

Three-Year Effects of Motivational Interviewing–Enhanced Behavior Therapy for Adolescents With Attention-Deficit/Hyperactivity Disorder: A Randomized Community-Based Trial

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Objective: This study reports 3-year effects of a parent–teen cognitive/behavioral treatment for adolescent attention-deficit/hyperactivity disorder (ADHD), blended with Motivational Interviewing (Supporting Teens' Autonomy Daily [STAND]), vs Usual Care (UC) in 4 community clinics.

Method: This was a randomized clinical trial with double randomization of adolescents and therapists to STAND vs UC. Participants were 278 culturally diverse adolescents diagnosed with *DSM-5* ADHD and 82 community therapists. Long-term effects on outcomes and theorized mechanisms were assessed at approximately 3 years post baseline (mean age = 16.94 years, SD = 1.69): ADHD severity (parent-rated), parent–teen conflict (parent/adolescent-rated), organization, time management, and planning skills (OTP; parent-rated), treatment and school enrollment (parent/adolescent-reported), and ADHD diagnostic persistence (clinician-determined). Therapist licensure was examined as a treatment moderator. Intent-to-treat (ITT) and per protocol analyses (n = 225; participants initiating treatment after agency intake) were conducted.

Results: As in the original trial, ITT analyses indicated no long-term group by time effects. However, STAND (vs UC) led to superior long-term outcomes when therapists were licensed (22% of sample) vs unlicensed for parent-rated hyperactivity/impulsivity ($d = 0.39$; adolescent-rated parent–teen conflict: $d = 0.27$, and parent-rated OTP skills: $d = 0.79$). Previously reported post-treatment group differences on medication engagement were non-significant at the 3-year follow-up.

Conclusion: Although STAND did not outperform UC overall, group by licensure interactions indicate specific long-term impacts on ADHD symptoms, executive function skills such as OTP, and parent–teen conflict, extending this trial's acute effects and replicating previous findings. Clinicians in community settings might recommend adjunctive cognitive/behavioral treatment to adolescents with ADHD to maximize long-term outcomes. However, additional efforts are needed to facilitate effective implementation by unlicensed clinicians.

Plain language summary: This randomized clinical trial examined a cognitive/behavioral treatment, Supporting Teens' Autonomy Daily (STAND), compared to usual care (UC) services, for adolescents with attention-deficit/hyperactivity disorder (ADHD). 278 adolescents with ADHD (ages 11–17) were randomized to a clinician in the STAND versus UC group. In this 3-year follow-up of the original study's outcomes, intent-to-treat analyses indicated no significant differences in adolescent outcomes between STAND and UC groups—however, when therapists were licensed (22% of practitioners), STAND led to superior long-term adolescent outcomes for parent-rated hyperactivity/impulsivity severity and organization, time management, and planning skills, as well as youth-rated parent-teen conflict.

Clinical trial registration information: STAND Community Trial (STAND); <https://clinicaltrials.gov/study/NCT02694939>. Long-term Follow-up of MI-based Behavioral Intervention Delivered in Community Mental Health; <https://osf.io/h5w6f>.

Diversity & Inclusion Statement: We worked to ensure sex and gender balance in the recruitment of human participants. We worked to ensure race, ethnic, and/or other types of diversity in the recruitment of human participants. We worked to ensure that the study questionnaires were prepared in an inclusive way. One or more of the authors of this paper self-identifies as a member of one or more historically underrepresented racial and/or ethnic groups in science. One or more of the authors of this paper self-identifies as a member of one or more historically underrepresented sexual and/or gender groups in science. One or more of the authors of this paper self-identifies as living with a disability. We actively worked to promote sex and gender balance in our author group. We actively worked to promote inclusion of historically underrepresented racial and/or ethnic groups in science in our author group. While citing references scientifically relevant for this work, we also actively worked to promote sex and gender balance in our reference list. The author list of this paper includes contributors from the location and/or community where the research was conducted who participated in the data collection, design, analysis, and/or interpretation of the work.

Key words: ADHD; adolescence; treatment

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Attention-deficit/hyperactivity disorder (ADHD) is a chronic neurodevelopmental disorder that persists into adulthood for most people with this

condition.^{1,2} Individuals with childhood ADHD are at risk for serious negative outcomes that include academic and occupational disengagement, financial problems,

depression, substance abuse problems, instability in interpersonal relationships, and premature death.³⁻⁶ With high public impacts of ADHD across the lifespan stemming largely from health care system use costs, reduced workforce participation, and engagement in government assistance programs,⁷ untreated ADHD imparts significant impacts to both the individual and society.

Symptoms and impairment severity among adolescents with ADHD are closely tied to adult outcomes,^{1,8} making this stage of life a potentially sensitive period for preventing escalations in psychopathology. Best practices in the management of ADHD during adolescence include combined medication (stimulant or non-stimulant) and cognitive/behavioral treatment.^{9,10} A recent systematic review of randomized controlled trials (RCTs) testing adolescent ADHD treatments indicates that medications demonstrate consistent effects on ADHD symptom severity whereas cognitive/behavioral treatments demonstrate consistent effects on informant-rated executive function skills and functional impairment indices.¹⁰ Thus, these treatment classes are viewed as complementary in adolescence.

Although there is a large body of literature on the acute impact of ADHD treatments delivered in childhood and adolescence, less work has examined long-term efficacy.¹¹ For childhood treatments, available research suggests that initial maintenance of gains after treatment is discontinued, with dissipation of effects by early adolescence.¹² Although no research has investigated long-term effects of medication delivered to adolescents with ADHD, emerging evidence suggests that maintenance of adolescent cognitive/behavioral treatments up to 6 months, and possibly 3 years (particularly for informant ratings of executive function skills).¹³⁻¹⁶ Recently, a first RCT examining long-term follow-up of an intensive adolescent behavior therapy for ADHD (summer treatment program) demonstrated significant group by time effects for executive function skills (specifically organization, time management, and planning skills) and ADHD symptom severity up to 3 years post treatment.¹⁷ If this finding withstands replication, cognitive/behavioral approaches for adolescents with ADHD might be viewed as a key prevention strategy.

