive, responders within each treatment group. Positive responders were those whose mean CSI inattention symptom severity score fell within one SD of the gender-and age-adjusted normative mean. These percentages were calculated separately according to parent and teacher report. At post-treatment according to parents, 54.8% of CLAS participants, 43.2% of PFT, and 29.8% of TAU were positive responders (X^2 = 7.30, p = .026), and the difference between CLAS and TAU was significant (X^2 = 7.22, p = .007), but not between CLAS and PFT (p>.05). At post-treatment according to teachers, 57.5% of CLAS, 44.4% of PFT, and 32.7% of TAU were positive responders (X^2 = 7.47, p = .024), and again the difference between CLAS and TAU was significant (X^2 = 7.28, p = .007), but not between CLAS and PFT (p>.05). At follow-up according to parents, 63.0% of CLAS, 52.7% of PFT, and 36.2% of TAU were positive responders (X^2 = 8.26, p = .016); the difference between CLAS and TAU was significant (X^2 = 8.26, p = .004), but not between CLAS and PFT (p>.05). At follow-up according to teachers, 47.2% of CLAS, 45.9% of PFT, and 38.8% of TAU were responders (ns).

Satisfaction

Parent and teacher satisfaction with CLAS was very high. The vast majority of parents (>95%) rated the child and parent skills taught as useful or very useful. They were satisfied or very satisfied with the treatment and would recommend the program to others. The majority of teachers (94%) rated the classroom challenge as helpful or very helpful and 83% reported they were likely or very likely to continue use of the program. The vast majority of teachers also rated the program as appropriate or very appropriate for treating attention/academic/social skills problems: 94% reported they would recommend or strongly recommend the program to other parents or teachers. Parent satisfaction with PFT was also

high: 95% rated parent skills as useful or very useful, 96% were satisfied or very satisfied with treatment, and 96% would recommend or strongly recommend the program to others. Finally, 85% of parents in PFT group would have preferred to have an accompanying child skills group and 79% would have preferred that the program have been implemented with their child's teacher.

Discussion

This study, comprising a randomized clinical trial of a novel psychosocial treatment for ADHD-I, was designed to include comparison conditions without some (teacher and child in the case of parent-focused treatment) or all (teacher, child and parent in the case of usual community care, or TAU) of the CLAS components. As predicted, results support the efficacy of CLAS relative to both contrast conditions. Immediately following treatment, parents and teachers of children who received CLAS reported significant improvements in inattention symptoms, organizational skills, social skills, and global functioning relative to usual community care, replicating the Pfiffner et al. (2007) findings with a much larger sample across two sites. Both parents and teachers reported that over half of CLAS group participants recovered to within one standard deviation of the normative mean for inattention symptoms. Significant differential effects favoring CLAS over PFT were seen for all school-based measures (symptoms, skills, and overall improvement) and for organizational skills at home. Differences for school outcomes favoring CLAS suggests that the direct involvement of teachers and coordination across home and school facilitated generalization to the school context and underscore the value of treating in all settings where problems occur. Differences for measures of child skills favoring CLAS provide evidence of the benefits of including child training in treatment programs for ADHD, consistent with other recent reports (Abikoff et al., 2013; Langberg et al., in press).

The magnitude of mean outcome changes in this study was consistently ordered as CLAS > PFT > TAU. The ordering sequence suggests a possible additive effect from including additional structured treatment components. It is also possible (and from our viewpoint likely) that additive effects were accompanied by synergistic effects. In our conceptual model, CLAS has benefits that extend beyond the sum of its parts due to its integration of component treatments across all three participants and settings, featuring common goals, language, and reinforcement. Note, however, that active treatment effects cannot be disentangled from the effects of having outcome raters who were also involved in treatment and thus may have contributed some favorable bias (see limitations below).

PFT showed a positive response to treatment relative to TAU on 3 of 4 parent-completed measures at post-treatment, suggesting that parent training can be useful for ADHD-I, a finding consistent with parent training outcome studies for ADHD-C (Pelham & Fabiano, 2008). Additionally, parent satisfaction with treatment was high for PFT, just as it was for CLAS. However, the majority of parents in PFT would have preferred to have the teacher and child components included in the treatment, and slightly better attendance at the parent group was observed when children attended their own group, both of which represent additional advantages for CLAS—and perhaps multicomponent treatments more generally. It also should be noted that most parent reported PFT-TAU group differences were reduced

at follow-up and teacher measures did not show benefit for PFT over TAU at either time-point; thus the beneficial effects of PFT for ADHD-I appear to be fairly circumscribed in terms of setting and duration.

