HHS Public Access

Author manuscript

Behav Ther. Author manuscript; available in PMC 2022 July 01.

Published in final edited form as:

Behav Ther. 2021 July ; 52(4): 847–860. doi:10.1016/j.beth.2020.10.007.

Community Implementation of MI-Enhanced Behavior Therapy for Adolescent ADHD: Linking Fidelity to Effectiveness

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Abstract

Evidence-based behavior therapy for adolescent ADHD faces implementation challenges in real-world settings. The purpose of this trial was to investigate the relationship between implementation fidelity and outcomes among adolescents receiving services in the active treatment arm (N=114; Motivational Interviewing (MI)-enhanced parent-teen behavior therapy) of a community-based randomized trial of adolescent ADHD treatment. Participants received therapy from community clinicians (N=44) at four agencies in a large, ethnically diverse metropolitan setting. Therapists provided self-report of session by session adherence to content fidelity checklists and audio recordings of sample sessions that were coded for MI integrity. Parents provided report of ADHD symptoms and family impairment at baseline, post-treatment, and follow-up, while academic records were obtained directly from the local school district. Results indicated that content fidelity significantly waned across the ten manualized sessions (d=−1.23); these trends were steepest when therapy was delivered outside the office-setting and parent attendance was low. Community therapist self-report of content fidelity predicted significantly greater improvements in academic impairment from baseline to follow-up. MI delivery quality was not associated with improved outcomes; contrary to hypotheses, lower MI relational scores predicted significantly greater improvements in family impairment over time. Findings indicate that community-based outcomes for evidence-based ADHD treatment are enhanced when treatment is implemented with fidelity. Future work should revise community-based implementation strategies for adolescent ADHD treatment to prevent declines in fidelity over time, thereby improving outcomes.

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Declarations of Interest: Dr. Sibley reports book royalties from Guilford Press for the manualized treatment described in this manuscript.

Keywords

ADHD; Community Care; Behavior Therapy; Motivational Interviewing

There are two recognized evidence-based treatments (EBTs) for Attention Deficit/Hyperactivity Disorder (ADHD) in childhood and adolescence: behavior therapy and pharmacological treatment (American Academy of Pediatrics, 2019). However, there is a noted age-based disparity in the delivery of pediatric ADHD treatments, with adolescents receiving far fewer services than children (Bussing, Zima, Mason, Porter, & Garvan, 2011; Danielson et al., 2018). The source of this disparity is clear—unlike children, adolescents self-advocate to desist their ADHD medication--claiming problems with palatability (i.e., stigma, side effects, perceived ineffectiveness; Brinkman, Sucharew, Majcher, & Epstein, 2018; Molina et al., 2009). Though behavior therapy packages may have higher adolescent acceptability (Sibley, Kuriyan, Evans, Waxmonsky, & Smith, 2014), they are rarely available in communities because they are costlier and more burdensome than medication to implement (Jensen et al., 2005), Furthermore, behavior therapy for adolescent ADHD historically demonstrates patient retention challenges due to family conflict or motivational issues that arise in treatment (Barkley, 2018; Barkley, Edwards, Laneri, Fletcher, & Metevia, 2001). As a result, very few adolescents with ADHD receive and accept either EBT for their symptoms (Bussing et al., 2011; Danielson et al., 2018).

In light of this treatment gap, our team developed an engagement-focused behavior therapy for adolescent ADHD (STAND; Supporting Teens' Autonomy Daily) with implementation features designed to promote translation into real-world settings: (1) an insurance billing compatible service delivery model, (2) a simple step by step manual and family activity workbooks, and (3) content that can be delivered with fidelity by even beginner therapists (Sibley et al., 2013). In addition, the content and delivery strategy of STAND were designed to increase patient engagement by integrating Motivational Interviewing (MI; Miller & Rollnick, 2013) with evidence-based behavior therapy for adolescent ADHD (Barkley et al., 2001; Evans, Axelrod, & Langberg, 2004; Smith, Waschbusch, Willoughby, & Evans, 2000). STAND emerged as a 10-session modular therapy that honors the heterogeneity of adolescent ADHD by allowing families to self-select into organization, time management, and planning (OTP), communication skills, and behavioral contracting modules that infuse MI strategies such as goal setting and implementation intentions, identifying patient values, reinforcing patient language about change, and mental contrasting (Miller & Rollnick, 2013). Three randomized controlled trials (RCTs) in university settings support STAND's acceptability, patient-engagement, and efficacy compared to treatment as usual, as well as standard evidence-based behavior therapy for adolescent ADHD for certain families (Sibley et al., 2013; Sibley et al., 2016; Sibley, Rodriguez, Coxe, Page, & Espinal, 2019).

