A Randomized Controlled Trial of a School-Implemented School–Home Intervention for Attention-Deficit/Hyperactivity Disorder Symptoms and Impairment

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Objective: This study evaluated the efficacy of a novel psychosocial intervention (Collaborative Life Skills [CLS]) for primary-school students with attention-deficit/hyperactivity disorder (ADHD) symptoms. CLS is a 12-week program consisting of integrated school, parent, and student treatments delivered by school-based mental health providers. Using a cluster randomized design, CLS was compared with usual school/community services on psychopathology and functional outcomes.

Method: Schools within a large urban public school district were randomly assigned to CLS (12 schools) or usual services (11 schools). Approximately 6 students participated at each school (N = 135, mean age 8.4 years, grade range 2–5, 71% boys). Using PROC GENMOD (SAS 9.4), the difference between the means of CLS and usual services for each outcome at posttreatment was tested. To account for clustering effects by school, the generalized estimating equation method was used.

Results: Students from schools assigned to CLS compared with those assigned to usual services had significantly greater improvement on parent and teacher ratings of ADHD symptom severity and organizational functioning, teacher-rated academic performance, and parent ratings of oppositional defiant disorder symptoms and social/interpersonal skills.

Conclusion: These results support the efficacy of CLS compared with typical school and community practices for decreasing ADHD and oppositional defiant disorder symptoms and improving key areas of functional impairment. They further suggest that existing school-based mental health resources can be redeployed from non-empirically supported practices to those with documented efficacy. This model holds promise for improving access to efficient evidence-based treatment for inattentive and disruptive behavior beyond the clinic setting.

Clinical Trial Registration Information—Study of the Collaborative Life Skills Program; http://clinicaltrials.gov/; NCT01686724.

Key words: attention-deficit/hyperactivity disorder, psychosocial intervention, behavioral intervention, school–home intervention

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An estimated 5.9% to 7.1% of youth meet criteria for attention-deficit/hyperactivity disorder (ADHD).[1] Problems associated with ADHD constitute a common reason for referrals for mental health services and place children at risk for adverse interpersonal, educational, vocational, and health outcomes.[2,3] Practice guidelines include psychosocial interventions among recommended treatments for ADHD (e.g., American Academy of Child and Adolescent Psychiatry and American Academy of Pediatrics). Despite the existence of evidence-based psychosocial treatments,[4-7] few children receive them. Most evidence-based psychosocial treatments have been developed by university research teams and are not widely available in the community. Cost, transportation, and stigma are barriers to clinic-based care, which is underscored by the fact that more than half those referred to clinics do not show up for their appointments.[8] Even if these barriers were mitigated, psychosocial treatment and pharmacotherapy would likely remain under-resourced (as evidenced by continued shortage of child psychiatrists), particularly in rural and low socioeconomic status locales.[9]

Access to evidence-based psychosocial treatments is limited even in schools, which are first-line providers of mental health care for students. Most students with ADHD do not receive any formal school-based services to address their difficulties,[10,11] and only 37% of students with ADHD who receive school services are provided with behavioral interventions.[11] Classroom-based services for ADHD are often limited to environmental (e.g., preferential seating) and academic (e.g., extended time on examinations, decreased workload) modifications, none of which have empirical evidence to support their use.[12] Beyond these modifications, services might consist of child-centered interventions provided by school mental health providers (SMHPs) that emphasize individual or small group counseling with limited engagement of teachers and parents.[13] These well-

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intended interventions have little evidence to support their use.[13,14]

To address this research-to-practice gap, Pfiffner *et al.* (2011) developed the Collaborative Life Skills (CLS) program. CLS was adapted from an evidence-based, clinic-delivered intervention for ADHD-predominantly inattentive presentation (ADHD-I)[15,16] for implementation in schools by SMHPs. Locating the intervention in schools was intended to maximize access because school is the setting where the vast majority (70%) of children receive mental health services for ADHD.[13,14] The study used existing school-based mental health professionals, rather than paid research staff, to favor generalizability and replication.