The current study tests the long-term efficacy of community-delivered Supporting Teens' Autonomy Daily (STAND),¹⁸ an empirically validated parent-teen cognitive/behavioral treatment for ADHD blended with Motivational Interviewing (MI).¹⁹ MI and other engagement-focused components (ie, parent-teen collaboration, enhanced planning supports for out-of-session exercises) are integrated into STAND in recognition of prominent ADHD treatment engagement problems during the

adolescent period.²⁰⁻²² STAND's parent-teen collaborative approach involves weekly outpatient sessions with a mental health therapist for approximately 10 to 14 sessions with a focus on executive function skills training, and parent-teen communication training to promote successful management of ADHD during the adolescent years.¹⁸

Three RCTs of STAND (2 compared to treatment as usual, 1 active control) established its initial efficacy in an academic research setting.^{16,23,24} More recently, integrative data analysis of a pooled sample of 4 RCTs (N = 854) examining various cognitive/behavioral treatments for adolescents with ADHD indicated that STAND outperformed other adolescent ADHD cognitive/behavioral treatment models (low-intensity behavioral skills groups, intensive group summer treatment) with respect to adolescent and parent engagement and certain key outcomes over time (ADHD symptoms, grade point average).²⁵ In the same study, improvements in parent-teen conflict and executive function skills (ie, organization, time management, and planning) were found to be significant mediators of STAND's acute impact on ADHD symptoms.²⁶ Experimental investigation of STAND's long-term efficacy is yet to be reported; however, qualitative interviews with adolescent and parent participants (N = 21 dyads; approximately 4 years post treatment) indicate a nearly unanimous perceived long-term impact on executive function skills as well as perceptions that treatment enhanced motivation, increased self-awareness, and improved parenting skills long term for a majority of those interviewed.²⁷ We hypothesize that equipping adolescents with enhanced motivation and lifelong skills in the management of their ADHD will create a lasting impact on functioning.

Herein, we report the long-term outcomes (on average, 3 years after study baseline [BL]) from an RCT (N = 278) of community-delivered STAND vs Usual Care (UC). The full acute outcomes from this study have been previously reported.²⁸⁻³² Briefly, an initiative to adapt STAND for a community-based setting began in 2015. Manualized content was not modified. However, we met with agency stakeholders to assess needs and to determine initial modifications to STAND's community-based implementation strategy. Therapists were randomly assigned to receive STAND training and supports or no information about STAND. Naturalistic use of STAND among agency clinicians was measured. Youth who were incoming clients at the agencies were also randomly assigned to a therapist who was in the STAND or UC group.²⁸⁻³²

Previously, we reported that nearly all therapists assigned to the STAND group completed the training and regularly attended supervision with the research team. Therapists rated STAND as acceptable and lower burden

than UC practices. There were no between-group differences in parent- or adolescent-rated therapeutic alliance, indicating that the manualized procedures did not undermine the client–therapist bond. However, there were clear, diagnosable problems with treatment fidelity when implementing treatment in the community context. Youth engagement in STAND was strong; most completed 10 sessions. Compared to UC, STAND parents showed higher engagement and satisfaction.^{28–32}

With respect to effectiveness, treatment group by time effects were smaller than in laboratory-based trials; STAND and UC showed no differences in intent-to-treat analyses of primary outcomes. However, ADHD medication adherence was significantly higher for STAND vs UC, indicating unexpected spillover effects for medication use. Analyses of only those youth who enrolled in services after agency intake ($n = 225$) demonstrated superiority of STAND on ADHD symptoms and on organization, time management, and planning skills, conduct problems, adolescent motivation, and certain parenting practices when therapists were licensed.^{28–32} Data have undergone extensive analyses in an attempt to clarify the nature of the licensure effect, but with little clarification thus far. Licensure status has been found to be unrelated to therapist demographics, clinical experience, competence, or quality and fidelity of intervention delivery (including therapeutic alliance). At present, the team's leading hypothesis is that licensed therapists may demonstrate higher professional autonomy,³³ potentially delivering STAND with higher quality than unlicensed clinicians (but via dimensions not captured in our available content fidelity and motivational interviewing integrity measures). Recent and ongoing work with community partners has revised STAND's implementation strategy for community contexts, with the goal of better supporting unlicensed therapists to deliver STAND and identifying treatment modifications to improve practicality.^{34,35}

Herein, we examine long-term treatment effects on ADHD symptoms (primary outcome) and 2 theoretical treatment mechanisms (adolescent organization, time management, and planning [OTP] skills, parent–teen conflict),²⁶ as well as 4 long-term functional outcomes (ADHD diagnostic persistence, ADHD medication use, engagement in psychosocial services, school enrollment) in the intent-to-treat (ITT) and per protocol (PP) samples. Based on the acute trial's failure to find group-level benefits of STAND vs UC in longitudinal ITT and PP analyses (except for medication use), we hypothesized that only medication use would separate for STAND vs UC at long-term follow-up. Based on previous acute trial findings that STAND vs UC leads to superior outcomes when therapists

are licensed (for ADHD symptom, OTP skills, conduct problems, adolescent motivation, and parenting behaviors),^{28,31,32} we hypothesized long-term group by licensure effects on all tested outcomes, with the largest impact on OTP skills given that it possessed the largest interaction effect size in the acute phase of this trial.^{17,27}

METHOD

All procedures were approved by the Florida International University Institutional Review Board. All parents, therapists, and adolescents signed consent/assent documents prior to participating.

Participants

Adolescents. Adolescents ($N = 278$; aged 11–17 years) were incoming patients at 4 community agencies in a large pan-Latinx and pan-Caribbean Ucity in the United States (Supplement 1, available online).³⁶ They were required to meet full *DSM-5* ADHD criteria (Supplement 2, available online). Autism spectrum disorder and intellectual disability ($IQ < 70$) were exclusionary. Adolescents were randomly assigned to STAND or UC using a stratified randomization procedure within agency. Randomization occurred after agency and study intake and before initiation of treatment at the agency (Supplement 2, available online). Table 1 presents sample demographic characteristics. There were no significant group differences on any variable.

Therapists. Therapists ($n = 82$) were mental health professionals employed at 4 agencies. Therapists self-identified as 19.8% non-Hispanic White ($n = 16$), 14.8% Black or African American ($n = 12$), 64.2% Hispanic ($n = 53$), and 1.2% Other ($n = 1$). The majority of therapists (86.6%) were female ($n = 71$), with 61.0% ($n = 50$) offering treatment in both Spanish and English. In all, 86.6% ($n = 71$) held a master's degree (7.3% held a doctorate [$n = 6$] and 6.1% were bachelor's level interns [$n = 5$]). On average, clinicians reported 5.24 years of delivering therapy ($SD = 5.00$). Of the therapists, 22.0% ($n = 18$) were licensed to practice by the state department of health and 78.0% were not. Unlicensed therapists included bachelor's level, master's level, and doctoral level practitioners. STAND ($n = 44$) and UC ($n = 38$) therapists did not differ on any of the background variables noted above.