After feasibility and efficacy testing in university settings, we initiated our first effort to translate STAND into real-world community contexts. We conducted a large clinical trial (N=278) of STAND compared to Usual Care (UC) in four community agencies. Though patient acceptability and treatment engagement were high in this trial, the efficacy of STAND was reduced in the community compared to university settings, and in most cases,

did not outperform usual care (Sibley, Graziano, Coxe, Bickman, & Martin, 2020). This finding was consistent with attempts to export EBTs for adolescent depression and anxiety to community settings (Weisz et al., 2009; Southam-Gerow et al., 2010).

Community mental health possesses greater implementation barriers compared to university clinics (Garland et al., 2013). Most agencies operate at a budget deficit with an oft-unlicensed master's level workforce (Schoenwald et al., 2008). Agencies offer low levels of professional development, experience high turnover, and lack quality assurance policies and practices. Services often are provided in homes and schools—outside the quiet therapy office (Garland et al., 2013). These barriers require iterative implementation efforts in collaboration with stakeholders to adapt EBTs for the challenges of community contexts. After demonstrating suboptimal effectiveness of STAND in our community-based trial, we now turn to secondary data analysis of factors that facilitated and impeded effective treatment delivery.

In the current study we analyze the relationship between treatment fidelity and outcome in our community-based RCT of STAND. In university settings, therapists delivered STAND with strong fidelity across all ten standardized sessions (85%–100% fidelity checklist scores; MI integrity benchmarks met by most therapists; Sibley et al., 2013, 2016, 2019). However, when moving to the community setting, STAND joined a long list of EBTs with documented reductions in implementation fidelity (i.e., the degree to which providers deliver an EBT according to its standards and critical ingredients; Bond & Drake, 2020; Brookman-Frazee, Haine, Gabayan, & Garland, 2008; Garland et al., 2013; Sibley et al., 2020b). In a previous investigation, we demonstrated that suboptimal STAND fidelity in the community was associated with several therapist-level (i.e., bilingual provider, more years of experience) and service delivery-level factors (i.e., delivering care outside the office, later sessions; Sibley et al., 2020b). Overall, we demonstrated that community-based STAND was delivered at both a lower intensity and a slower pace than in university trials (Sibley et al., 2020b). Each therapist submitted one sample audio recording per case (from any session). We found that recordings from earlier sessions demonstrated higher fidelity than those from later sessions. Despite these findings, longitudinal trends in STAND fidelity remain unexamined and whether STAND fidelity failures influence community-based therapy outcomes remains an unanswered question.

Fidelity to an EBT is defined by adherence to its core components—including both structural elements and the skillfulness with which the therapist delivers treatment (i.e., relational behaviors such as partnership and empathy, depth and quality of engagement and self-exploration evoked in the client; Bond & Drake, 2020; Moyers, Martin, Catley, Harris, & Ahluwalia, 2003). In community contexts, therapist fidelity is malleable (Hallgren et al., 2018; Small et al., 2020) and can be improved by attending to factors that include client characteristics, workflow and organization supports (e.g. supervision, professional development), therapist qualities, and characteristics of the treatment being delivered (Beidas & Kendall, 2010). Although fidelity disruptions unquestionably translate into poorer quality care, it remains unclear whether reduced fidelity directly contributed to STAND's reduced effectiveness in the community setting (Sibley et al., 2020a), signaling that efforts to improve effectiveness might target fidelity. Evidence for a direct link between