CLS consists of simultaneous delivery of 3 empirically supported treatments: teacher consultation and use of daily report cards,[17,18] parent training,[19,20] and child social and life skills training.[15,21] Students learn independence and organizational and social-emotional (e.g., social skills, self-control) skills, which are reinforced by teachers and parents to promote generalization into naturalistic settings. Teachers and parents learn specific strategies for promoting engagement, motivation, and regulation of behavior. 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.). The net effect is to implement around-the-clock support of child behavior across impairment domains in an active partnership of parents, teachers, and SMHPs who share goals and terminology. Open trials of CLS have demonstrated feasibility, fidelity, acceptability, and preliminary efficacy.[18,22,23]

The study evaluated the efficacy of CLS through implementation of a randomized controlled study comparing CLS with business as usual (BAU). The BAU condition represented the general level of school and clinical services accessed by the typical child with attention and behavior concerns. The authors predicted that ADHD and oppositional defiant disorder (ODD) symptom severity and key areas of functional impairment, including organization, academic, and social functioning at home and at school, would be significantly improved at the end of treatment among those receiving CLS versus BAU. The authors also predicted that CLS would result in significantly higher rates of recovery into the normative range on each of these outcomes.

TABLE 1 Baseline Characteristics by Treatment Assignment

	CLS			BAU		
Variable	**%**	**Mean**	**SD**	**%**	**Mean**	**SD**
Child age (y)		8.3	1.1		8.5	1.1
WASI FSIQ		103.0	13.0		101.0	14.7
Gender (% boys)	75			67		
Grade						
2	31			27		
3	35			21		
4	25			35		
5	9			17		
Race/ethnicity						
White	31			22		
African American	8			10		
Asian	22			19		
Hispanic/Latino	21			27		
Multiracial/multiethnic	18			22		
On medication at randomization	9.7			7.9		
Single-parent household	33.3			25.4		
Parent education (% college graduates)	65			55		
ADHD presentation						
Combined	54			62		
Inattentive	40			38		
Hyperactive-impulsive	6			0		
ODD	43			59		

Note: ADHD = attention-deficit/hyperactivity disorder; BAU = business as usual; CLS = Collaborative Life Skills program; ODD = oppositional defiant disorder; SD = standard deviation; WASI FSIQ = Wechsler Abbreviated Scale of Intelligence, Full-Scale Intelligence Quotient.

METHOD

Participant Characteristics

Participants included 135 children in grades 2 through 5 across 23 schools in a northern California urban public school district and 23 SMHPs. Table 1 presents demographic information and symptom profiles based on combined parent and teacher symptom ratings of "often" or "very often" on the Child Symptom Inventory (CSI).[24] Participating schools (19 with kindergarten through grade 5 and 4 with kindergarten through grade 8) had an average of 420 students (range 253–699), with 54.6% of students qualified for free or reduced lunch (range 23–95%).

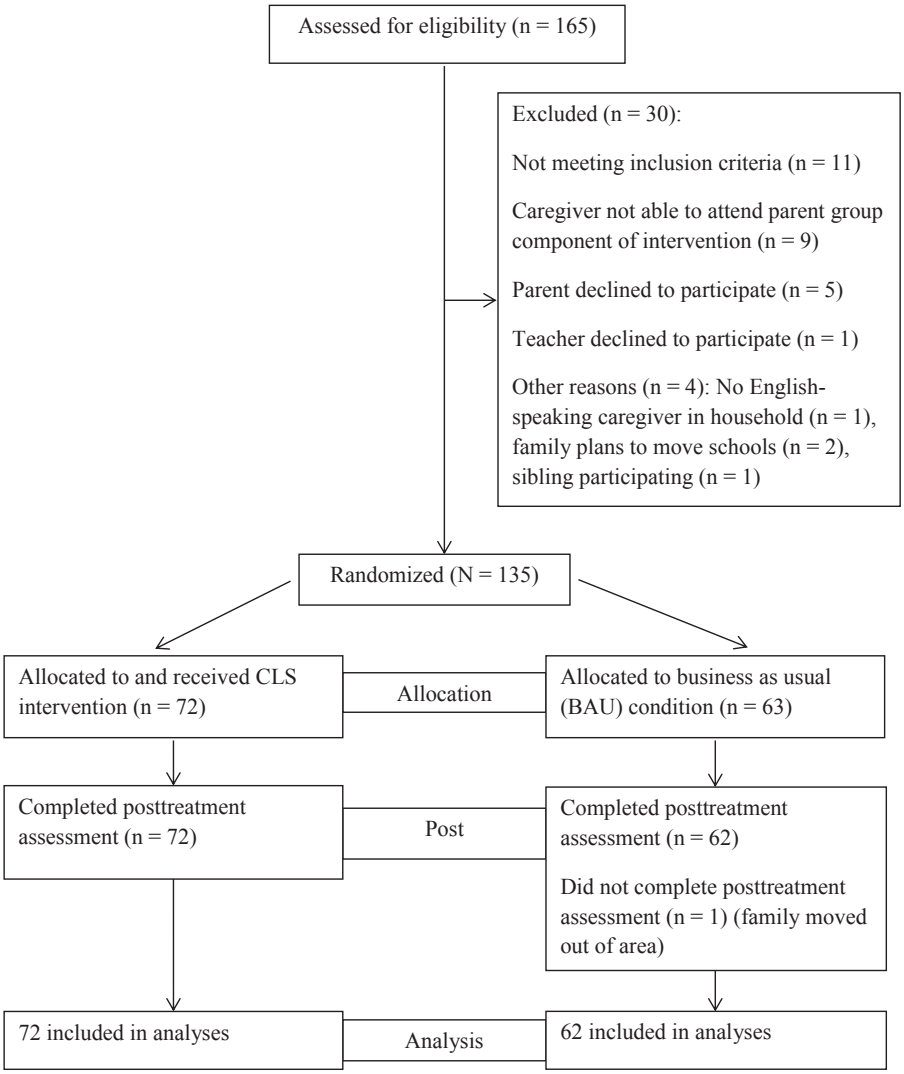
Participant Recruitment and Screening Procedures