At follow-up, most outcomes fell in the expected order: CLAS continued to outperform PFT for parent-reported organizational skills and to outperform TAU for parent-reported inattention, organizational skills and overall improvement. However, any relative benefit of CLAS to the new classroom was not observed. Inspection of the group means at post-treatment and follow-up shows an improvement in teacher ratings for TAU at follow-up, which may have mitigated between-group differences at that time point. This pattern was also seen in the pilot study (Pfiffner et al., 2007). Possible explanations include regression to the mean, maturation, or other spontaneous improvement for the TAU group (note that ADHD symptoms tend to fluctuate with time: Langberg et al., 2008; Willcutt et al., 2012). However, these possibilities are not clearly supported, given that parent ratings reveal ongoing problems at follow-up for TAU relative to CLAS. Greater service utilization for TAU also is an unlikely explanation, as rates did not differ between groups (Pfiffner & Hinshaw, 2014). It is also possible that CLAS effects may not persist into the next school year with a new teacher, although the lack of significant deterioration in this group does not clearly support this possibility. Yet another possibility is that treatment allegiance inflated teacher ratings at post-treatment, but not at follow-up (at which time most teachers had not participated in treatment). Alternatively, it is possible that because the ratings were gathered from follow-up teachers early in the school year (October), the problems of ADHD-I, which are mostly not obtrusive or disruptive, were not yet evident. Follow-up assessment of children later in the school year, after teachers are more aware of these problems, may provide a more powerful indicator of treatment effects.

Monthly booster sessions between post-treatment and follow-up were offered to families, as was assistance in implementing CLAS treatment strategies (e.g., classroom challenge) with the next school year's teacher. Although many parents did take advantage of the optional booster sessions for themselves, few took advantage of the opportunity for our assistance with the next year's teacher. More substantial follow-up gains at school may have been realized with greater school-based intervention at that time point. Still, follow-up levels of symptoms and impairment at school were still below baseline rates.

Too few children were taking medication at baseline to permit evaluation of potential moderation effects of medication on CLAS outcomes. The low rates of medication use are consistent with Pfiffner et al., (2007) and may reflect the largely school-referred nature of the present sample. Most had not received services prior to the study, which may be typical for youth with ADHD-I who appear to be under-referred for treatment (Willcutt, 2012). It is also noteworthy that the magnitude of CLAS effects at post-treatment with this mostly unmedicated sample (as found in the pilot study, Pfiffner et al., 2007) compare favorably to those of medication with ADHD-I (Stein et al, 2003). However, randomized head-to-head comparisons of CLAS and medication are needed to determine the relative benefits of each intervention.

A number of strengths of the study are notable. Our sample of children with ADHD-I was clinically diagnosed using state-of-the-art, empirically supported procedures, and we employed rigorous clinical trial standards (active and TAU controls, careful fidelity monitoring, detailed treatment manuals, weekly clinical supervision). Inclusion of an active treatment control allowed us to be confident that our findings were attributable to the CLAS program and not just nonspecific effects of treatment. Because the active treatment control was a component of CLAS, this feature also allowed us to confirm that the multiple components showed benefit beyond the single (parenting) component. We also confirmed treatment effects using independent informants for school and home.