Procedures

Recruitment and Intake. At agency intake, agency staff provided study information to parents of sixth- to 12th grade students with attention, organization, motivation, or

TABLE 1 Characteristics of the Sample at Baseline

	STAND (N = 138)	UC (N = 140)
Diagnostic variables		
WASI estimated Full Scale IQ, mean (SD)	94.15 (14.07)	96.81 (13.20)
ADHD presentation		
ADHD— predominantly inattentive (%)	50.0	54.3
ADHD— combined (%)	50.0	45.7
ODD/CD	50.7	47.1
Current ADHD medication (%)	31.2	23.6
Demographic variables		
Age, y, mean (SD)	13.97 (1.51)	14.08 (1.50)
Male patients, %	70.3	70.7
Race/ethnicity, %		
Black non-Hispanic	16.7	10.0
Hispanic any race	77.5	85.7
White non-Hispanic	5.1	3.6
Other	0.7	0.7
Single parent, %	35.5	36.4
Limited parent English proficiency, %	36.2	46.4
Billing source, %		
Medicaid	57.0	55.0
State/county subsidy	12.2	14.4
Sliding scale	29.8	28.8
Pro bono	0.0	1.8
Private insurance	0.9	0.0
Parent education level		
High school graduate or less, %	23.9	27.3
Part college or specialized training, %	30.4	30.2
College or university graduate, %	33.3	33.1
Graduate professional training, %	12.3	9.4

Note: ADHD = attention-deficit/hyperactivity disorder; CD = conduct disorder; ODD = oppositional defiant disorder; STAND = Supporting Teens Autonomy Daily; UC = Usual Care; WASI = Wechsler Abbreviated Scale of Intelligence.

behavior problems. Parents signed a permission-to-contact form, and study staff administered an eligibility screen by phone that queried ADHD symptoms, impairment, exclusionary criteria, and treatment priority.³⁷ If another presenting problem (eg, anxiety, substance use) took priority over ADHD, the teen was not eligible. Students with at least 4 inattention (IN) or hyperactivity/impulsivity (H/I) symptoms according to the screen attended a full diagnostic assessment to evaluate inclusion criteria. The study

intake included an IQ screener (Wechsler Abbreviated Scale of Intelligence, 2nd Edition)³⁸ and parent-administered Diagnostic Interview Schedule for Children (DISC).³⁹

Therapist Recruitment. Detailed information about therapist recruitment can be found in Supplement 2, available online. All therapists were randomly assigned to STAND or UC at baseline.

Intervention Content. STAND is a manualized, engagement-focused psychosocial treatment for adolescent ADHD. STAND consists of 10 weekly 60-minute sessions attended by the adolescent and parent.¹⁸ Skill instruction is blended with MI and guided parent-teen behavioral contracting.¹⁸ Treatment targets family, behavioral, and academic impairment. Treatment is modular to promote flexibility and treatment tailoring. In the engagement phase, MI increases awareness of personal values and goals, identifies strengths, and recognizes ways to achieve personal goals and to act consistently with values. The skills phase teaches parent-teen communication, parent behavioral strategies, and organization, time management, and planning skills applied to homework, school, and chores. Planning sessions teach families to integrate skills into a daily routine, transfer new habits to school settings, and build a final parent-teen contract. MI in the final session promotes maintenance of change.

Therapist Procedures. Intervention delivery occurred across 3 years. Duration of treatment varied naturalistically to avoid built-in, between-group dose differences. Participating therapists treated an average of 2.74 study participants (range, 0-14). Therapists who discontinued employment with the agency prior to receiving a study case were not removed from the study, and their data were included when examining implementation, but not patient, outcomes in this trial. Study interventions were provided by agency employees using typical billing procedures. Therapists randomized to STAND were offered a 3-day training and 30 minutes of weekly supervision while treating study participants. Every 12 months, a 4-hour booster training was provided. STAND therapists were provided with a treatment manual and a family workbook for each participant. Therapists in both groups were instructed to use usual care (UC) procedures for termination, allowing STAND therapists to continue treatment after completing STAND manualized content. UC therapists were instructed to treat study participants using usual procedures in the agency and the treatments that they believed would be most effective for the youth. They received weekly supervision for study participants from agency

supervisors according to typical agency practices. UC therapists were offered STAND training at study conclusion.

Data Collection. Participants were permitted to use stimulant medication naturalistically during all phases of the study; all medications were monitored. Because therapy duration was allowed to vary naturalistically, post-treatment (PT) assessments were scheduled for 16 weeks after the participant's first session at the agency, which provided ample time for families to complete the 10-session STAND protocol with assumed cancellations. On average, PT assessments occurred 5.11 months after BL ($SD = 2.26$). Follow-up (FU) assessments were attempted at approximately 12 weeks after PT. On average, FU assessments occurred approximately 4.70 months after PT ($SD = 2.50$). Retention was 99.3% ($n = 276$) at PT and 97.5% ($n = 271$) at FU (data provided by at least 1 informant). Academic records and teacher ratings were obtained directly from schools. Electronic health records were accessed directly. Parent ratings were available in Spanish or English.

The full sample (parents and adolescents) were separately contacted to consent to participation and complete a long-term follow-up (LTFU) assessment consisting of parent and self-ratings of symptoms and impairments. On average, data collection for the LTFU wave occurred 2.99 years ($SD = 0.99$) after BL (mean age = 16.94 years, $SD = 1.69$). A total of 226 participants (81.3% of the original sample) participated in the LTFU. Based on participant preference, assessments were administered either by online survey (47.5%) or by phone (52.5%). Phone interviews were administered in English or Spanish by carefully trained and supervised research assistants. Participants received \$50 for completing the LTFU assessment.

Outcome Measures

ADHD Symptoms. Parent and self-reports of IN and HI symptom severity were measured on the parent *DSM-5* ADHD checklist.⁴⁰ Respondents rated symptoms on both scales as 0 (not at all) to 3 (very much). Symptom severity scale scores were the mean levels (0-3) of subscale items. The *DSM-5* checklist contains 9 items per subscale that correspond with *DSM-5* items. Psychometric properties of the measure are very good, with empirical support for internally consistent subscales.^{40,41} In this sample, ADHD subscale alphas ranged from 0.86 to 0.92. Because self-reports were not collected prior to LTFU, we could not integrate self-reported ADHD outcomes into longitudinal analyses; however, self-report was integrated into clinician-determined ADHD persistence designations at LTFU.

Parent-Teen Conflict. For family impairment, the parent and adolescent versions of the Conflict Behavior Questionnaire—20 (CBQ-20) assessed parent-teen conflict.⁴² Informants rated statements about the parent-teen relationship on a 5-point scale ranging from 1 (strongly agree) to 5 (strongly disagree). In this study, alpha values (α) ranged from 0.92 to 0.93.

Organization, Time Management, and Planning Skills. The 24-item parent Adolescent Academic Problems Checklist (AAPC) measures observable secondary school-specific OTP skills and is validated in samples of adolescents with ADHD.⁴³ The AAPC has 2 distinct factors and a total score, with strong internal reliability and concurrent validity.⁴³ In this study, the total score was used ($\alpha = 0.91$).