Participant flow is depicted in Figure 1. Recruitment occurred from 2012 through 2015, beginning with invitations to SMHPs and their school principals to participate in the program. Those agreeing to participate initiated recruitment of students. Student participants (n = 5–6 per school) were referred by school staff to the SMHP for excessive inattention and/or hyperactivity/impulsivity and related academic and/or social problems (generally those who would be identified as needing school services) and whose teachers and parents provided consent to participate. Children taking medication were eligible as long as their regimens were stable. Students with significant visual or hearing impairments, severe language delay, psychosis, or pervasive developmental disorder or who were in full-day special day classrooms were excluded.

Eligibility criteria were high ratings of ADHD symptoms (i.e., ≥6 inattention symptoms and/or ≥6 hyperactive/impulsive symptoms) endorsed on the CSI by the parent or teacher as occurring often or very often; cross-situational impairment (home and school), documented as a score of at least 3 in at least 1 domain of functioning on parent and teacher Impairment Rating Scales[25]; Full-Scale Intelligence Quotient equivalent to higher than 79 on the Wechsler Abbreviated Scale of Intelligence[26]; a caretaker available to participate in treatment; and a primary classroom teacher who agreed to participate in the classroom component.

Consent forms (parent and teacher) and an assent form (child), approved by the University of California–San Francisco committee on human research, were completed by parents, teachers, and children. Parents and teachers were paid $50 for completing the measurements at each time point.

FIGURE 1 Participant flow diagram for Collaborative Life Skills (CLS) program.



SMHP Background

SMHPs (12 full-time and 11 half-time masters-level mental health clinicians) implemented study interventions as part of their work responsibilities. SMHPs received extended calendar pay, at a rate similar to their district salary, for attending training that occurred outside their normal working hours.

Study Design and Description of CLS Treatment Components

A 2-level (students, schools) cluster randomized controlled design[27] accounted for treatment (CLS or BAU) within level 2 (schools). Entry into the study was staggered into 2 cohorts during each of 3 school years, with 1 cohort beginning in fall and 1 in winter. Schools within cohorts (n = 3–5 schools) were randomized to CLS (n = 12) or BAU (n = 11), with randomization of schools stratified based on the percentage of students receiving free or reduced lunch. Schools were rank-ordered by the percentage of students receiving free or reduced lunch. Ordered pairs were randomized to CLS or BAU by the study statistician after students, parents, and teachers consented to participation and completed baseline measurements.

Classroom Component. SMHPs led 2 group meetings with participating teachers (1 1-hour orientation session, 1 30-minute troubleshooting meeting) and 2 to 3 individual 30-minute meetings attended by the parent, the student, and the student's individual teacher. The classroom intervention consisted of a school–home daily report card (classroom challenge [CC]), homework plan, and classroom accommodations as needed (e.g., preferential seating, targeted use of praise, providing prompts to improve student compliance). Each student's CC included 2 to 3 target behaviors (e.g., academic work, classroom deportment, social interactions) rated up to 3 times per day. Points earned for meeting target goals were exchanged for daily home rewards and brought to the child group each week for group-based reinforcement. Target behaviors were refined throughout the intervention period during the individual meetings.

