

Sustained Effects of Collaborative School-Home Intervention for ADHD Symptoms and Impairment

Running head: School-home treatment for ADHD

Linda J. Pfiffner PhD, Mary E. Rooney PhD, Yuanyuan Jiang PhD, Lauren M. Haack PhD, Allyson Beaulieu MPH, & Keith McBurnett PhD

Department of Psychiatry, University of California, San Francisco (all authors)

Journal of the American Academy of Child and Adolescent Psychiatry, 57, 245-251.

Publication Date: April, 2018

Corresponding author:

Linda Pfiffner, PhD

Department of Psychiatry

University of California, San Francisco

401 Parnassus Ave., Box 0984

San Francisco, CA 94143

e-mail: linda.pfiffner@ucsf.edu

telephone: 415-476-7418

Acknowledgement:

This study was supported by a grant from the Institute of Education Sciences, US Department of Education to the University of California, San Francisco. Award number: R324A120358 (PI: Linda Pfiffner, PhD).

Keywords: ADHD, psychosocial intervention, behavioral intervention, school-home

intervention, follow-up

Abstract

Objectives: The Collaborative Life Skills (CLS) program is a school-home intervention for students with Attention Deficit Hyperactivity Disorder (ADHD) symptoms and impairment. CLS integrates school, parent, and student treatments followed by booster sessions during a maintenance period into the subsequent school year. The program is delivered by school-based mental health providers. Beneficial post-treatment effects have been documented. This study evaluates effects of CLS after the maintenance period in the subsequent school year.

Method: Using a cluster randomized design, schools within a large urban public-school district were randomly assigned to CLS (12 schools) or usual services (11 schools). Approximately six students participated at each school (N=135, grade range=2-5). Measures were completed at baseline, post-treatment, and follow-up during the next school year.

Results: Students from schools assigned to CLS, relative to those assigned to usual services, showed significantly greater improvement at follow-up on parent, but not teacher, ratings of ADHD and oppositional defiant disorder (ODD) symptom severity, organizational skills, and global impairment. Within-group analyses indicated that parent and teacher-reported post-treatment gains for CLS in ADHD and ODD symptoms, organizational skills and academic competence maintained into the next school year.

Conclusions: These results extend support for CLS to the following school year by demonstrating sustained benefits on parent-reported ADHD and ODD symptoms and functional impairment. The lack of significant teacher-reported differences between CLS and usual services highlights the need for further study of booster treatments for improving outcomes with new teachers across school years.

Key words: ADHD, disruptive behavior, school-home intervention, behavioral intervention, follow-up

Clinical trials registration information – Study of the Collaborative Life Skills Program, <http://clinicaltrials.gov/>; NCT01686724

Youth with Attention-Deficit/Hyperactivity Disorder (ADHD) exhibit interpersonal, academic/educational, and behavioral challenges throughout the school years.^{1,2} The result is frequent referral for mental health services, predominantly in the school setting. Few receive evidence-based psychosocial treatments (EBTs) such as parent training and classroom management recommended in practice guidelines.^{3,4} Availability of EBTs in schools is limited due to lack of training for school personnel and also because most EBTs were developed for clinic settings or for implementation by research staff and have not been translated for implementation in school settings.⁴

Treatments with durable effects are important given the chronicity of ADHD symptoms and impairments. Many treatments (behavioral and pharmaceutical) show impressive short-term effects. Maintenance may require specialized approaches.^{5,6} Studies of interventions that teach transferable parent and child skills and/or promote school-home partnerships report maintenance of treatment effects into the subsequent school year.⁷⁻⁹ None of these studies included a comparison to usual care at follow-up, precluding control for factors such as maturation and time. In two studies of multi-component behavioral treatments that included usual care comparison groups, one showed evidence for sustained improvement in symptoms and impairment in the home setting relative to usual care 5-7 months post treatment.¹⁰ A second reported significant reductions in homework problems for the treated group relative to usual services 10 months after treatment ended.¹¹ In all of these studies, research teams administered the interventions, limiting generalizability.

To promote maintenance of treatment outcomes and sustainability, Pfiffner et al. (2016)¹² developed the Collaborative Life Skills (CLS) program. CLS was adapted from an empirically-supported, clinic-delivered intervention for the inattentive presentation of ADHD^{10,13} for

implementation in schools by school mental health providers (SMHPs) and for students with all ADHD presentations. CLS consists of integrated components for teachers, parents, and students simultaneously delivered over 10-12 weeks. Teachers and parents learn specific strategies for promoting engagement, motivation, and regulation of behavior. Students learn independence, organizational, and social-emotional (e.g., social skills, self-control) skills, which are then reinforced by teachers and parents to promote generalization into naturalistic settings. Reinforcement contingencies are set within and across settings (e.g., parents reward behaviors that occur at home and school, therapists reward behaviors that occur at home, school, and group, etc.) in an active partnership of parents, teachers, and SMHPs with shared goals. Procedures to support maintenance of treatment gains at home and school are implemented during the remainder of the school year and during the subsequent school year.