Medication and Psychosocial Treatment Use. The use of ADHD medication (stimulant or non-stimulant) and psychosocial treatment was naturalistic. At each assessment, parents and teens completed a treatment interview (Medication and Treatment Chronology Questionnaire) that has been used extensively in past trials of adolescent ADHD treatment.⁴⁴ Respondents indicated current medications received, doses, administration schedules, settings taken, changes made since the last assessment, reasons for changes, and information about frequency of medication visits. For psychosocial treatment, respondents qualitatively described the nature of services. Data were screened for discordant parent-teen reports, which were resolved by discussion. Based on these combined reports, current medication and psychosocial treatment use at LTFU was coded (yes/no).

School Enrollment. Parents answered a question regarding whether the adolescent was currently enrolled in school at the time of the assessment. Parents were asked to provide the name of the school and the adolescent's current grade in school.

ADHD Persistence. For ADHD persistence, we applied the *DSM-5* symptom threshold (5 or 6 symptoms of either Inattention or Hyperactivity/Impulsivity, depending on age) using the *DSM-5* ADHD Rating Scale⁴⁰ and impairment threshold of "3 or higher" on the overall impairment item of the Impairment Rating Scale.⁴⁵ For clinician-determined persistence designations, a licensed clinical psychologist reviewed both parent- and self-reports and systematically integrated both sources of information using an "or rule" combined at the item-level, such that the higher of the 2 ratings was taken for both individual ADHD symptoms and the Impairment Rating Scale's overall impairment item.

Analytic Plan

Longitudinal Symptom and Mechanism Trajectories. Analyses were conducted in Mplus⁴⁶ Version 7 with a full information maximum likelihood approach with robust standard errors (Huber and White,^{47,48}), which is robust to data that are missing at random (MAR) or missing completely at random (MCAR).

We first conducted ITT analyses including all randomized participants ($N = 278$). Four separate latent growth curve analyses⁴⁹ were conducted for inattention (IN) and hyperactivity/impulsivity (HI), parent–teen conflict, and OTP skills. Linear and quadratic effects of time were examined in each model, given the possibility that outcomes demonstrated different slopes in the BL to FU and FU to LTFU periods. We formulated latent growth factors for intercept and slope with 4 person-specific time indicators (BL, PT, FU, LTFU) with intercept at LTFU (time = 0). BL, PT, and FU were modeled as months since LTFU (transformed for modeling parsimony by dividing this variable by 10). Direct paths from each predictor to latent intercept and slope factors were modeled. Standardized difference scores derived from LGA estimates were calculated from the BL to LTFU means, divided by BL standard deviation. Group (UC = 0, STAND = 1) was a dummy coded predictor. To model agency-specific effects, we included 3 dummy codes, with agency 1 (largest) serving as the reference group.

Categorical Outcomes. Using ITT analyses, binary logistic regression was conducted to determine whether randomized treatment group predicted 4 outcomes: (1) ADHD persistence, (2) medication engagement (yes/no), (3) psychosocial treatment engagement (yes/no), and (4) school enrollment (yes/no). Agency dummy codes and time since BL were entered into all models as covariates. BL medication status was entered as a covariate in the medication analysis. All other outcomes were uniform at BL because of study inclusion criteria.

Per Protocol Analyses. Because 19.1% of the sample did not initiate treatment at the agencies after completing an agency intake assessment, we conducted PP analyses that included only those participants who initiated treatment ($n = 225$). As part of these analyses, we investigated maintenance of the significant group by licensure effects found in the acute phase of this trial (only those participants in the PP sample had a therapist assigned to them). Compared to those individuals who initiated treatment, those who did not ($n = 53$) did not differ on demographic or clinical variables (Table 1). All growth curve and logistic regression models were conducted as described above, with

the addition of licensure (1 = yes, 0 = no) and group by licensure predictors to indicate whether the group's effect on outcome over time varied by therapist licensure status.

RESULTS

Intent-to-Treat Analyses

Longitudinal Symptom and Mechanism Trajectories. Across all outcomes, results indicated no effect of treatment group (STAND vs UC) on linear or quadratic slope of outcome over time (Table 2).

Categorical Outcomes. Across all outcomes, results indicated no effect of treatment group on outcome at long-term FU (Supplement 3, available online).

Per Protocol Analyses

Longitudinal Symptom and Mechanism Trajectories. For H/I, there was a significant group by licensure effect for both the intercept (level of H/I at long-term FU) and the quadratic slope in the outcome over time (Table 3). Visual depiction of the model (Figure 1) demonstrates that STAND (vs UC) led to greater reduction in H/I over time (and at long-term FU) when the therapist was licensed. For long-term effect on H/I, the group by time standardized difference score for the STAND licensed compared to the UC licensed group was $d = 0.39$ (small effect) and for the STAND licensed compared to the STAND unlicensed group was $d = 0.36$ (small effect).

For adolescent-reported parent–teen conflict, there was a significant effect of group (STAND vs UC) for linear slope and a significant group by licensure effect for both the linear and quadratic slopes in the outcome over time (Table 3). Visual depiction of the model (Figure 1) demonstrates that STAND (vs UC) led to the greatest reductions in adolescent-reported parent–teen conflict over time when the therapist was licensed. For the long-term effect on adolescent-reported parent–teen conflict, the group by time standardized difference score for the STAND licensed compared to the UC licensed group was $d = 0.27$ (small effect) and for the STAND licensed group compared to the STAND unlicensed group was $d = 0.12$ (negligible effect).

For OTP skills, there was a significant effect of group on linear and quadratic slope in the outcome over time as well as a significant group by licensure effect for the quadratic slope in the outcome over time (Table 3). Visual depiction of the model (Figure 1) demonstrates that STAND (vs UC) led to greater reduction in OTP skills over time when the therapist was licensed. For the long-term effect on organization, time management, and planning, the group by time standardized difference score for the

TABLE 2 Intent-to-Treat Analyses of Long-Term Impact of STAND vs UC Delivered in Community Clinics