Limitations include the following. First, most participating parents were college-educated, and few were living at or below poverty levels. It is possible that the nature of the sample contributed to our high rates of parent attendance, acceptability, and positive outcomes. Future studies are needed to determine whether results generalize to families from broader socioeconomic backgrounds. Second, participating children exhibited low rates of comorbidity, which is not uncommon for the inattentive subtype (see Bauermeister et al, 2005; Willcutt et al, 2012). Thus, we could test our intervention with a relatively “pure” group of ADHD-I-affected youth. However, whether this treatment would be sufficient with children having more substantial comorbidities is not known. Third, because the core outcome measures showing treatment effects were gathered from parents and teachers involved in the treatment, rater bias or expectancy is a potential explanatory factor. Objective measures of outcome, such as blinded observations of parent-child interactions, classroom behavior and/or peer interactions (including peer nominations), homework products, or tests of academic achievement would avoid these rater biases and are important to include in future studies. Fourth, because only the parent training component of CLAS was evaluated separately from CLAS, we do not know the relative contribution of the teacher consultation/daily report card and child skills training components in terms of the efficacy of the intervention, although accumulating data support both intervention classes (Abikoff et al., 2013; Fabiano et al., 2010; Owens et al., 2012; Pfiffner Villodas, Kaiser, Rooney, & McBurnett, 2013). Fifth, although CLAS and PFT were equated for number of parent groups and individual family sessions, CLAS involved more treatment sessions because of the child group sessions and teacher-family meeting. Thus, differences between CLAS and PFT may be due to differences in treatment content and/or dose (i.e., number of sessions).

The feasibility of the widespread application of this treatment could not be ascertained within the present design. However, aspects of the program could be integrated into current plans for mental health coverage, as third-party payers currently cover some of the costs of diagnosis, family sessions, and group therapies. The teacher consultation component may represent a greater funding challenge. Indeed, school-based services are usually disjointed from clinic-based services for any type of ADHD. Along with other investigations (Webster-Stratton et al., 2004), our findings highlight the limitations of a clinic-only approach to treatment and document the crucial need for integrating teachers into successful treatments for children with ADHD. As such, these results could have direct implications for public policy regarding services for children with ADHD, suggesting that behavioral treatments be coordinated across settings to adequately address the needs of youth with ADHD. However,

future investigations are needed to evaluate whether the incremental benefits conferred by CLAS relative to PFT are sufficient from a cost-effectiveness perspective. Efforts to house interventions within schools are likely to increase accessibility and reduce cost, yielding a net increase in cost-effectiveness (Pfiffner et al., 2013).

In conclusion, the present findings extend support for CLAS, a novel treatment for ADHD-I, by documenting treatment effects in a large sample across two study sites, revealing that the multicomponent psychosocial treatment is superior to parent-focused treatment alone or usual care. Only children receiving the CLAS intervention, which included components for teaching children new skills and training parents and teachers in strategies to scaffold their children's executive deficits and promote generalization of skills at home and school, had significant improvements across multiple outcomes in home and school settings immediately after treatment, and as reported by parents at follow-up. These findings support the efficacy of the first non-pharmacological behavioral treatment specifically designed for ADHD-I. Future studies are needed to identify effective methods for enhancing school-based treatment gains with new teachers across longer follow-up intervals given the chronic nature of ADHD-I and the need to balance feasibility with cost and clinical utility.

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References

Abikoff H, Gallagher R, Wells KC, Murray DW, Huang L, Lu F, Petkova E. Remediating organizational functioning in children with ADHD: Immediate and long-term effects from a randomized controlled trial. Journal of Consulting and Clinical Psychology. 2013; 81(1):113–128. http://dx.doi.org/10.1037/a0029648. [PubMed: 22889336]

Abikoff H. ADHD psychosocial treatments: Generalization reconsidered. Journal of Attention Disorders. 2009; 13:207–210. [PubMed: 19553560]

Antshel KM, Remer R. Social skills training in children with attention deficit hyperactivity disorder: A randomized-controlled clinical trial. Journal of Clinical Child and Adolescent Psychology. 2003; 32(1):153–165. [PubMed: 12611031]

Barbaresi W, Datusic S, Colligan R, Weaver A, Leibson C, Jacobson S. Long-term stimulant medication treatment of attention-Deficit/Hyperactivity disorder: results from a population-based study. Developmental and Behavioral Pediatrics. 2006; 27:1–10.

Barkley, RA. Defiant children: A clinician's manual for parent training. New York: Guilford Press; 1987.

Bauermeister JJ, Matos M, Reina G, Salas CC, Martínez JV, Cumba E, Barkley RA. Comparison of the DSM-IV combined and inattentive types of ADHD in a school-based sample of Latino/Hispanic children. Journal of Child Psychology and Psychiatry. 2005; 46(2):166–179. http://dx.doi.org/10.1111/j.1469-7610.2004.00343.x. [PubMed: 15679525]

Benjamini Y, Hochberg Y. Controlling the false discovery rate: A practical and powerful approach to multiple testing. Journal of the Royal Statistical Society Series B (Methodological). 1995; 57(1): 289–300.