Open trials and a cluster randomized controlled trial of CLS have demonstrated feasibility, acceptability, and efficacy of CLS for improving student outcomes immediately following treatment.^{12,14,15} CLS resulted in significant gains relative to usual school services on parent and teacher ratings of ADHD symptoms and organizational skills, academic skills, parent ratings of ODD symptoms, and social skills.¹² The current study evaluated student outcomes in CLS relative to usual services (BAU) immediately following implementation of maintenance procedures by SMHPs which occurred in the school year following core treatment (5-8 months after core treatment ended). We predicted that student outcomes showing significant benefit from CLS relative to BAU at post-treatment (ADHD and ODD symptom severity, organization, academic competence, and social functioning) would continue to show significant between-group treatment effects at follow-up. We also predicted that CLS outcomes at post-treatment

would maintain at follow-up and that recovery into normative ranges at post-treatment would predict greater maintenance during the subsequent school year.

Method

Study Design

A 2-level (students, schools) cluster randomized controlled design¹⁶ accounted for treatment (CLS or Business as Usual; BAU) within level 2 (schools). Entry into the study was staggered into two cohorts (Fall and Winter) during each of 3 school years. Schools within cohorts (n = 3-5 schools) were randomized into CLS (n = 12) and BAU (n = 11), with randomization of schools stratified based on the percentage of students receiving free or reduced lunch.

Participant Characteristics

Participants included 135 children (grades 2 through 5, mean age = 8.4 years, 71% boys) in general education classrooms at participating schools in an urban public school district. Twenty-six percent were Caucasian, 24% were Latino, 21% were Asian American, 9% were African American, and 20% were mixed race. Sixty percent of the primary parents of participating children reported having graduated from college. Thirty percent were living in single-parent homes. School mental health providers (SMHPs, 12 full-time and 11 half-time masters-level social workers or counselors; 91% female) volunteered to implement procedures as part of their work responsibilities. On average, the SMHPs worked in the mental health field for 8.4 years (range 3-17 years). Of the 12 SMHPs at schools assigned to CLS, 9 (4 full-time and 5 half-time) also implemented the maintenance intervention during the next school year. The remaining 3 had left their school prior to the start of the subsequent school year. Two of these were replaced by another SMHP. In the single school in which the SMHP had not yet been

replaced, the maintenance intervention was implemented by the CLS trainer from the university site. SMHPs assigned to BAU did not implement CLS until after follow-up measures were completed.

Participant Recruitment and Screening Procedures

Recruitment flow and procedures are fully described in our prior report.¹² Briefly, student participants (n = 5-6 per school) were referred by school staff due to inattention and/or hyperactivity-impulsivity and related academic and/or social problems. Eligibility criteria were: (1) elevated ratings of ADHD symptoms, (2) cross-situational impairment (home and school), (3) FSIQ equivalent of >79¹⁷, (4) a caretaker available to participate in treatment, and (5) a primary classroom teacher who agreed to participate in the classroom component. Children taking medication were eligible as long as their regimens were stable. All 72 CLS cases and 59 of 62 BAU cases who had completed post-treatment measures completed follow-up measures.

Consent forms (parent and teacher) and an assent form (child), approved by University of California San Francisco Committee on Human Research, were completed by parents, teachers, and children. Parents and teachers were each paid \$50 for completing measures at each time point.

Description of CLS Treatment Components

CLS included three manualized components delivered by the SMHP at their school site during the 10-12 week core intervention period (fully described in Pfiffner et al., 2016¹²) and a subsequent maintenance period into the following school year. Components were integrated via joint sessions with teachers, parents, and children and establishment of an active partnership and shared goals and responsibilities for all parties.

Core Treatment:

Classroom Component: SMHPs led 2 group meetings with participating teachers (1 1-hour orientation session, 1 30-minute troubleshooting meeting) and 2-3 30-minute individual meetings attended by parent, student, and the student's teacher. Teachers implemented a customized school-home daily report card (Classroom Challenge, CC), homework plan, and classroom accommodations as needed. Each student's CC included 2-3 target behaviors (e.g., academic work, classroom deportment, social interactions, CLS child group skills) rated up to three times per day and reinforced daily at home and weekly at the student group.

Parent Component: SMHPs led 10 1-hour group sessions usually at the start of the school day. The curriculum included skills covered by traditional parent training programs, including effective use of commands, rewards, and discipline, plus strategies to promote skills covered in the child group and stress management. Families also learned skills to support the CC and collaborate effectively with teachers.