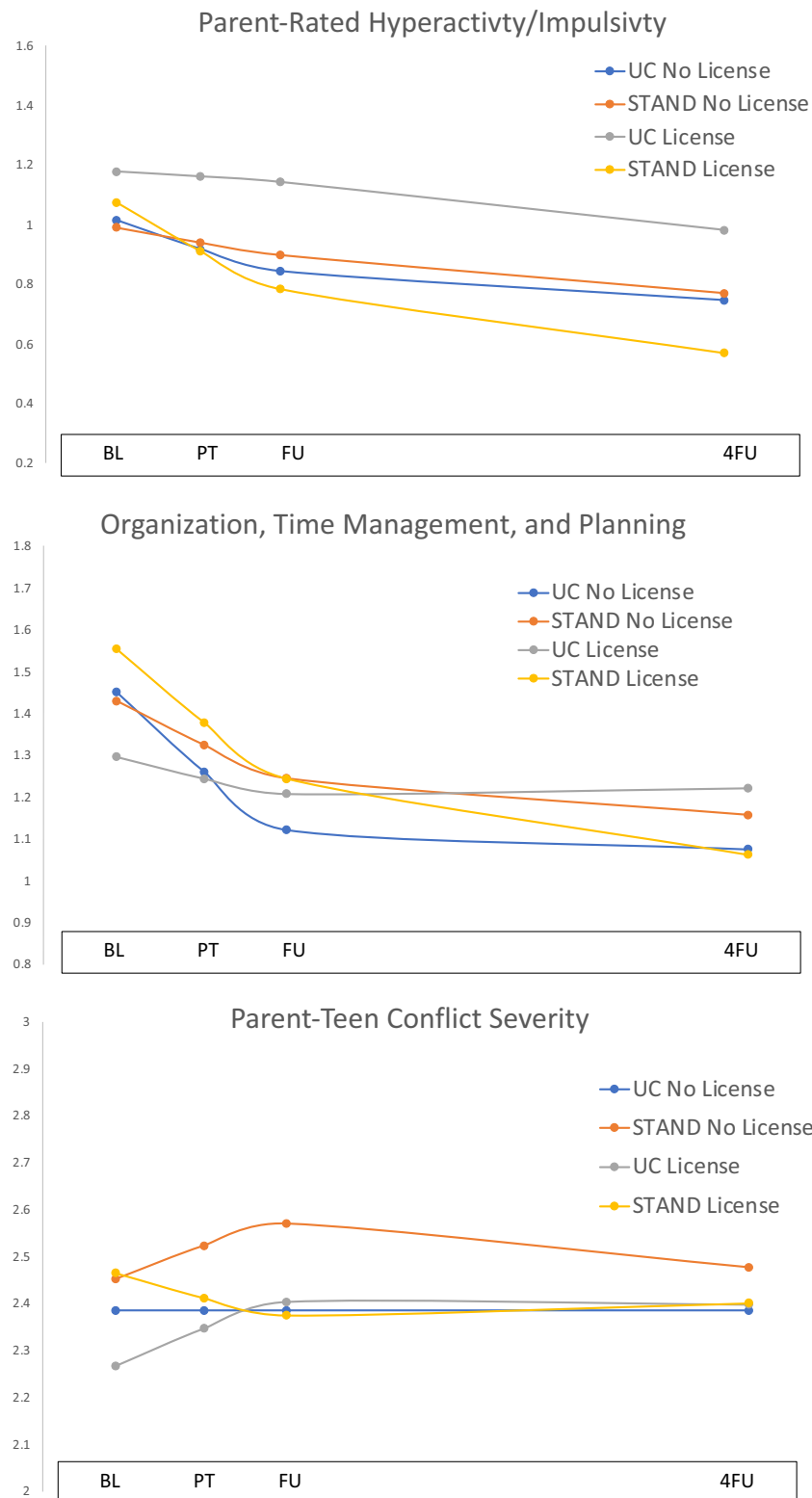
		Inattention (parent)									Hyperactivity/impulsivity (parent)								
		Intercept			Linear			Quadratic			Intercept			Linear			Quadratic		
		M = 1.35, <i>p</i> < .001			M = 0.29, <i>p</i> < .001			M = 0.13, <i>p</i> < .001			M = 0.86, <i>p</i> < .001			M = 0.05, <i>p</i> = .256			M = 0.03, <i>p</i> = .03		
		<i>d</i> = 0.23, <i>p</i> < .001			<i>d</i> = 0.03, <i>p</i> = .327			<i>d</i> = 0.00, <i>p</i> = .298			<i>d</i> = 0.32, <i>p</i> < .001			<i>d</i> = 0.02, <i>p</i> = .224			<i>d</i> = 0.00, <i>p</i> = .253		
ADHD symptoms	b	SE	<i>p</i>	b	SE	<i>p</i>	b	SE	<i>p</i>	b	SE	<i>p</i>	b	SE	<i>p</i>	b	SE	<i>p</i>	
	Agency 2	0.00	0.11	.979	−0.12	0.07	.096	−0.03	0.03	.271	−0.01	0.12	.966	−0.02	0.05	.726	0.00	0.02	.922
	Agency 3	−0.15	0.10	.130	−0.08	0.08	.306	−0.01	0.03	.696	−0.24	0.10	.014	0.00	0.07	.955	0.00	0.02	.924
	Agency 4	−0.01	0.12	.935	0.13	0.11	.238	0.03	0.04	.369	−0.03	0.12	.828	.011	0.08	.146	0.03	0.03	.207
	Group	−0.07	0.08	.338	−0.11	0.06	.058	−0.03	0.02	.203	−0.10	0.08	.183	−0.02	0.04	.712	0.00	0.02	.944
		Parent–teen conflict (parent)									Parent–teen conflict (adolescent)								
		Intercept			Linear			Quadratic			Intercept			Linear			Quadratic		
		M = 2.73, <i>p</i> < .001			M = 0.14, <i>p</i> = .005			M = 0.04, <i>p</i> = .012			M = 2.37, <i>p</i> < .001			M = −0.01, <i>p</i> = .905			M = 0.00, <i>p</i> = .930		
		<i>d</i> = 0.43, <i>p</i> < .001			<i>d</i> = 0.01, <i>p</i> = .556			<i>d</i> = 0.00, <i>p</i> = .478			<i>d</i> = 0.36, <i>p</i> < .001			<i>d</i> = 0.02, <i>p</i> = .430			<i>d</i> = 0.00, <i>p</i> = .416		
Target mechanisms	b	SE	<i>p</i>	b	SE	<i>p</i>	b	SE	<i>p</i>	b	SE	<i>p</i>	b	SE	<i>p</i>	b	SE	<i>p</i>	
	Agency 2	0.02	0.13	.891	−0.05	0.07	.450	0.00	0.02	.860	.02	0.11	.846	0.01	0.07	.924	0.00	0.03	.918
	Agency 3	−0.16	0.12	.187	−0.10	0.07	.133	−0.01	0.02	.582	−0.06	0.12	.629	0.06	0.06	.390	0.01	0.02	.775
	Agency 4	0.08	0.14	.558	−0.01	0.09	.920	0.00	0.03	.918	−0.04	0.12	.728	0.04	0.10	.646	0.01	0.03	.735
	Group	0.01	0.09	.923	0.04	0.06	.496	−0.01	0.02	.730	0.13	0.08	.117	−0.05	0.05	.360	−0.02	0.02	.412
		Organization, time management, and planning skills (parent)																	
		Intercept			Linear			Quadratic											
		M = 1.13, <i>p</i> < .001			M = 0.17, <i>p</i> = .001			M = .07, <i>p</i> < .001											
		<i>d</i> = 0.20, <i>p</i> < .001			<i>d</i> = 0.02, <i>p</i> = .456			<i>d</i> = 0.00, <i>p</i> = .314											
Target mechanisms	B	SE	<i>p</i>	B	SE	<i>p</i>	B	SE	<i>p</i>										
	Agency 2	0.14	0.09	.123	−0.03	0.06	.578	−0.01	0.02	.797									
	Agency 3	−0.04	0.09	.632	0.05	0.06	.410	0.02	0.02	.304									
	Agency 4	0.07	0.10	.469	−0.08	0.08	.324	−0.03	0.03	.270									
	Group	0.01	0.07	.880	−0.06	0.05	.221	−0.01	0.02	.389									

Note: *b* = Unstandardized beta; *d* = variance; *M* = mean; *SE* = standard error; STAND = Supporting Teens Autonomy Daily; UC = Usual Care.