Blachman DR, Hinshaw SP. Patterns of friendship among girls with and without attention-deficit/hyperactivity disorder. Journal of Abnormal Child Psychology. 2002; 30(6):625–640. http://dx.doi.org/10.1023/A:1020815814973. [PubMed: 12481976]

Carlson C, Boothe J, Shin M, Canu W. Parent-, teacher-, and self-rated motivational styles in ADHD subtypes. Journal of Learning Disabilities. 2002; 35:104–113. [PubMed: 15490739]

Fabiano GA, Pelham WE Jr, Waschbusch DA, Gnagy EM, Lahey BB, Chronis AM, et al. Burrows-Maclean L. 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. 2006; 35(3):369–385.10.1207/s15374424jccp3503_3 [PubMed: 16836475]

Fabiano GA, Pelham WE, Coles EK, Gnagy EM, Chronis-Tuscano A, O'Connor BC. A meta-analysis of behavioral treatments for attention-deficit/hyperactivity disorder. Clinical Psychology Review. 2009; 29(2):129–140.10.1016/j.cpr.2008.11.001 [PubMed: 19131150]

Fabiano GA, Vujnovic RK, Pelham WE, Waschbusch DA, Massetti GM, Pariseau ME, et al. Volker M. Enhancing the effectiveness of special education programming for children with attention deficit hyperactivity disorder using a daily report card. School Psychology Review. 2010; 39(2): 219–239.

Forehand, R.; McMahon, R. Helping the noncompliant child: A clinician's guide to parent training. New York: Guilford Press; 1981.

DuPaul GJ, Eckert TL, Vilardo B. The effects of school-based interventions for attention-deficit hyperactivity disorder: A meta-analysis 1996-2010. School Psychology Review. 2012; 41:387–412.

Fabiano GA, Vujnovic RK, Pelham WE, Waschbusch DA, Massetti GM, Pariseau ME, et al. Volker M. Enhancing the effectiveness of special education programming for children with attention deficit hyperactivity disorder using a daily report card. School Psychology Review. 2010; 39(2): 219–239.

Gadow, KD.; Sprafkin, J. Child symptom inventories manual. Stony Brook, NY: Checkmate Plus; 1994.

Gadow, KD.; Sprafkin, J. ADHD symptom checklist-4 manual. Stony Brook, NY: Checkmate Plus; 1997.

Garner A, Marceaux JC, Mrug S, Patterson C, Hodgens B. Dimensions and correlates of attention deficit/hyperactivity disorder and sluggish cognitive tempo. Journal of Abnormal Child Psychology. 2010; 38:1097–1107. [PubMed: 20644992]

Gresham, FM.; Elliott, SN. Social skills improvement system (SSIS) rating scales manual. Minneapolis, MN: NCS Pearson, Inc; 2008.

Hinshaw, SP.; Klein, R.; Abikoff, H. Childhood attention-deficit hyperactivity disorder: nonpharmacologic treatments and their combination with medication. In: Nathan, PE.; Gorman, J., editors. A guide to treatments that work. 3rd. Oxford University Press; 2007. p. 3-27.

Hinshaw SP. Is the inattentive type of ADHD a separate disorder? Clinical Psychology: Science and Practice. 2001; 8:498–501.

Hinshaw SP. Preadolescent girls with attention-hyperactivity disorder: I. background characteristics, comorbidity, cognitive and social functioning, and parenting practices. Journal of Consulting and Clinical Psychology. 2002; 70:1086–1098. [PubMed: 12362959]

Huang-Pollock CL, Mikami AY, Pfiffner L, McBurnett K. ADHD subtype differences in motivational responsivity but not inhibitory control: Evidence from a reward-based variation of the stop signal paradigm. Journal of Clinical Child and Adolescent Psychology. 2007; 36(2):127–136. http://dx.doi.org/10.1080/15374410701274124. [PubMed: 17484686]

Kaufman J, Birmaher B, Brent D, Rao U. Schedule for affective disorders and schizophrenia for school-age children-present and lifetime version (K-SADS-PL): Initial reliability and validity data. Journal of the American Academy of Child & Adolescent Psychiatry. 1997; 36(7):980–988. [PubMed: 9204677]

Langberg JM, Epstein JN, Becker SP, Girio-Herrera E, Vaughn AJ. Evaluation of the homework, organization and planning skills (HOPS) intervention for middle school students with ADHD as implemented by school mental health providers. School Psychology Review. in press.