Child Skills Component: SMHPs led 9 40-minute child group sessions during the school day, and two celebratory parties with parents, teachers, and students. Modules targeted social functioning (i.e., good sportsmanship, accepting consequences, assertion, dealing with teasing, problem solving, self-control, and friendship making) and independence (i.e., homework skills, completing chores and tasks independently, and establishing and following routines).¹⁸ To facilitate generalization, children were reinforced by parents and teachers for accomplishing target goals at home and school.

Treatment Maintenance Procedures:

After the core intervention period, SMHPs met with teachers to troubleshoot programs and conducted monthly booster groups with parents and children to review skills until the end of the school year. At the beginning of the next school year, SMHPs invited the CLS students' new

teachers, and their teachers from the previous year, to attend a 1-hour group CLS meeting. Here, new teachers learned about CLS, heard from previous teachers about strategies that were effective in last year's classrooms, and designed tailored CCs and homework plans as needed, based on the new teacher's assessment of their student's current functioning. The SMHP conducted one meeting (if needed) attended by parent, student, and the student's teacher to review the CC and homework plan. Booster groups (one for parents and one for children) were also conducted during the new school year by the SMHP. Six students in the CLS condition transferred to new schools during the follow-up school year; they were invited but did not participate in the maintenance treatment.

BAU Condition

Participating students in schools assigned to BAU received school and community services as usual. After families and teachers in schools assigned to BAU completed their follow-up assessments, they were offered the CLS program.

SMHP Training

During the core treatment period, SMHPs attended group training sessions (an initial 8-hour training plus weekly supervision) with a doctoral-level clinician-trainer.¹² Thereafter, trainers provided monthly consultation for booster groups and individual students until the end of the school year. During the following school year, SMHPs attended one training/supervision session prior to conducting the teacher orientation and booster sessions. The two SMHPs new to their school were provided with an overview of CLS and training in the CC procedure.

Fidelity Measures

See Pfiffner et al. (2016)¹² for fidelity measures during the core treatment period. During the maintenance period, attendance records were gathered for each booster session. Trainers rated SMHP adherence to session content (item coverage rated: *not at all*, *partially*, or *fully*) and

implementation quality (competence rated 1=*not at all* to 5=*great deal*). Teacher CC implementation was based on copies of the CC forms. Parent implementation of strategies was measured through self-ratings of strategy utilization (1 = *no days* to 5 = *every day*)

Student Outcome Measures

Measures were completed at baseline, post-treatment, and follow-up. Follow-up assessments occurred in late fall of the following school year (immediately after the end of the maintenance period) for all cohorts (Fall cohorts: 8-months after core treatment, Spring cohorts: 5-months after core treatment).

ADHD and ODD Symptoms: The ADHD and ODD scales from the Child Symptom Inventory,¹⁹ rated on a 4-point scale (*never, sometimes, often, very often*), were totaled to measure symptom severity. The CSI has normative data and acceptable test-retest reliability and predictive validity for ADHD and ODD diagnoses.¹⁹ In our sample, internal consistency was high for parent and teacher versions of the CSI (alphas >.8).

Organizational Functioning: The Children's Organizational Skills Scale,²⁰ with items rated on a 4-point scale (1 = *hardly ever or never* to 4 = *just about all the time*) assessing organization, management of materials/supplies, and task planning skills (parent = 58 items, teacher = 38 items) were totaled for analyses. Lower scores indicate better organizational functioning. Parent and teacher versions have adequate psychometric properties, including internal consistency (alphas = .94).

Social Skills: The Social Skills Improvement System (SSIS) Social Skills Scale standard score (sex-specific), which reflects communication, cooperation, assertion, responsibility, empathy, and self-control skills was used to measure social skills.²¹ Each item is rated on a 4-point scale (*never, seldom, often, almost always*). The SSIS has excellent psychometric

properties, including high internal consistency (alphas $\geq .94$), test-retest reliability ($r_s \geq .81$) and evidence for convergent and discriminant validity.²¹ Higher scores indicate greater social skill.

Global Psychosocial Functioning. Global ratings of the severity of psychosocial functioning were captured using the 7-point Clinical Global Impressions Scale, Improvement version (CGI-I) administered at follow-up to parents (1 = *much worse* to 7 = *much improved*). The CGI has been widely used to measure treatment response in clinical trials for ADHD.^{7,10}

Academic Functioning: The Academic Competence scale on the teacher version of the SSIS²¹ was used to measure academic functioning. This scale measures reading and math performance, academic motivation, and general cognitive functioning. Each item is rated on a 5-point scale relative to students in the same class (lowest 10% to highest 10%). This scale has excellent psychometric properties, including high internal consistency (alpha = .97), test-retest reliability ($r = .93$), and evidence for convergent and discriminant validity.²¹ We analyzed the total academic competence standard score (sex-specific).