Parent Component. SMHPs led 10 1-hour group sessions. Modules taught skills covered by traditional parent training programs, including effective use of commands, rewards, and discipline, plus

strategies covered in the child group (e.g., homework time, organization, independence in completing daily routines, peer interactions, and social skills) and stress management for parents. Families developed a homework plan and home challenges targeting child skills. They also learned skills for supporting the CC at home.

Child Skills Component. SMHPs led 9 40-minute child group sessions during the school day and 2 celebratory parties with parents, teachers, and students. Modules targeted social functioning and independence.[21] Social skills modules included good sportsmanship, accepting consequences, assertion, dealing with teasing, problem solving, self-control, and friendship making. Independence modules included homework skills, completing chores and tasks independently, and establishing and following routines. Activities accommodated developmental needs (e.g., having older children take more of a leader/helper role in groups, providing age-appropriate examples of skill use). Skills were taught through didactic instruction, behavior rehearsal, and in vivo practice. A reward-based contingency management program was used to manage child behavior, encourage active group participation, and reinforce new skills. To facilitate generalization, children earned tokens and rewards for accomplishing target goals at home and school.

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 final assessments in the fall of the subsequent school year, they were offered the CLS program.

SMHP Training

SMHPs attended group training sessions (an initial full-day training plus weekly supervision) with a doctoral-level clinician-trainer to review manual content, view session videotapes, role-play key interactions, and troubleshoot emerging problems. Trainers also attended each session to complete fidelity measurements and to model the curriculum if needed.

Fidelity Measurements

Trainers rated SMHP adherence to session content (coverage of each item rated as "not at all," "partially," or "fully") and implementation quality (competence of delivery rated 1 = "not at all" to 5 = "great deal"). Teacher fidelity included the number of days the CC was completed (based on a count of completed CC forms). Parent implementation of strategies taught during groups was measured through weekly self-ratings of strategy use frequency (1 = no days to 5 = every day), parent signatures on the daily CC, and clinician-trainer ratings of parent overall adherence to the treatment program (1 = "not at all" to 5 = "great deal").

Student Outcome Measurements

ADHD and ODD Symptoms. Teachers and parents completed the CSI.[24] The ADHD and ODD items were rated on a 4-point scale (never, sometimes, often, or very often). The CSI has normative data and acceptable test-retest reliability and predictive validity for ADHD and ODD diagnoses.[24] In the present sample, internal consistency was high for parent and teacher versions of the CSI ($\alpha > 0.8$ for all comparisons). Total ADHD and ODD scale scores were used in analyses to measure symptom severity.

Organizational Functioning. Teachers and parents completed the Children's Organizational Skills Scale (COSS).[28] Items are rated on a 4-point scale (1 = "hardly ever or never" to 4 = "just about all the time"). Items assessing organization, management of materials/supplies, and task planning skills (parent = 58 items, teacher = 38 items) were totaled for analyses, with lower scores indicating better organizational functioning. Parent and teacher versions have adequate psychometric properties, including internal consistency ($\alpha = 0.94$ for all comparisons).

Social Skills. Parent and teacher versions of the Social Skills Improvement System (SSIS) Social Skills scale were used to measure social skills.[29] Each item is rated on a 4-point scale (never, seldom, often, or almost always). The SSIS has excellent psychometric properties, including high internal consistency ($\alpha \geq 0.94$ for all comparisons), test-retest reliability ($r \geq 0.81$ for all comparisons), and evidence for convergent and discriminant validity.[29] In this study, the total social skills standard score (sex-specific) was analyzed, which reflects communication, cooperation, assertion, responsibility, empathy, and self-control skills. Higher scores indicate greater social skill.

Academic Functioning. The Academic Competence scale on the teacher version of the SSIS 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 ($\alpha = 0.97$) and test-retest reliability ($r = 0.93$) and evidence for convergent and discriminant validity.[29] The total academic competence standard score (sex-specific) was analyzed. The standard score was dichotomized at 85 (with scores <85 representing below average and scores >85 representing at least average) to evaluate for treatment effects on the percentage of students functioning within at least the average range at posttreatment and on improving the academic functioning of those most at risk for academic failure (i.e., those within the below-average range at baseline).