Langberg JM, Epstein JN, Urbanowicz CM, Simon JO, Graham AJ. Efficacy of an organization skills intervention to improve the academic functioning of students with Attention-Deficit/Hyperactivity Disorder. School Psychology Quarterly. 2008; 23(3):407–417.

Langberg JM, Epstein JN, Altaye M, Molina BSG, Arnold LE, Vitiello B. The transition to middle school is associated with changes in the developmental trajectory of ADHD symptomatology in young adolescents with ADHD. Journal of Clinical Child and Adolescent Psychology. 2008; 37(3):651–663. http://dx.doi.org/10.1080/15374410802148095. [PubMed: 18645755]

Maedgen JW, Carlson CL. Social functioning and emotional regulation in the attention deficit hyperactivity disorder subtypes. Journal of Clinical Child Psychology. 2000; 29(1):30–42. [PubMed: 10693030]

Massetti G, Lahey BB, Pelham WE Jr, Loney J, Ehrhardt A, Lee SS, Kipp H. Academic achievement over eight years among children who met modified criteria for attention-deficit/hyperactivity disorder at 4-6 years of age. Journal of Abnormal Child Psychology. 2008; 36:399–410. [PubMed: 17940863]

McBurnett K, Pfiffner LJ, Frick PJ. Symptom properties as a function of ADHD type: An argument for continued study of sluggish cognitive tempo. Journal of Abnormal Child Psychology. 2001; 29:207–213. [PubMed: 11411783]

Milich R, Balentine AC, Lynam DR. ADHD combined type and ADHD predominantly inattentive type are distinct and unrelated disorders. Clinical Psychology: Science and Practice. 2001; 8(4): 463–488. http://dx.doi.org/10.1093/clipsy/8.4.463.

MTA Cooperative Group. A 14-month randomized clinical trial of treatment strategies for ADHD. Archives of General Psychiatry. 1999; 56:1073–1086. [PubMed: 10591283]

National Institute of Mental Health. Clinical global impression scale (CGI). Psychopharmacology Bulletin. 1985; 21(1):839–843.

Owens JS, Holdaway AS, Zoromski AK, Evans SW, Himawan LK, Girio-Herrera E, Murphy CE. Incremental benefits of a daily report card intervention over time for youth with disruptive behavior. Behavior Therapy. 2012; 43(4):848–861. http://dx.doi.org/10.1016/j.beth.2012.02.002. [PubMed: 23046786]

Pelham WE Jr, Fabiano GA. Evidence-based psychosocial treatments for attention-deficit/ hyperactivity disorder. Journal of Clinical Child and Adolescent Psychology. 2008; 37(1):184–214.10.1080/15374410701818681 [PubMed: 18444058]

Pfiffner, LJ. All about ADHD: The complete practical guide for classroom teachers. 2nd. New York: Scholastic; 2011.

Pfiffner LJ. Manual for the Child Life and Attention Skills Program. Unpublished manuscript. 2014

Pfiffner, LJ.; Barkley, RA.; DuPaul, G. Treatment of ADHD in school settings. In: Barkley, RA., editor. Attention Deficit Hyperactivity Disorder: A handbook for diagnosis and treatment. 3rd. Guilford Press; 2006.

Pfiffner LJ, Kaiser NM, Burner C, Zalecki C, Rooney M, Setty P, McBurnett K. From clinic to school: Translating a collaborative school-home behavioral intervention for ADHD. School Mental Health. 2011; 3:127–142.