Data Analytic Approach

Study hypotheses were tested by estimating and testing linear mixed-effects models of mean follow-up scores between groups using SAS PROC GENMOD and the Generalized Estimating Equation (GEE) to account for clustering effects by school (all two-tailed). In addition to intervention group, models also included the baseline level of the outcome measure. Effect sizes were based on group differences in estimated means at follow-up (adjusted for pre-treatment score) using Cohen's d . To control Type I error rate, a Benjamini-Hochberg False Discovery Rate²² was applied within domain. To judge clinical significance, we compared the percentage of cases that recovered from outside the normative range at baseline to within the normative range (within one SD of the sex-specific population mean) at follow-up based on

published norms for each measure. To test maintenance of treatment effects for those measures with significant or trend level ($p < .07$) significant group differences at post-treatment (i.e., parent- and teacher-reported ADHD and ODD symptoms and organizational functioning, parent-reported social skills, and teacher-reported academic skills, as reported in Pfiffner et al., 2016¹²), within-group analyses were conducted between post-treatment and follow-up adjusted for clustering effects of school. As a further test of maintenance, we compared follow-up outcomes on those measures which had demonstrated significant or trend-level ($p < .07$) significant group differences in the percentage of children who had recovered to within normative ranges at post-treatment, adjusted for clustering effects of school.

Results

Booster groups, attendance, and fidelity

Fidelity and attendance were high during the core treatment period (see Pfiffner et al., 2016¹²); attendance and fidelity during the maintenance period is described herein. Booster parent and child groups during the Spring of the core treatment year were held at most Fall cohort schools (4 of 6 schools held at least one parent group and all 6 schools held at least one child group). Spring booster sessions did not occur for the Winter cohort schools because too little time was left in the school year after the core treatment was completed. During the Fall of the next school year, 10 of 12 schools held a parent booster group, 11 of 12 schools held a child booster group and 11 of 12 schools held a teacher orientation group meeting. Based on trainer ratings, SMHPs partially or fully covered over 96% of parent, child and teacher session elements with moderate to high levels of competence (mean=4.8). Parent attendance at the booster group averaged 60% (range across schools: 0-100%). Child attendance at the booster group averaged 93% (range across schools: 67-100%). One school declined maintenance procedures, but did

complete follow-up measures. CC meetings were held based on teacher's assessed needs of student. Teachers of 61% of students had a CC meeting and implemented a CC in the new school year. At follow-up, 75% of parents reported using strategies taught during the parenting group to address home behaviors, on average, at least half the time and 66% reported supporting the CC on at least most days.

Student Outcome Measures

Little attrition (defined as cases missing both parent and teacher data at follow-up) occurred (6% in BAU, 0% in CLS; 3% overall). Data from teachers of 6 students (who had parent data) and from parents of 7 students (who had teacher data) were missing at follow-up. Overall, few data were missing at baseline, post-treatment, or follow-up (7-9% across measures), so none were imputed. Groups did not differ on demographics or medication use at baseline. Several demographic variables (parent education, gender, child IQ) and medication status were associated with one or more outcome measures. Similar results occurred in models that were adjusted vs. not adjusted for these covariates, thus we report results from the unadjusted models. We examined Fall vs. Winter cohort-by-treatment effects on student outcomes at follow-up and none were significant. Therefore, we did not covary cohort in our analyses. Table 1 presents results for ADHD and ODD symptoms and functional impairment at baseline, post-treatment, and follow-up. Table 2 presents comparisons at follow-up among those who recovered into normative ranges at post-treatment vs. those who did not.

CLS vs BAU: Between-Group Comparisons at Follow-up

Parent-completed Measures

ADHD Symptom Severity: Significant group differences were found at follow-up for parent report of ADHD symptom severity ($\chi^2 = 12.15, p = .0005; d = -.95, 95\% \text{ CI: } -1.33, -.58$).

Rates of recovery from outside the normative range at baseline to within the normative range at follow-up were significantly greater for CLS (52%) than BAU (27%) ($\chi^2 = 5.24, p = .022$).

ODD Symptom Severity: Significant reductions in parent-reported ODD symptom severity were found for CLS relative to BAU at follow-up ($\chi^2 = 6.93, p = .0085; d = -.57, 95\% \text{ CI: } -.94, -.22$). Recovery rate from outside the normative range at baseline to within the normative range at follow-up was greater for CLS (68%) than BAU (59%); not significant ($p > .1$).

Organizational Functioning: The CLS group showed significantly greater improvement in organizational functioning relative to the control group at follow-up per parent report ($\chi^2 = 6.66, p = .0099; d = -.57, 95\% \text{ CI: } -.95, -.21$). Recovery rate to the normative range for parent reported organizational skills was greater for CLS (51%) than BAU (43%); not significant ($p > .1$).