Data Analytic Approach and Sample Size

Sample size was estimated based on the authors' previous findings of effect sizes in the medium to large range for decrease in ADHD symptoms and impairment.[15,16] With a sample of 24 schools and 135 students, the estimated detectable effect size for this study is 0.48 (intraclass correlation coefficient = 0.01, $\alpha = 0.05$, 2-sided).

Baseline demographic characteristics were compared between treatment conditions by testing linear models using SAS PROC GENMOD (SAS Institute, Cary, NC) and the generalized estimating equation to account for clustering effects by school. Study hypotheses were tested by estimating and testing linear mixed-effects models of mean posttest scores between groups using SAS PROC GENMOD with the generalized estimating equation (all 2-tailed). In addition to intervention group, models included the baseline level of the outcome measurement. Effect sizes were based on group differences in estimated means at posttreatment (adjusted for pretreatment score) using Cohen's *d*. To control type I error rate, a Benjamini-Hochberg false discovery rate[30] was applied within the domain. The false discovery rate exerts more powerful control over incorrectly rejecting the null hypothesis compared with procedures that control the familywise error rate (e.g., Bonferroni correction). Specifically, using this method, each p value below the a priori familywise α level of 0.05 (i) is ranked in ascending order, i thru M, where M is the rank of the largest (least significant) p value. Then, these p values are compared iteratively with an adjusted α level of $i(\alpha)/M$, until 1 of the p values (k) is larger than the adjusted α level. When this occurs, k and all p values ranked after k are considered nonsignificant. All comparisons with significant p values

(i.e., $p < .05$) remained significant after applying the Benjamini-Hochberg false discovery rate correction. To judge clinical significance, the percentage of cases were compared with symptom and impairment scores within the normative range (within 1 standard deviation of the sex-specific population mean) at posttreatment, separately for parents and teachers, based on published norms for each measurement.

RESULTS

Fidelity Measurements and Attendance

SMHPs at least partly covered 94% of parent session elements and 97% of child session elements with moderate to high levels of competence (mean 4.4 for parent group and 4.8 for child group). Teachers used the CC an average of just over 4 days per 5-day week (mean 4.1). Parents reported using strategies taught during the parenting group to address home behaviors on most days (mean 4.3) and to support the CC on most days (mean 4.5), and parent signatures were obtained on more than 70% of the CCs collected. Trainer ratings of parental overall adherence to the program averaged 4.1. Parent attendance at groups averaged above 79% (range 0–100%). More than 90% attended at least half the group sessions. Child attendance averaged above 92% (range 67–100%). Eighty-five percent of students had 2 teacher/family meetings and 15% had 1.

Student Outcome Measurements

Few data were missing at baseline or posttreatment (2–5% across measurements), so none were imputed. Most of the missing data were related to attrition. 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 at least 1 outcome measurement. Similar results were obtained in models that were adjusted versus not adjusted for these covariates; thus, results from the unadjusted models are reported. Table 2 presents results for ADHD and ODD symptoms and functional impairment at baseline and posttreatment.

ADHD Symptom Severity. Significant treatment effects were found at posttreatment for ADHD symptom severity per parent ($\chi^2 = 13.64$, $p = .0002$) and teacher report ($\chi^2 = 8.7$, $p = .0032$), with large and medium effect sizes, respectively. Decreases in ADHD symptom severity from baseline to posttreatment for the CLS group averaged 46% and 35% per parent and teacher report, respectively, but only 15% and 17% for the BAU group per parent and teacher report, respectively. After treatment, the percentages of cases that moved from outside to within the normative range were 59% and 50% per parent and teacher report, respectively, for the CLS group, but only 16% and 17% per parent and teacher report, respectively, for the control group. These group differences were statistically significant (parent: $\chi^2 = 11.26$, $p = .0008$; teacher: $\chi^2 = 7.01$, $p = .0081$).