Pfiffner LJ, Hinshaw SP. Service utilization rates among youth with ADHD-I. Unpublished manuscript. 2014

Pfiffner LJ, McBurnett K. Social skills training with parent generalization: Treatment effects for children with attention deficit disorder. Journal of Consulting and Clinical Psychology. 1997; 65(5):749–757. [PubMed: 9337494]

Pfiffner LJ, Mikami AY, Huang-Pollock C, Easterlin B, Zalecki C, McBurnett K. A randomized controlled trial of integrated home-school behavioral treatment for ADHD, predominantly inattentive type. Journal of the American Academy of Child and Adolescent Psychiatry. 2007; 46(8):1–10.10.1097/chi.0b013e318064675f [PubMed: 17195721]

Pfiffner LJ, Villodas M, Kaiser N, Rooney M, McBurnett K. Educational outcomes of a collaborative school–home behavioral intervention for ADHD. School Psychology Quarterly. 2013; 28(1):25–36. http://dx.doi.org/10.1037/spq0000016. [PubMed: 23506023]

Power TJ, Mautone JA, Soffer SL, Clarke AT, Marshall SA, Sharman J, et al. Jawad AF. A family–school intervention for children with ADHD: Results of a randomized clinical trial. Journal of Consulting and Clinical Psychology. 2012; 80(4):611–623. http://dx.doi.org/10.1037/a0028188. [PubMed: 22506793]

Salee FR, Kollins SH, Wigal TL. Efficacy of guanfacine extended release in the treatment of combined and inattentive only subtypes of Attention-Deficit/Hyperactivity Disorder. Journal of Child and Adolescent Psychopharmacology. 2012; 22:206–214. [PubMed: 22612526]

Solanto M, Newcorn J, Vail L, Gilbert S, Ivanov I, Lara R. Stimulant drug response in the Predominantly Inattentive and Combined Subtypes of Attention-Deficit/Hyperactivity Disorder. Journal of Child and Adolescent Psychopharmacology. 2009; 19(6):663–671. [PubMed: 20035584]

Stein MA, Sarampote CS, Waldman ID, Robb AS, Conlon C, Pearl PL, et al. Newcorn JH. A dose-response study of OROS methylphenidate in children with attention-Deficit/Hyperactivity disorder. Pediatrics. 2003; 112(5):e404. [PubMed: 14595084]

Volpe RJ, DuPaul GJ, DiPerna JC, Jitendra AK, Lutz JG, Tresco KE, Vile Junod RE. Attention deficit hyperactivity disorder and scholastic achievement: A model of mediation via academic enablers. School Psychology Review. 2006; 35:47–61.

Webster-Stratton CH, Reid MJ, Beauchaine T. Combining parent and child training for young children with ADHD. Journal of Clinical Child and Adolescent Psychology. 2011; 40(2):191–203. http://dx.doi.org/10.1080/15374416.2011.546044. [PubMed: 21391017]

Webster-Stratton C, Reid MJ, Hammond M. Treating children with early-onset conduct problems: Intervention outcomes for parent, child, and teacher training. Journal of Clinical Child and Adolescent Psychology. 2004; 33(1):105–124. http://dx.doi.org/10.1207/S15374424JCCP3301_11. [PubMed: 15028546]

Weiss M, Worting D, Wasdell M. A chart review study of the ianttentive and combined types of ADHD. Journal of Attention Disorders. 2003; 7:1–9. [PubMed: 14738177]

Wells, KC.; Abikoff, H.; Abramowitz, A.; et al. Pfiffner, et al. Parent training for attention deficit hyperactivity disorder: MTA Study manual. Duke University Medical Center; Durham, NC: 1996.

Willcutt EG. The prevalence of DSM-IV attention-deficit/hyperactivity disorder: A meta-analytic review. Neurotherapeutics. 2012; 9(3):490–499. http://dx.doi.org/10.1007/s13311-012-0135-8. [PubMed: 22976615]

Willcutt EG, Nigg JT, Pennington BF, Solanto MV, Rohde LA, Tannock R, et al. Lahey BB. Validity of DSM-IV attention deficit/hyperactivity disorder symptom dimensions and subtypes. Journal of Abnormal Psychology. 2012; 121(4):991–1010. http://dx.doi.org/10.1037/a0027347. [PubMed: 22612200]