Social Skills: Parent ratings of social skills on the SSIS failed to show significant between-group differences at follow-up ($\chi^2 < .29, p > .1; d < .11$).

Global Improvement: Parent ratings of global improvement at follow-up were significantly greater for CLS than BAU ($\chi^2 = 10.21, p = .0014$) with an odds ratio = 2.55 (95% CI: 1.7-3.9). Seventy-nine percent of CLS parents, but only 29% of BAU parents, reported that their child had either improved or much improved since baseline.

Teacher-completed Measures

Teacher reports of ADHD and ODD symptom severity and organizational, social, and academic functioning were not significantly different for CLS and BAU ($p > .1$).

CLS Outcomes: Within-group comparisons

ADHD Symptom Severity: Maintenance of treatment gains for CLS was demonstrated based on non-significant ($p > .05$) within-group analyses between post-treatment and follow-up parent and teacher ratings of ADHD symptom severity. Recovery into the normative range on parent-reported ADHD symptom severity at post-treatment predicted reduced ADHD symptom severity at follow-up ($\chi^2 = 4.9, p < .03$). Per parent report, 54% of those in CLS fell within the normal range for ADHD symptom severity at follow-up, representing an over 6-fold increase from baseline. Recovery into normative ranges at post-treatment showed a trend for predicting reduced teacher-reported ADHD symptom severity at follow-up ($\chi^2 = 3.4, p = .066$). Per teacher report, 40% of cases fell within the normal range at follow-up, double the baseline levels (19%).

ODD Symptom Severity: Within-group analyses between post-treatment and follow-up for parent and teacher reports of ODD symptom severity for the CLS group were not significant ($p > .1$), suggesting that levels of ODD symptoms at post-treatment were maintained at follow-up. Recovery into normative range at post-treatment predicted reduced teacher-reported ODD symptom severity at follow-up ($\chi^2 = 5.0, p < .03$). Over half of students in the CLS group (63%) fell within the normative range for ODD symptom severity per teacher report at follow-up, representing a 9% increase from baseline. Per parent report, recovery into normative range at post-treatment did not predict ODD symptom severity at follow-up ($\chi^2 = .45, p > .1$); however, 85% of cases fell within the normative range for ODD symptom severity at follow-up.

Organizational Functioning: Within-group analyses between post-treatment and follow-up parent and teacher report of organizational skills were not significant for CLS ($p > .1$), suggesting maintenance of parent- and teacher-reported gains in organizational functioning made at post-treatment. Recovery at post-treatment predicted fewer organizational problems at follow-up (per parent-report: $\chi^2 = 4.35, p < .04$; per teacher-report: $\chi^2 = 8.2, p < .004$). Per parent

report, two-thirds of children in the CLS group fell within the normative range at follow-up, compared to 35% at baseline. Per teacher report, close to one-half of children were within the normative range at follow-up, representing a 23% increase from baseline levels.

Social Skills: Within-group analysis between post-treatment and follow-up parent report on the SSIS Social Skills scale was not significant for CLS ($p > .1$), suggesting that the significant gains observed in social skills for CLS at post-treatment were maintained at follow-up. Recovery into normative ranges at post-treatment did not predict social skills at follow-up ($\chi^2 = 1.59, p > .1$). More than two-thirds of treated youth were functioning at or above the normal range on the parent completed social skills scale at follow-up (more than a 28% increase from baseline levels).

Academic Functioning: Differences between post and follow-up were not significant ($p > .1$). Recovery into the normative range at post-treatment predicted greater academic competence at follow-up ($\chi^2 = 5.47, p < .02$). Slightly more students in CLS (68%) scored in the average or above average range at follow-up than baseline (61%), an 11% increase.

BAU Teacher-Reported Outcomes: Within-group comparisons

To better understand the lack of significant group differences in teacher ratings, we compared BAU post-treatment and follow-up ratings. Although improvement was observed across measures, post-treatment to follow-up differences were significant only for the COSS (COSS: $\chi^2 = 3.73, p < .05$). Recovery at post-treatment did not significantly predict greater functioning on any teacher-completed measure at follow-up ($ps > .1$)

Satisfaction measures

Parent satisfaction with CLS was high at follow-up. The vast majority of parents (> 94%) rated the program as appropriate or very appropriate for treating children's attention, academic,

and social skills problems, were satisfied or very satisfied with the services received, and would recommend or strongly recommend the program to others (one of the two most favorable options on a 5-point scale). Eighty-six percent of teachers at follow-up would recommend or strongly recommend the program to others.

Non-CLS Service Utilization for BAU and CLS

At follow-up, CLS and BAU did not significantly differ ($p > .1$) in medication (92% stimulant) use (9.7%, $n=12$) receipt of an IEP (20%, $n=25$) or 504 plan (12%, $n=15$), educational interventions/tutoring (43%, $n=54$ cases), or school counseling and/or psychotherapy in the community (family therapy, child therapy or parenting group) (31%, $n=38$). Almost half of students received one or more classroom accommodations, including modified homework, behavioral chart, and/or extra time on tests (45%, $n=56$); group differences were not statistically significant ($p > .1$).