ODD Symptom Severity. Significant decreases in parent-reported ODD symptom severity were found for CLS compared with BAU at posttreatment ($\chi^2 = 13.77$, $p = .0002$), with ODD symptoms decreasing by 42% from baseline to posttreatment in the treated group but only 13% in the control group and a between-group effect size in the large range. Group differences in teacher-reported ODD symptom severity trended toward significance (teacher: $\chi^2 = 3.56$, $p = .0593$), with the treated group averaging a 29% decrease and the control group averaging a 20% decrease and a modest between-group effect size. After

TABLE 2 Mean (M) and Standard Deviation (SD) for Student Outcome Measurements

		CLS		BAU			
Measurement	Data Source	Baseline, Mean (SD)	Post, Mean (SD)	Baseline, Mean (SD)	Post, Mean (SD)	Cohen's *d*/OR (95% CI)	*p* Value
ADHD symptom severity	P	33.77 (10.54)	18.09 (8.13)	32.25 (9.29)	27.30 (10.68)	−1.05 (−1.42 to −0.69)	.0002*
	T	30.93 (10.44)	19.99 (9.33)	33.10 (10.88)	27.50 (9.82)	−0.67 (−1.02 to −0.32)	.0032*
ODD symptom severity	P	10.38 (6.28)	6.03 (3.86)	10.79 (6.05)	9.43 (5.09)	−1.08 (−1.45 to −0.71)	.0002*
	T	6.31 (6.02)	4.46 (4.44)	7.6 (6.63)	6.06 (5.07)	−0.35 (−0.69 to −0.01)	.0593
COSS (total score)	P	158.50 (21.62)	137.17 (20.42)	155.02 (23.80)	147.95 (22.64)	−1.09 (−1.46 to −0.72)	.0393*
	T	92.85 (14.69)	84.96 (14.34)	100.00 (17.08)	96.61 (16.15)	−0.68 (−1.03 to −0.33)	.0001*
SSIS—Social Skills (standard score)	P	87.24 (15.5)	93.16 (14.45)	85.02 (17.38)	86.84 (17.33)	0.39 (0.04 to 0.74)	.0034*
	T	84.51 (12.72)	85.07 (11.43)	82.63 (12.61)	83.87 (13.78)	0.01 (−0.33 to 0.35)	NS
SSIS—Academic Competence (standard score)	T	89.0 (13.7)	89.6 (13.9)	88.0 (11.9)	88.1 (13.0)	0.11 (−0.24 to 0.45)	NS
At or above average, %		61	72	59	60	OR 3.41 (1.4 to 8.6)	.0291*

Note: ADHD = attention-deficit/hyperactivity disorder; BAU = business as usual; CLS = Collaborative Life Skills program; COSS = Children's Organizational Skills Scale; NS = not significant (p > .1); ODD = oppositional defiant disorder; OR = odds ratio; P = parent; SSIS = Social Skills Improvement System; T = teacher.
**Significant after within-domain Benjamini-Hochberg false discovery rate correction.*

treatment, the percentages of cases that moved from outside to within the normative range were 62% and 53% per parent and teacher report, respectively, for the treated group and 28% and 31% per parent and teacher report, respectively, for the control group; these group differences were statistically significant for parent report ($\chi^2 = 6.6$, $p < .0102$) and trended toward significance for teacher report ($\chi^2 = 3.49$, $p = .0618$).

Organizational Functioning. The CLS group showed significantly greater improvement in organizational functioning compared with the control group per parent report ($\chi^2 = 14.68$, $p = .0001$) and teacher report ($\chi^2 = 8.58$, $p = .0034$) at posttreatment, with effect sizes in the large and medium range, respectively. Significantly higher rates of recovery into the normal range were found for CLS (65%) compared with BAU (26%) on the parent-reported COSS ($\chi^2 = 9.18$, $p = .0024$) and for CLS (41%) compared with BAU (17%) on the teacher-reported COSS ($\chi^2 = 4.7$, $p = .0301$).

Social Skills. Parent ratings of social skills on the SSIS showed significant between-group differences at posttreatment favoring the CLS group ($\chi^2 = 4.25$, $p = .0393$), with an effect size in the modest range. Significantly higher rates of recovery into the normal range were found for CLS (69%) compared with BAU (28%) on the parent-reported SSIS Social Skills scale ($\chi^2 = 8.69$, $p < .0032$). Between-group differences on teacher-reported social skills were not statistically significant ($p > .1$).

Academic Functioning. Teacher ratings of academic competence on the SSIS measured by mean standard scores did not show significant group differences at posttreatment ($p > .1$). However, when scores were dichotomized at a standard score of 85, significant between-group differences were found at posttreatment, favoring the CLS group ($\chi^2 = 4.46$, $p = .0291$) with an odds ratio (3.41) in the moderate range. Significantly more students in CLS (72%) were scoring in the average or above average range than were students in BAU (58%). Significantly greater rates of recovery from below to within or above the average range were found for CLS (36%) compared with BAU (8%; $\chi^2 = 4.47$, $p = .0344$).