TABLE 3 Per Protocol Analyses of Long-Term Impact of STAND vs UC Delivered in Community Clinics

		Inattention (parent)									Hyperactivity/impulsivity (parent)								
		Intercept			Linear			Quadratic			Intercept			Linear			Quadratic		
		M = 1.29, <i>p</i> < .001			M = 0.38, <i>p</i> < .001			M = 0.17, <i>p</i> < .001			M = 0.75, <i>p</i> < .001			M = 0.07, <i>p</i> = .279			M = 0.04, <i>p</i> = .053		
		<i>d</i> = 0.22, <i>p</i> < .001			<i>d</i> = 0.04, <i>p</i> = .166			<i>d</i> = 0.01, <i>p</i> = .095			<i>d</i> = 0.28, <i>p</i> < .001			<i>d</i> = 0.02, <i>p</i> = .177			<i>d</i> = 0.00, <i>p</i> = .167		
		<i>b</i>	SE	<i>p</i>	<i>b</i>	SE	<i>p</i>	<i>b</i>	SE	<i>p</i>	<i>b</i>	SE	<i>p</i>	<i>b</i>	SE	<i>p</i>	<i>b</i>	SE	<i>p</i>
ADHD symptoms																			
Agency 2		0.10	0.12	.410	−0.13	0.09	.173	−0.04	0.03	.199	0.10	0.12	.405	0.03	0.06	.685	0.01	0.02	.605
Agency 3		−0.17	0.12	.135	−0.08	0.09	.384	−0.01	0.03	.769	−0.23	0.10	.023	0.04	0.07	.595	0.02	0.02	.474
Agency 4		−0.04	0.13	.771	0.08	0.13	.539	0.01	0.04	.796	0.01	0.13	.946	0.13	0.09	.137	0.04	0.03	.198
Group		0.02	0.10	.829	−0.17	0.09	.065	−0.06	0.03	.057	0.02	0.10	.812	−0.08	0.05	.137	−0.03	0.02	.175
Licensure		0.16	0.15	.289	−0.15	0.12	.179	−0.05	0.04	.170	0.24	0.15	.115	−0.15	0.10	.130	−0.05	0.04	.192
Group by licensure		−0.34	0.21	.098	0.10	0.14	.491	0.07	0.05	.141	−0.43	.20	.028	0.24	0.13	.069	0.09	0.05	.047
		Parent–teen conflict (parent)									Parent–teen conflict (adolescent)								
		Intercept			Linear			Quadratic			Intercept			Linear			Quadratic		
		M = 2.61, <i>p</i> < .001,			M = 0.11, <i>p</i> = .077			M = 0.04, <i>p</i> = .050			M = 2.39, <i>p</i> < .001,			M = 0.00, <i>p</i> = .995			M = 0.00, <i>p</i> = .986		
		<i>d</i> = 0.39, <i>p</i> < .001			<i>d</i> = 0.02, <i>p</i> = .285			<i>d</i> = 0.00, <i>p</i> = .155			<i>d</i> = 0.36, <i>p</i> < .001			<i>d</i> = 0.01, <i>p</i> = .900			<i>d</i> = 0.00, <i>p</i> = .880		
Target mechanisms		<i>b</i>	SE	<i>p</i>	<i>b</i>	SE	<i>p</i>	<i>b</i>	SE	<i>p</i>	<i>b</i>	SE	<i>p</i>	<i>b</i>	SE	<i>p</i>	<i>b</i>	SE	<i>p</i>
Agency 2		0.12	0.13	.392	−0.04	0.08	.592	0.00	0.03	.913	.06	0.13	.655	0.07	0.11	.544	0.02	0.04	.638
Agency 3		0.04	0.15	.802	−0.10	0.09	.237	−0.01	0.03	.726	.00	0.14	.981	0.11	0.09	.199	0.03	0.03	.369
Agency 4		0.20	0.15	.199	0.02	0.10	.873	0.01	0.03	.742	−0.02	0.13	.866	0.05	0.11	.631	0.01	0.04	.732
Group		0.06	0.12	.635	−0.02	0.07	.757	−0.01	0.02	.744	.09	0.11	.390	−0.15	0.07	.024	−0.04	0.02	.055
Licensure		−0.18	0.15	.229	0.05	0.12	.653	−0.01	0.04	.894	0.01	0.17	.941	−0.11	0.11	.329	−0.04	0.03	.235
Group x Licensure		0.05	0.22	.832	−0.09	0.15	.562	0.01	0.05	.915	−0.09	0.25	.723	0.34	0.15	.023	0.11	0.05	.026
		Organization, time management, and planning skills (parent)																	
		Intercept			Linear			Quadratic											
		M = 1.08, <i>p</i> < .001,			M = 0.22, <i>p</i> = .001			M = 0.09, <i>p</i> < .001											
		<i>d</i> = 0.18, <i>p</i> < .001			<i>d</i> = 0.02, <i>p</i> = .537			<i>d</i> = 0.00, <i>p</i> = .494											
Target mechanisms		<i>b</i>	SE	<i>p</i>	<i>b</i>	SE	<i>p</i>	<i>b</i>	SE	<i>p</i>									
Agency 2		0.22	0.10	.038	−0.04	0.07	.519	−0.02	0.02	.504									
Agency 3		−0.07	0.10	.469	0.06	0.07	.403	0.03	0.03	.212									
Agency 4		−0.01	0.09	.947	−0.09	0.09	.318	−0.03	0.03	.339									
Group		0.08	0.08	.321	−0.14	0.06	.028	−0.05	0.02	.029									
Licensure		0.15	0.10	.159	−0.14	0.09	.107	−0.06	0.03	.029									
Group by licensure		−0.24	0.16	.120	0.17	0.12	.149	0.09	.04	.024									

Note: Boldface data are statistically significant. *b* = Non-standardized beta; *d* = variance; *M* = mean; *SE* = standard error; STAND = Supporting Teens Autonomy Daily; UC = Usual Care.