implementation fidelity and effectiveness is mixed for child and adolescent EBTs broadly and may depend on an intervention's characteristics (Collyer, Eisler, & Woolgar, 2019; Rapley & Loades, 2019). However, the fidelity-effectiveness association is established for several EBTs that share common elements with STAND: (1) cognitive behavior therapy for adolescent externalizing disorders (Hogue et al., 2008), (2) Multisystemic Therapy for juvenile offenders (Henggeler, Melton, Brondino, Scherer, & Hanley, 1997), (3) MI for adolescent cannabis use (McCambridge, Day, Thomas, & Strang, 2011), (4) behavioral parent training for children with conduct problems (Eames et al., 2009), and (5) school mental health interventions (Rojas-Andrade & Bahmondes, 2019). Therefore, we hypothesize that implementation fidelity will predict effectiveness for community-based delivery of STAND. By noting longitudinal trends in fidelity over the course of the ten sessions, as well as particular aspects of fidelity that have the greatest impact on effectiveness, a strategic plan can be devised to address critical fidelity failures. Future efforts to increase the effectiveness of community-based STAND will target these failures through iterative implementation strategy modifications.

The current study analyzes data provided by 114 adolescents with ADHD and 44 therapists who were randomly assigned to the STAND condition in our community-based RCT of STAND compared to UC at four community mental health agencies. Our first aim was to examine longitudinal trends in community therapist report of session-by-session adherence to fidelity checklists. In line with the cross-sectional findings from our observationally coded STAND sessions, we hypothesize that therapist report of fidelity will significantly wane across the ten weeks of manualized STAND content. As part of this aim, we also examined patient, therapist, and service delivery-level predictors of fidelity trajectories over time. Our second aim examined the extent to which four indices of STAND fidelity predict patient outcomes: (1) a validated content fidelity checklist that lists parent and teen behavioral tasks (Sibley et al., 2013, 2016, 2019), (2) MI reliational score as measured by the Motivational Interviewing Treatment Integrity (MITI 4.2; Moyers, Manuel, & Ernst, 2014) Relational global scale, (3) MI technical score as measured by the MITI 4.2 technical global scale, and (4) MI competence measured by the Video Assessment of Simulated Encounters-Revised (VASE-R; Rosengren, Hartzler, Baer, Wells, & Dunn, 2008). We hypothesized that all four indices would predict effectiveness across outcomes based on work demonstrating the fidelity-effectiveness link for adolescent MI and family-based behavioral interventions (e.g., Eames et al., 2009; McCambridge et al., 2011). Findings will inform ongoing efforts to adapt STAND's implementation strategy to improve effectiveness in the community context.

Methods

Participants

Adolescents.—The current study utilizes data from a subsample of 114 adolescents with ADHD who participated in a larger community-based randomized trial (N=278; Sibley et al., 2020a/b) of evidence-based treatment for adolescent ADHD compared to usual care (UC). Adolescents (ages 11–17) were incoming patients at four community agencies in a large pan-Latinx and pan-Caribbean U.S. city. Participants in the subsample represented cases who: (1) were randomized to the active treatment condition (STAND; n=138) and (2)

presented for at least one session of therapy from a study-enrolled community therapist (n=114; 9 cases were assigned by the agency to a non-study clinician, 15 cases did not return for services after the agency and study intakes). Adolescent participants were required to meet full DSM-5 criteria for ADHD according to a structured parent interview integrated with parent and teacher symptom and impairment ratings, independently reviewed by two licensed clinical psychologists. 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. Table 1 presents demographic characteristics for the subsample.

Therapists.—Therapists (N=44) were mental health professionals employed at four agencies that were randomly assigned to the STAND group. Therapists in this subsample self-identified as 15.9% non-Hispanic White, 15.9% Black or African-American, 65.9% Hispanic, and 2.3% Other. They were 88.6% female, with 65.9% offering treatment in both Spanish and English. 22.7% of therapists were licensed and 88.6% held a master's degree (6.8% held a doctorate and 4.5% were bachelor's level interns). On average, clinicians reported 4.63 years delivering therapy (SD=3.81).

Procedures

Adolescent Recruitment and Intake.—At agency intake, agency staff provided study information to parents of 6th–12th grade students with attention, organization, motivation, or behavior problems. Adolescents with at least four symptoms of inattention (IN) or hyperactivity/impulsivity (H/I) according to a research phone screen attended the full diagnostic assessment to evaluate inclusion criteria at which informed consent was obtained.