Satisfaction Measurements

Parent, teacher, and SMHP satisfaction with CLS was high at posttreatment. The vast majority of parents and teachers (>90%) 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 (these ratings are the 2 most favorable options on a 5-point scale). Students (93%) reported they liked the group and/or learned a lot (most favorable option on a 5-point scale). All SMHPs rated the overall quality of the program as high or very high (on a 5-point scale with rating options ranging from very low to very high).

Non-CLS Service Usage for BAU and CLS

During the period from baseline to posttreatment, CLS and BAU did not significantly differ ($p > .1$ for the 2 comparisons) in medication use (BAU: 7.9%, 5 individuals; CLS: 12.7%, 9 individuals) or receipt of educational interventions, including special education services at school (individualized education program) and/or tutoring during or after school (BAU: 39.7%, 25 individuals; CLS: 40.9%, 29 individuals). However, BAU received significantly more school counseling and/or psychotherapy in the community (family therapy, child therapy, or parenting group) than CLS (BAU: 46%, 29 individuals; CLS: 27.5%, 19 individuals; $\chi^2 = 4.87$, $p = .0274$). More than half the students in BAU received at least 1 classroom accommodation, including preferential seating, modified homework, behavioral chart, and/or extra time on tests (BAU: 58.7%, 37 individuals). All CLS participants received classroom accommodations as part of their participation in the treatment.

DISCUSSION

This is the first randomized trial of CLS, a novel school-implemented school–home intervention for ADHD symptoms and impairment. CLS resulted in statistically and clinically significant improvement in ADHD symptom severity and organizational skills across home and school settings compared with usual school/community services. Improvement was substantial, as indicated by medium to large effects (at or above levels reported in meta-analyses of behavioral treatment effects[6]) and clinically significant recovery of symptom severity and organizational impairment into normative ranges for most of those treated with CLS. As predicted, parents also reported statistically significant decreases in ODD symptoms and improvement in social skills, with recovery into normal ranges in the 2 domains for most youth in the CLS. Teachers also reported decreases in ODD symptoms, but these were just shy of statistical significance, possibly owing to less-severe teacher-reported ODD symptoms at baseline. These findings suggest that improvement from CLS in this trial, and, by inference, a previous open (uncontrolled) trial,[22,23] is unlikely because of factors such as time, maturation, or response to usual services.

The substantial decrease in ADHD symptom severity is consistent with the authors' previous study of multicomponent treatment (Child Life and Attention Skills program [CLAS][16]). That study found moderate effect sizes for decreased inattention symptom per parent ($d = 0.64$) and teacher ($d = 0.7$) report compared with effect sizes in the large range per parent ($d = 1.05$) and moderate range per teacher ($d = 0.67$) reported in the present study. In contrast, another study involving clinic-based family and school components for school-age youth did not find treatment-related change in ADHD or ODD severity.[31] In that study, medication usage was relatively high in all groups, and the treatment was compared with a psychoeducational intervention, which might have limited the extent to which behavioral treatment would show effects beyond services already provided. The authors' supposition is that the coordinated components and intensity that are specific to

CLAS[16] and CLS confer greater efficacy for decreasing ADHD and ODD symptoms. However, because the 2 present samples used medication infrequently, one cannot rule out the possibility that concurrent medication use would substantially decrease room for improvement of ADHD symptoms for all behavioral treatments, including the present treatment.

Although treatment effects on mean scores of academic competence were not significant, teachers rated significantly more CLS than BAU students as functioning at or above the average range in overall academic competence at posttreatment and as having improved from below average at baseline to at least the average range at posttreatment. Such effects on the dichotomized but not the continuous variable might have occurred because CLS does not improve academic competence in students already functioning at or above the normal range. CLS might be most helpful for improving the academic performance of those students who are most at risk for academic failure.

Contrary to expectations, CLS did not yield significant improvement on teacher-reported social skills. Lesser effects at school might be a function of less awareness by teachers of changes in the specific peer interaction skills assessed on the SSIS, because these might be relatively subtle and less observable in the structured classroom context. Alternatively, the intervention might not be sufficiently targeted or potent to address school-related social problems. For example, teachers tended to identify target behaviors for the daily report card that focused on behavior and work-related outcomes rather than specific social skills. Increased use of socially focused target behaviors in peer recreational settings could yield stronger effects. It is worth noting that teachers do not often supervise less-structured activities, such as lunch and recess, and thus they most likely were unavailable to observe or to deliver treatment in these social activities.