FIGURE 1 Long-Term Effect of Licensure Status and Group on Outcomes and Mechanisms

Note: The x-axis represents time, and the y-axis represents the severity score on the measure noted in the title of the figure. Time was modeled as months from long-term follow-up (transformed by dividing by 10 for modeling purposes). Parent-teen conflict was rated by the adolescent. Organization, time management, and planning was rated by the parent. STAND = Supporting Teens' Autonomy Daily; UC = Usual Care. Please note color figures are available online.

STAND licensed compared to the UC licensed group was $d = 0.79$ (medium effect) and for the STAND licensed group compared to the STAND unlicensed group was $d = 0.42$ (small effect).

There were no significant effects of group or group by time on the intercept or slope factors for IN or parent-reported parent–teen conflict (Table 3).

Categorical Outcomes. There were no significant effects of group or of group by licensure on any categorical outcome (Supplement 3, available online).

DISCUSSION

The purpose of this study was to investigate long-term effects (approximately 3 years post baseline) of STAND vs UC delivered in a routine care, community context. As in the original trial,²⁸ ITT analyses demonstrated no impact of treatment group on primary outcome or theorized treatment mechanisms. In addition, the STAND group no longer demonstrated superior medication use at 3-year follow-up.²⁸ However, PP analyses confirmed long-term maintenance of the acute trial's group by licensure findings for some outcomes.²⁸ Specifically, when STAND was delivered by licensed therapists, long-term improvements relative to UC were as follows: (1) parent-reported hyperactivity/impulsivity demonstrated continued relative improvement over time ($d = 0.39$), (2) baseline to post-treatment relative improvement in adolescent-reported parent–teen conflict maintained long-term ($d = 0.27$), and (3) parent-reported OTP skills demonstrated continued relative improvement over time ($d = 0.79$). No other outcomes demonstrated significant effects. We discuss findings below.

Herein, we replicate several prior findings. First, STAND's largest long-term effect was to parent-reported OTP skills (Table 3). Qualitative interviews with STAND participants and parents also indicated that the most prominent perceived long-term impact was on OTP skills.²⁷ The relatively larger long-term effects of STAND on OTP (vs other variables) also converge with Sibley *et al.*,¹⁷ who reported on an RCT of an intensive summer treatment program for adolescent ADHD that demonstrated its greatest 3-year impacts on OTP skills. Similar to the current study, Sibley *et al.*¹⁷ also found long-term effects on ADHD symptoms for at least a subset of treatment recipients. Taken together, these 2 RCTs demonstrate replication of long-term effects of cognitive/behavioral therapies for adolescent ADHD. However, in both studies, effects were not ubiquitous. Sibley *et al.*¹⁷ demonstrated that some effects were present only for older youth, whereas the current study

found long-term effects only when the therapist was licensed. Overall, the totality of this nascent literature supports the possibility that adolescence offers a unique opportunity to sustain long-term effects from cognitive/behavioral treatments for ADHD. The literature indicates an absence of long-term effects of cognitive/behavioral approaches for children with ADHD,¹² suggesting that cognitive maturation or other factors germane to adolescence or adolescent treatment models may promote maintenance of gains. We are unaware of experimental research examining long-term effects of cognitive/behavioral treatments for adult ADHD,⁵⁰ which is an important future direction for study.

One finding of this study diverged from acute trial findings: the initially large impact of STAND vs UC on medication use dissipated by 3-year follow-up.²⁸ Interpreting naturalistic (non-randomized) ADHD medication effects in observational follow-ups is challenging because of bi-directional effects between medication and ADHD severity (ie, youth with more severe symptoms are more likely to receive medication over time, which in turn may reduce symptoms over time).⁵¹ In the acute trial, we hypothesized that STAND's statistically significant therapeutic mechanisms (eg, adolescent motivation, parenting skills)³¹ may have had spillover effects to medication engagement. However, 2 qualitative studies examining perceived long-term impacts of cognitive/behavioral treatments for adolescent ADHD suggest that some adolescents discontinued ADHD medication long term after perceiving that improvements to their OTP skills helped them to manage their ADHD without pharmacological treatment.^{17,27} Thus, it is unclear whether lack of long-term group effects on medication use represents lack of maintenance, a positive outcome of successful care, or the inevitability of medication desistance over the course of adolescence.⁵¹ Similar bi-directional effects may explain a lack of impact on psychosocial treatment engagement long-term. Future work on predictors of treatment desistance among adolescents with ADHD may shed light on our lack of long-term treatment use effects; for example, it is possible that adolescent self-awareness of difficulties promotes continued engagement in care.

Some unexpected findings warrant continued study. Unlike H/I, acutely significant group by licensure effects on IN symptoms were not maintained at long-term follow-up. It is not clear why H/I symptoms demonstrated greater relative therapeutic benefit compared to IN (Table 3). However, examination of within-group trends suggests that the UC group may have experienced the highest gains over time on the IN variable. Thus, this effect's lack of significance may reflect a strength of UC rather than a deficiency of STAND. In contrast, the licensed UC group demonstrated a striking lack of improvement in H/I symptoms over time

compared to the other groups. This finding is in line with acute phase findings that UC led to relative gains in some executive functioning tasks (associated with ADHD's IN dimension), whereas STAND led to relative gains in adolescent motivation (associated with ADHD's H/I dimension).³¹ The long-term impact on H/I may be clinically meaningful, given the prominent role of impulsivity in developing ADHD-related substance use risks in adulthood.⁵² Although the groups did not separate on IN long term, it is noteworthy that OTP skill improvement, which may help individuals with ADHD compensate for IN symptoms (without directly remediating them), has been shown to mediate the link between ADHD and functional impairment in adolescent samples.⁵³

We did not expect that the parent and adolescent perspectives would diverge regarding effects on parent-teen conflict. Given a group by licensure effect on intrusive parenting in the acute trial,³¹ perhaps adolescent subjective attitudes toward parents, rather than observable conflict behavior, improved long term as parents reduced their overinvolvement. In addition, neither ADHD persistence nor school enrollment demonstrated statistically significant effects in this study. Consistent with previous research,² approximately 45% of the sample continued to meet criteria for ADHD at LTFU. With non-significant impact of treatment on inattention and limited effects on H/I, it appears that incremental improvements in symptom severity did not translate into ADHD remission. At LTFU, 90.3% of the sample were still enrolled in school; this outcome's limited variability may have made it insensitive to potential treatment effects. Although impact on long-term functional outcomes was not present, the incremental benefit of STAND over UC was present for 2 previously established acute mediators of ADHD symptom change in cognitive/behavioral therapies for adolescent ADHD (ie, executive function skill development, parent-teen conflict). These findings are in line with existing theoretical models of symptom change in adolescent ADHD cognitive/behavioral treatments.²⁶