Discussion

This is the first controlled study of student outcomes during the school year following sustained school-implemented school-home intervention for ADHD symptoms and impairment. Findings show that benefits of CLS relative to usual school/community services are evident 5-8 months following completion of core treatment and just after completion of maintenance procedures on parent-reported ADHD and ODD symptom severity, organizational skills, and global impairment. Effects were in the medium to large range; more than half of those in the CLS group recovered from baseline levels into normative ranges at follow-up. In most cases, those who had recovered into normative ranges on measures of symptoms and impairment at post-treatment continued to outperform those who did not, indicating that gains persisted into the next school year.

Teacher-reported symptoms and impairment at follow-up did not differ significantly between CLS and BAU. Within-group analyses for CLS indicate that those who had recovered into normative ranges on teacher-completed measures of ODD symptom severity, organizational skills, and academic competence at post-treatment continued to outperform those who did not in these areas. In contrast, post-treatment recovery for BAU did not significantly predict follow-up school outcomes. These data provide evidence that positive response to CLS may be a stronger predictor of subsequent year school outcomes than positive response to usual services.

Reduction in parent reports of ADHD and ODD symptom severity and impairment from baseline to follow-up for CLS relative to BAU, and persistence of gains over time at home and school, are consistent with prior studies of CLAS (the multi-component treatment which served as the basis for CLS).¹⁰ CLS and CLAS utilized similar strategies to promote maintenance and generalization which we posit facilitated the sustainment of gains over time. These strategies included teaching of transferable skills to youth, strategies for parents and teachers to reinforce skill use in naturalistic settings, integrated components, active partnership between teachers and families, booster sessions with parents and children to review and reinforce skills learned, and involvement of the student's teacher in the next school year in a plan for continuing CLS classroom interventions (e.g., daily report card).

Findings also are consistent with previous studies of skills-based treatments for ADHD showing maintenance of treatment gains.^{7,9} Unique to the current study, however, is a usual care comparator at follow-up and results indicating a clear advantage of CLS relative to usual services for parent-reported outcomes. Another study involving family and school components did not find treatment-related change in symptom severity at a 3-month follow-up.⁸ In contrast to the current study, medication usage was relatively high, teacher training was less intensive, the

intervention groups and family meetings were not held at the school site or led by a school clinician, and the treatment was compared to a psychoeducational intervention, which may have limited treatment effects.

Contrary to expectations, teacher-reported benefits of CLS relative to BAU at post-treatment did not extend into the new school year. CLS services were less intensive during the maintenance period. More substantial follow-up gains at school may have occurred with additional parent and student booster sessions, and more coaching and support for teachers to enhance their engagement and strategy use.

Alternatively, lack of between-group differences appears to be at least partially due to teacher-reported improvement in BAU. We cannot rule out possible regression to the mean, maturation, or other spontaneous improvement for the BAU group, but these would not explain why parents in BAU continued to observe problem behavior. Improvement is also unlikely due to non-study services since they are equivalent between groups. BAU “recovery” might be related to setting-specific factors. For instance, follow-up ratings were gathered from new teachers early in the school year. Had ratings been collected later in the school year when teachers were more familiar with their students²³, increased problematic behavior may have been reported. This possibility may have been more likely for BAU than CLS since CLS teachers were made aware of their student’s problems prior to completing the follow-up measures based on their having conferred with the past year’s teacher during the teacher orientation meeting. BAU teachers did not have this contact and thus, may have had less awareness about the student’s history of problem behavior when they completed the measures. This factor, in addition, to the common observation that children with ADHD perform better in novel situations (i.e., a new classroom, teacher and classmates) may have contributed to the BAU “recovery.”

Additionally, the use of different teacher raters at the two time points may have introduced biases related to teacher perceptions and environmental factors.²⁴

The feasibility of CLS maintenance procedures for SMHPs, teachers, parents and children was supported by attendance rates and low attrition. Parent and teacher acceptability and implementation of the strategies at home and school were high.

There are several limitations of the study. First, the sample may not be representative of children presenting to clinics or those taking medication. Many participants were from well-educated families (representative of the region), which may have contributed to higher treatment adherence. Rater bias or expectancy may have been factors for parents and teachers given their involvement in the treatment. More objective measures of outcome (e.g., blinded observations) would avoid these biases. In addition, the sustainability of treatment effects across school years and effects on school grades require further study. The relative contribution of the maintenance treatment per se and of each treatment component is not discernable from the design.