This study demonstrated that CLS can be feasibly implemented at school sites by school personnel with similar, or in some cases stronger, effects than clinic-based family–school interventions. Feasibility was demonstrated by high attendance rates for parents, children, and teachers at groups and meetings and low attrition. Acceptability of CLS was high per reports from the SMHPs, teachers, parents, and students. Fidelity of implementation by SMHPs was high, as was parent and teacher implementation of the strategies at home and school. Implementing all intervention components at the school, by a full-time school employee, might have bolstered the acceptability of the intervention among teachers and parents and/or could have enhanced treatment fidelity by facilitating closer monitoring of parent and teacher components (by daily access to teachers and parents). Together, these results suggest that SMHPs can be redeployed from conventional treatment to an evidence-based treatment. Pending controlled evaluation of cost-effectiveness, this shift could be accomplished with modest additional cost compared with the costs that might be projected by sending these same children to clinics for comparable treatment. This approach confers the potential for increased accessibility for families, and it addresses the difficulties associated with disjointed school and clinic services. It could be adapted to areas with few services (rural and low socioeconomic status locales) in far less time than would be required to build out current (clinic-based) service delivery models.

The recovery rate of CLS, with symptom-decreasing effects similar to medication,[32] suggests that CLS or comparable interventions could attenuate the number of schoolchildren who require further treatment with medication.[33] If so, then an alignment of public policy could substantially ameliorate the current and projected underservice of needy children that is a function of too few child psychiatrists.[9] As a public health measure, this would be consistent with providing the lowest-risk intervention first. Other studies have shown that sequencing psychosocial treatment before medication treatment decreases the dose and overall exposure of medication[33] and increases parents' engagement in behavioral interventions.[34]

There are several limitations to this study. The sample might not be representative of children who typically present to clinics with complaints related to ADHD. These children were referred by the school and clinical diagnoses were not made (although ADHD symptoms and impairment were confirmed at baseline for all participants). Many were from well-educated families (representative of the region), which might have contributed to higher treatment adherence. Rater bias or expectancy might have been factors (parents and teachers involved in the treatment provided the ratings). More objective measurements of outcome (e.g., academic achievement tests, blinded observations) would avoid these biases. However, the fact that teachers reported significant improvements in some areas (ADHD symptom severity, organizational and academic functioning) but not in others (ODD symptom severity or social skills) suggests that if rater biases were operative, they were not universal. The study reports only short-term effects; thus, sustainability of treatment effects requires further study. The relative contribution of each treatment component is not discernable from the design. Masters-level SMHPs delivered CLS in this study, and although school clinicians are on staff in districts across the country,[35] training might need to be modified for delivery by those without a mental health background.

In sum, school-delivered multicomponent psychosocial treatment can decrease ADHD and ODD symptoms and improve organizational, academic, and social functioning. The feasibility demonstrated in the present study holds promise for increasing accessibility and optimizing cost-effectiveness of services if the critical gap in initial training and supervision can be bridged. Future research should include the development of portable approaches to training school clinicians in multicomponent treatments such as CLS (e.g., by interactive web-based treatment and training); otherwise there will be a lag owing to inadequate resources for in-person training in many

locales. The dissemination of evidence-based behavioral interventions more generally across school districts is an urgent consideration and will depend on policy decisions that emphasize funding for school mental health and other systems of care so that these services are accessible to all youth and families in need. &

CG Clinical guidance

- CLS is a multicomponent treatment for childhood ADHD symptoms and impairments that integrates classroom interventions, parent training groups, and child skills groups. CLS was designed for delivery by SMHPs at school sites. Treatment effects are generalized across school and home through behavior targets that are reinforced in the 2 settings and common terminology used by parents, teachers, and SMHPs.
- CLS resulted in significant decreases in ADHD and ODD symptoms and organizational, academic, and social impairments compared with usual services. In many cases, ADHD and ODD symptoms and impairments were normalized. Most benefits were reported in the home and classroom settings where CLS was implemented. SMHPs delivered CLS with high fidelity. Program satisfaction was high among parents, teachers, SMHPs, and children.
- The school delivery of CLS confers the potential for increased accessibility, potency, and cost-effectiveness of empirically supported services for youth with increased ADHD symptoms and impairment.

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