A majority of this sample self-identified as holding minoritized ethnic/racial identities (ie, the sample was approximately 80% Latinx and 15% Black) and reported substantial economic disadvantages (ie, over 70% of the sample received services through Medicaid, state subsidized insurance, or pro bono). Many also had non-English-speaking parents (Table 1). Youth from minoritized ethnic/racial backgrounds, particularly those with non-English-speaking or immigrant parents, are far less likely to receive ADHD treatment in their communities because of a range of systemic and resource barriers.⁵⁴⁻⁵⁶ Latinx youth, who make up the majority of the current sample, face additional

specific barriers to care, such as language barriers and sociocultural factors that influence problem recognition, perceived stigma, care preferences, and help seeking, creating a perceived misalignment with extant services.⁵⁷ Thus, the high level of treatment engagement previously reported for this trial,²⁸ coupled with the long-term effects detected in the current one, give hope to improving ADHD care disparities. Credit should be given to participating community agencies for employing a workforce that is culturally representative of their clientele. It is not clear how the current findings would generalize to middle-class White adolescents or youth from minoritized racial/ethnic backgrounds treated by primarily White therapists.

It is important to acknowledge that the positive long-term treatment effects detected in this study were small to medium ($d = 0.27$ to 0.79) and limited to licensed professionals, who make up a minority of the community mental health workforce.⁵⁸ As noted, our ongoing research has been unable to identify variables differentiating licensed vs unlicensed providers within this study's measurement battery. Future research investigating ADHD treatments delivered by a community mental health workforce should administer a more comprehensive measurement battery to therapists to better understand the characteristics and behaviors that differentiate licensed and unlicensed providers in this context. For example, research suggests that licensed clinicians may possess different psychological characteristics than unlicensed therapists, which may influence the manner in which they engage with patients.³³ Although one might assume that licensed providers should therefore be engaged to deliver STAND and similar interventions, a thorough cost-effectiveness evaluation is still needed to confirm this conclusion. Higher wages are associated with employing licensed vs non-licensed therapists to deliver care; thus, it remains unclear whether employing a licensed workforce to deliver STAND would optimize the economic value of treatment.⁵⁹

To close the gap in the effectiveness of licensed vs unlicensed providers, refinement of STAND's community-based implementation model is ongoing.^{34,35} Following the trial, we conducted qualitative work with the agency staff, parents, and adolescents that led to the revision of STAND's community-based implementation model to better support unlicensed clinicians in delivering STAND.³⁴ The key redesigned features of this model included the following: (1) task-shifting supervision from experts to agency supervisors, (2) holding bi-weekly technical assistance drop-ins to provide extra training and implementation support to therapists and supervisors, (3) motivational interviewing (MI) integrity monitoring and feedback by artificial intelligence (AI) (Lyssn; www.lyssn.org).

io), (4) immediate feedback on STAND content fidelity via an online clinician portal, (5) digitizing clinician resources (manual, worksheets, tip sheets, case videos) on a Web-based clinician dashboard, (5) creating visual displays of fidelity feedback using badges and graphs, and (7) adding a rapport-building session prior to the start of manualized content. Initial open trial data investigating STAND's revised community-based implementation model indicates promise, and this model is currently being evaluated in a subsequent RCT with the original partnering agencies in this trial.³⁵

One limitation of this study is that 19.1% of the randomized sample dropped out of care between agency intake and first session of treatment. This failure to enroll in services is typical in community mental health contexts,⁵⁸ and our trial was deliberately designed to prioritize external over internal validity. We analyzed all initially randomized agency clients in ITT analyses. Thus, our ITT and PP analyses offer an upper and lower bound on the effects that may be expected in routine care settings. In addition, our long-term follow-up had resource constraints that required us to administer a limited battery to participants. We did not obtain teacher ratings (and some participants were no longer in high school, making this choice potentially developmentally inappropriate), and we did not administer cognitive tasks or our extended mechanistic battery to participants, which included several hypothesized mechanisms of long-term effects (eg, adolescent motivation). Had we done so, we might have obtained a richer understanding of the findings herein. Because mediators of long-term outcomes may be different based on key moderating factors (ie, treatment group, therapist licensure status), future studies with larger samples will be needed to test plausible moderated mediation models. Integrative data analysis combining and harmonizing long-term outcome data from multiple trials may be a cost-effective way to leverage existing data to pursue some mechanistic questions that may vary within patient subgroups.⁶⁰

Given the nature of the treatment, it was not possible to mask therapists and participants to study group, though they were masked to study hypotheses. The therapist-to-client ratio was low in this trial (ie, 1:2.74) because of high turnover in community contexts and fine-grained patient-therapist matching that required consideration of agency, parent language, therapist catchment area, and insurance type. As a result, we did not cluster within therapist in analyses (although we covaried for agency). We did not assess the number of potential participants (therapist or adolescent) who were present at agencies but who elected not to enroll in the trial.

In sum, this study suggests that relative to an active control, a single course of parent-teen, engagement-

focused, cognitive/behavioral treatment, delivered by a licensed practitioner in community mental health contexts, has moderate long-term effects on adolescent hyperactivity/impulsivity severity, parent-teen conflict, and organization, time management, and planning (OTP) skills. Most notably, this study offers continued support that when delivered in adolescence, cognitive/behavioral treatments for ADHD have a specific long-term impact on youth executive function skill development (eg OTP skills),^{17,27} which supports patient and parent perceptions that development of these key skills continues to have downstream impacts on functioning as the individual transitions to adulthood.²⁷

Based on the findings of this study, clinicians in community settings might recommend adjunctive cognitive/behavioral treatment to adolescents with ADHD to maximize long-term outcomes. Clinic administrators might consider implementing an intervention such as STAND on an agency-wide scale; however, if widespread implementation is resource prohibitive, even implementation of individual components linked to significant effects (eg, parent-teen communication or executive function skills training) might improve the quality of usual care, although this must be confirmed empirically. Although a treatment dismantling study is needed to test the individual efficacy of STAND's components, viewing cognitive/behavioral interventions for ADHD as toolboxes rather than monoliths may promote implementation in lower-resource contexts. At the public health level, translating the long-term effects of cognitive/behavioral therapies for adolescent ADHD will require significant public investment, as well as innovations, to increase access to care by communities currently facing prominent treatment disparities.

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Consent has been provided for descriptions of specific patient information.

This work has been prospectively registered: <https://osf.io/h5w6f>.

Data Sharing: Deidentified participant data, Data dictionary, and Study Protocol supporting documents available at the National Institute of Mental Health Data Archive (NDA) <https://nda.nih.gov/>. Data will be available June 1, 2019 – June 1, 2040. The data will be made available to anyone the NDA approves through data use agreement for any analyses the NDA approves through data use agreement. The NDA manages the sharing of this data as it has been turned over to them by the researchers.

Stefany Coxé served as the statistical expert for this research.

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