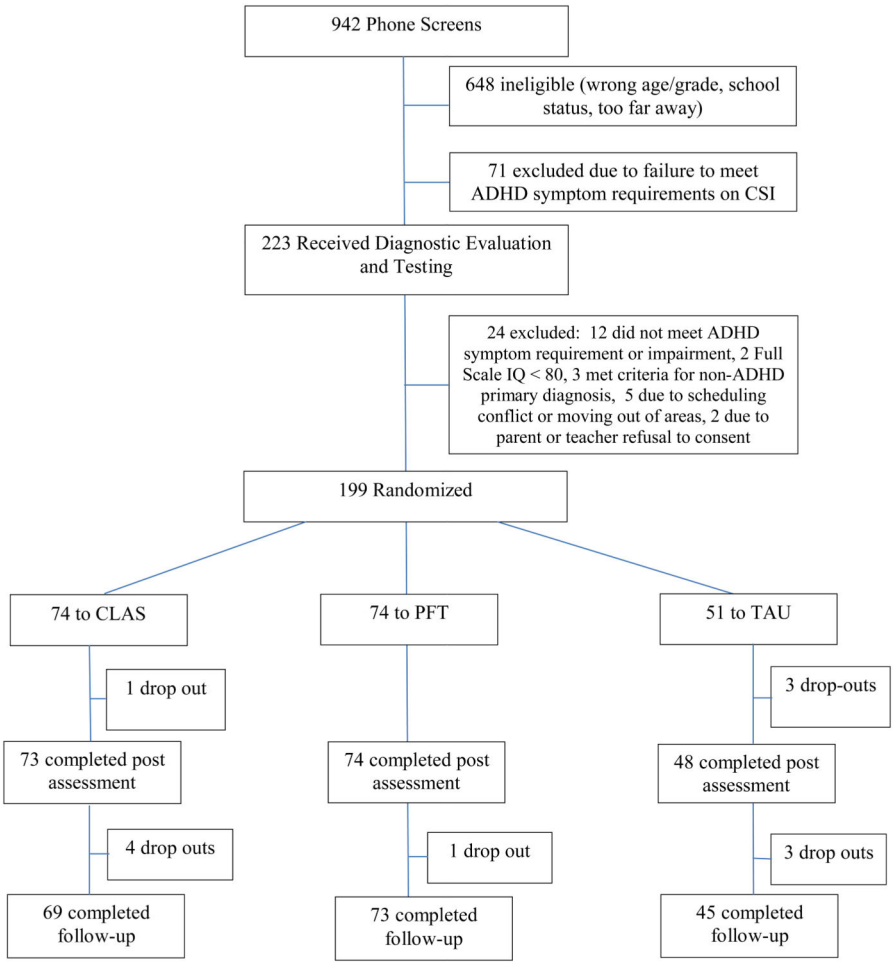

Figure 1. Participant Flow Chart

Table 1

Baseline characteristics by treatment assignment

	CLAS	PFT	TAU
	M (SD)	M (SD)	M (SD)
Child Age	8.8 (1.2)	8.7 (1.2)	8.4 (1.1)
WISC FSIQ	103.6 (11.0)	102.7 (11.5)	105.6 (11.6)
CSI IN symptoms, parent	6.2 (2.2)	6.8 (2.0)	6.7 (1.8)
CSI IN symptoms, teacher	6.4 (2.1)	6.0 (2.3)	6.4 (2.2)
CSI HI symptoms, parent	1.1 (1.4)	1.7 (2.0)	1.3 (1.6)
CSI HI symptoms, teacher	1.2 (1.5)	1.2 (1.4)	1.2 (1.4)
Gender (% boys)	51.4%	64.9%	58.8%
Parent education (% college grads)	83.6%	80.8%	78.4%
On medication at randomization*	9.5%	1.4%	2.0%
Single-parent household	9.5%	16.2%	11.8%
KSADS Comorbid Anx	6.8%	10.2%	5.3%
KSADS Comorbid Dep	1.7%	1.7%	2.6%
KSADS Comorbid ODD	5.1%	6.8%	5.3%

Note. CLAS = Child Life and Attention Skills Treatment; PFT = Parent Focused Treatment; TAU = Treatment As Usual; CSI=Child Symptom Inventory; IN = inattention; HI = hyperactivity/impulsivity; Anx = anxiety disorder; Dep = depressive disorder; ODD = oppositional defiant disorder.

*Difference across groups is significant at p =.035.