In conclusion, these findings extend previously documented benefits of CLS on ADHD and ODD symptoms and impairment following core treatment¹² into the next school year just after maintenance treatment. These beneficial outcomes were accomplished with minimal additional training and intervention during the maintenance period, and suggest that programs such as CLS have the potential to reduce the use of costlier special education and mental health services, and may represent a viable alternative to medication as an initial intervention for some children. Pending the development of cost-effective training programs for school clinicians, programs such as CLS hold promise for increasing accessibility of empirically-supported services and for improving long-term outcomes for high-risk students.

References

1. DuPaul, G. J., Morgan, P. L., Farkas, G., Hillemeier, M. M. & Maczuga, S. Academic and Social Functioning Associated with Attention-Deficit/Hyperactivity Disorder: Latent Class Analyses of Trajectories from Kindergarten to Fifth Grade. *J. Abnorm. Child Psychol.* 1–14 (2016). doi:10.1007/s10802-016-0126-z
2. Barkley, R. A. *Attention-Deficit Hyperactivity Disorder, Fourth Edition: A Handbook for Diagnosis and Treatment.* (The Guilford Press, 2014).
3. Evans, S. W., Owens, J. S. & Bunford, N. Evidence-based psychosocial treatments for children and adolescents with attention-deficit/hyperactivity disorder. *J. Clin. Child Adolesc. Psychol.* 527–551 (2014).
4. Owens, J. S. *et al.* Implementation science in school mental health: Key constructs in a developing research agenda. *School Ment. Health* **6**, 99–111 (2014).
5. Abikoff, H. ADHD psychosocial treatments: Generalization reconsidered. *J. Atten. Disord.* **13**, 207–210 (2009).
6. Chronis, A. M., Chacko, A., Fabiano, G. A., Wymbs, B. T. & Pelham, W. E. Enhancements to the behavioral parent training paradigm for families of children with ADHD: Review and future directions. *Clin. Child Fam. Psychol. Rev.* **7**, 1–27 (2004).
7. Abikoff, H., Gallagher, R. & Wells, K. Remediating organizational functioning in children with ADHD: Immediate and long-term effects from a randomized controlled trial. *J. Consult. Clin. Psychol.* **81**, 113–128 (2013).
8. Power, T. J., Mautone, J. & Soffer, S. A family–school intervention for children with ADHD: Results of a randomized clinical trial. *J. Consult. Clin. Psychol.* **80**, 611–623 (2012).
9. Webster-Stratton, C., Reid, M. & Beauchaine, T. Combining parent and child training for young children with ADHD. *J. Clin. Child Adolesc. Psychol.* **40**, 191–203 (2011).

10. Pfiffner, L. J. *et al.* A two-site randomized clinical trial of integrated psychosocial treatment for ADHD-inattentive type. *J. Consult. Clin. Psychol.* (2014). doi:10.1037/a0036887
11. Langberg, J. M., Arnold, L. & Flowers, A. Parent-reported homework problems in the MTA study: Evidence for sustained improvement with behavioral treatment. *J. Clin. Child Adolesc. Psychol.* **39**, 220–233 (2010).
12. Pfiffner, L. J. *et al.* A Randomized Controlled Trial of a School-Implemented School–Home Intervention for Attention-Deficit/Hyperactivity Disorder Symptoms and Impairment. *J. Am. Acad. Child Adolesc. Psychiatry* (2016). doi:10.1016/j.jaac.2016.05.023
13. Pfiffner, L. J. *et al.* A randomized, controlled trial of integrated home-school behavioral treatment for ADHD, predominantly inattentive type. *J. Am. Acad. Child Adolesc. Psychiatry* **46**, 1041–1050 (2007).
14. Pfiffner, L. J., Villodas, M., Kaiser, N. M., Rooney, M. & McBurnett, K. Educational outcomes of a collaborative school–home behavioral intervention for ADHD. *Sch. Psychol. Q.* **28**, 25 (2013).
15. Villodas, M. T., McBurnett, K., Kaiser, N., Rooney, M. & Pfiffner, L. J. Additive effects of parent adherence on social and behavioral outcomes of a collaborative school–home behavioral intervention for ADHD. *Child Psychiatry Hum. Dev.* **45**, 348–360 (2014).
16. Hayes, R. & Moulton, L. *Cluster randomized trials.* (Chapman & Hall/CRC, 2009).
17. Wechsler, D. *Wechsler Abbreviated Scale of Intelligence.* (The Psychological Corporation, 2011).
18. Pfiffner, L. J. & McBurnett, K. Social skills training with parent generalization: Treatment effects for children with attention deficit disorder. *J. Consult. Clin. Psychol.* **65**, 749–757 (1997).

19. Gadow, K. D. & Sprafkin, J. *Child Symptom Inventory 4: Screening and Norms Manual*. (Checkmate Plus, 2002).
20. Abikoff, H. & Gallagher, R. *Children's organizational skills scale*. (Multi-Health Systems, 2009).
21. Gresham, F. M. & Elliot, S. N. *Social Skills Improvement System (SSIS) rating scales manual*. (NCS Pearson, Inc., 2008).
22. Benjamini, Y. & Hochberg, Y. Controlling the false discovery rate: A practical and powerful approach to multiple testing. *J. R. Stat. Soc. B Methodol.* **57**, 289–300 (1995).
23. Evans, S. W., Allen, J., Moore, S. & Strauss, V. Measuring symptoms and functioning of youth with ADHD in middle schools. *J. Abnorm. Child Psychol.* **33**, 695–706 (2005).
24. Pas, E. T. & Bradshaw, C. P. What affects teacher ratings of student behaviors? The potential influence of teachers' perceptions of the school environment and experiences. *Prev. Sci.* **15**, 940–950 (2014).

Table 1.
Means (M) and Standard Deviations (SDs) for Student Outcome Measures

Measure	CLS			BAU		
	Baseline	Post	Follow-Up	Baseline	Post	Follow-Up
	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)
ADHD-P	33.77(10.54)	18.09(8.13)	18.49(8.11)	32.25(9.29)	27.30(10.68)	24.35(9.56)
% at or below average	7%	60%	54%	8%	20%	28%
ADHD-T	30.93(10.44)	19.99(9.33)	23.27(11.32)	33.10(10.88)	27.50(9.82)	24.42(11.16)
% at or below average	19%	57%	40%	13%	21%	45%
ODD-P	10.38(6.28)	6.03(3.86)	6.31(3.61)	10.79(6.05)	9.43(5.09)	8.37(4.13)
% at or below average	57%	83%	85%	41%	54%	70%
ODD-T	6.31(6.02)	4.46(4.44)	5.16(5.72)	7.6(6.63)	6.06(5.07)	5.9(6.26)
% at or below average	58%	72%	63%	48%	55%	62%
COSS-P	158.50(21.62)	137.17(20.42)	140.03(21.89)	155.02(23.8)	147.95(22.64)	146.09(25.99)
% at or below average	35%	76%	66%	37%	51%	61%
COSS-T	92.85(14.69)	84.96(14.34)	88.94(17.51)	100.00(17.08)	96.61(16.15)	89.94(17.01)
% at or below average	39%	57%	48%	24%	29%	44%
SSIS-Social Skills-P (standard score)	87.24(15.5)	93.16(14.45)	92.64(14.26)	85.02(17.38)	86.84(17.33)	89.26(16.72)
% at or above average	54%	77%	69%	47%	56%	60%

SSIS-Social Skills-T (standard score)	84.51(12.72)	85.07(11.43)	86.44(14.43)	82.63(12.61)	83.87(13.78)	85.27(11.51)
% at or above average	46%	57%	54%	43%	50%	55%
SSIS-Academic Competence-T (% at or above average)	61%	72%	63%	59%	59%	54%

Note: Lower scores on the Children’s Organizational Skills Scale (COSS) indicate better functioning. ADHD = attention-deficit/hyperactivity disorder; BAU = Business As Usual; CLS = Collaborative Life Skills program; ODD = Oppositional Defiant Disorder; P = parent; T = teacher; SSIS = Social Skills Improvement System.

Table 2
Means (M) and Standard Deviations (SDs) for Student Outcomes at Follow-up Based on Recovery Status at Post-Treatment^a

Measure	Recovered	Not-recovered	
	<i>M(SD)</i>	<i>M(SD)</i>	<i>p</i> -value
ADHD-P (<i>n</i> =62)	16.8 (8.2)	22.3(6.3)	<.03
ADHD-T (<i>n</i> =56)	21.7(10.4)	30.1(9.4)	.066
ODD-P (<i>n</i> =28)	8.5(2.4)	9.2(3.7)	ns
ODD-T (<i>n</i> =29)	4.8(3.9)	11.0(7.2)	<.03
COSS-P (<i>n</i> =45)	142.0(18.5)	156.3(14.9)	<.04
COSS-T (<i>n</i> =43)	82.81(17.4)	100.71(13.3)	<.004
SSIS-Social Skills-P (standard score) (<i>n</i> =32)	85.3(14.0)	81.4(11.0)	ns
SSIS-Academic Competence-T (<i>n</i> =25)	83.3(7.8)	77.0(7.5)	<.02

Note: Lower scores on the Children's Organizational Skills Scale (COSS) indicate better functioning. ADHD = attention-deficit/hyperactivity disorder; BAU = Business As Usual; CLS = Collaborative Life Skills program; ODD = Oppositional Defiant Disorder; P = parent; T = teacher; SSIS = Social Skills Improvement System.

^a*N* varies per measure since cases scoring within the normal range at baseline are not included in analyses.