Table 2

Functioning in three domains at post-treatment, controlling for pre-treatment, by treatment assignment

	CLAS		PFT		TAU		ES[b] and pairwise comparisons			
Dependent variable	*N*	est. M (se)	*N*	est. M (se)	*N*	est. M (se)	*p*[a]	C-P	C-T	P-T
Inattentive Symptoms										
P CSI count	73	2.8 (0.3)	74	3.5 (0.3)	47	4.7 (0.4)	.001	.25	.64*	.38*
T CSI count	73	2.9 (0.3)	72	4.2 (0.3)	49	5.0 (0.4)	.000	.42*	.70*	.28
Organizational Skills										
P COSS Total	73	2.70 (0.04)	74	2.54 (0.04)	46	2.40 (0.05)	.000	.40*	.74*	.34*
T COSS Total	72	2.72 (0.04)	72	2.51 (0.04)	49	2.49 (0.05)	.000	.44*	.49*	.05
Social Skills										
P SSIS Total	72	96.2 (1.2)	71	93.4 (1.2)	45	91.3 (1.5)	.039	.21	.36*	.15
T SSIS Total	71	94.6 (1.2)	69	90.5 (1.2)	47	90.1 (1.4)	.017	.31*	.34*	.03
Overall Improvement										
P CGI-I[c]	73	6.0 (0.7)	73	5.8 (0.9)	47	5.0 (1.0)	.000	.22	1.07*	.86*
T CGI-I[c]	73	5.8 (0.8)	69	5.2 (1.0)	48	5.0 (1.1)	.000	.57*	.82*	.24

Note. C = CLAS, P=PFT, T = TAU. Est = estimated means, adjusted for pre-treatment score. P = primary caregiver; T = teacher. CSI = Child Symptom Inventory. CGI-I = Clinical Global Impressions-Improvement. COSS = Children's Organizational Scale.

[a] Probability in omnibus ANCOVA covarying pre-test score (except for CGI).

[b] Effect sizes: Standardized mean differences (Cohen's *d*) in pairwise comparisons of treatment groups.

[c] means and standard deviations not adjusted for pre-treatment scores presented in these rows.

* Significant after within-domain Benjamini-Hochberg FDR correction

Table 3

Functioning in three domains at follow-up, controlling for pre-treatment, by treatment assignment

	CLAS		PFT		TAU		ES[b] and pairwise comparisons			
Dependent variable	*N*	est. M (se)	*N*	est. M (se)	*N*	est. M (se)	*p*[a]	C-P	C-T	P-T
Inattentive Symptoms										
P CSI count	73	2.2 (0.3)	74	3.2 (0.3)	47	4.1 (0.4)	.000	.35	.68*	.33
T CSI count	73	3.7 (0.4)	74	4.2 (0.4)	49	4.2 (0.4)	.396	.21	.17	.04
Organizational Skills										
P COSS Total	73	2.74 (0.04)	74	2.60 (0.04)	47	2.55 (0.05)	.007	.35*	.46*	.12
T COSS Total	73	2.64 (0.05)	73	2.52 (0.05)	49	2.56 (0.07)	.255	.25	.16	.09
Social Skills										
P SSIS Total	73	96.6 (1.3)	73	94.9 (1.3)	46	92.1 (1.6)	.093	.12	.34	.22
T SSIS Total	73	93.0 (1.5)	72	89.6 (1.5)	48	92.7 (1.8)	.208	.26	.02	.24
Overall Improvement										
P CGI-I[c]	73	6.0 (1.0)	74	5.8 (1.0)	47	5.3 (1.3)	.001	.23	.67*	.45*
T CGI-S	55	3.4 (0.2)	56	3.5 (0.2)	34	3.6 (0.2)	.775	.16	.17	.01

Note. C = CLAS, P=PFT, T = TAU. Est = estimated means, adjusted for for pretreatment score. P = primary caregiver; T = teacher. CSI = Child Symptom Inventory. CGI-I = Clinical Global Impressions-Improvement, CGI-S = Clinical Global Impressions-Severity. COSS = Children's Organizational Scale.

[a] Probability in omnibus ANCOVA, covarying pre-test score (except for CGI-I).

[b] Effect sizes: Standardized mean differences (Cohen's *d*) in pairwise comparisons of treatment groups.

[c] means and standard deviations not adjusted for pre-treatment scores presented in this row.

* Significant after within-domain Benjamini-Hochberg FDR correction.

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