Therapist Recruitment.—Agencies distributed information about the study to its staff. Agency directors provided the research team with a list of interested therapists and informed consent was obtained from all therapists. All therapists were randomly assigned to STAND or UC at the beginning of the study. At four points during the study, additional therapists were recruited and randomized to replace therapists who left the agency. Allocation at subsequent randomization was set to maintain equal number of STAND and UC therapists within agency. The current study includes only data provided by therapists in the STAND group.

Intervention Content.—STAND is a manualized engagement-focused psychosocial treatment for adolescents with ADHD. STAND consists of 10 weekly 60-minute sessions attended by the adolescent and parent (Sibley, 2016). Skill instruction is blended with MI and guided parent-teen behavioral contracting (Sibley, 2016). 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 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. Average time to complete STAND was *M*=13.13 weeks, (*SD*=3.57 weeks).

Therapist Procedures.—Therapy was delivered across three years. Eighty-two therapists were randomized (study cases per therapist *M*= 2.74, range: 0–14) and 44 were assigned to the STAND group. Therapists randomized to STAND were offered a three-day training and 30- minutes of weekly supervision while treating study cases. Every 12 months, a four-hour booster training was provided. STAND therapists were provided with a treatment manual and a family workbook for each case. STAND group therapists were asked to: (1) complete competency measures post-training, (2) provide one sample session audio recording per study case, (3) complete a fidelity checklist for each session, and (4) complete PT measures for each case. Therapists received $20 for each audio recording.

Data Collection.—Participants were permitted to utilize naturalistic stimulant medication during the study; all medications were monitored and controlled for in analyses. Study interventions were provided by agency employees using typical billing and service delivery procedures. Given variability in the amount of time from BL assessment to initiation of treatment by the agency, post-treatment (PT) assessments were scheduled approximately 12 weeks after initiation of treatment (rather than BL). 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% at PT and 97.5% at FU (data provided by at least one informant). Families received $100 for each completed assessment.

Measures

STAND Content Fidelity.—Fidelity checklists used extensively in STAND trials (Sibley et al., 2013, 2016, 2019) were provided to each STAND therapist. Therapists were instructed to complete one checklist for each session delivered to study cases, endorsing therapeutic tasks that they perceived were completed in the session. Therapists completed a form for 83.3% of sessions that occurred prior to PT. Trained research assistants listened to all submitted audio recordings in the STAND group (*n*=80) and completed binary fidelity checklists to assess validity of a subsample of these therapist reports. As reported previously (Sibley et al., 2020b), a reliability probe based on these recordings indicated that 61.6% of audio-recorded therapist-endorsed tasks were corroborated by research assistants.

MI Integrity.—The *Motivational Interviewing Treatment Integrity* (MITI) version 4.2 is a well-established coding system that measures MI treatment integrity. It possesses strong reliability and predictive validity (Moyers et al., 2014; Moyers, Martin, Manuel, Hendrickson, & Miller, 2005). MITI yields global scores of MI implementation quality on four relational and technical dimensions (1–5 scale), MI-adherent and non-adherent clinician behavior counts (e.g., affirm, emphasize autonomy, confront), and technical skill indices (i.e., reflection to question ratio, % complex reflection). A twenty-minute interval of each audio tape was randomly selected and coded for therapists who submitted session audio samples (*n*=80 with available tapes). Two coders who were masked to study group

independently coded sessions. Twenty percent of coded sessions were selected for an inter-rater reliability probe. Average Intraclass Correlation (ICC) was .81, indicating "almost perfect" inter-rater reliability (Landis & Koch, 1977). MI Relational score was the average of the Empathy and Partnership global scores. MI Technical score was the average of the Cultivating Change Talk and Softening Sustain Talk global scores.

Analysis of the subsample of treated STAND participants with a community-therapist submitted tape (70.2%) indicated that there were no significant group differences (all $p>.05$) on any demographic (age, gender, ethnicity, parent education level, parental English proficiency, parent marital status), clinical (ADHD subtype, medication status, ODD diagnosis), or therapist characteristics (ethnicity, gender, Spanish language proficiency, therapist licensure, therapist years of experience). However, those without a tape received significantly fewer sessions in their course of agency treatment (M=8.72, SD=12.63) than those with a submitted tape (M=16.08, SD=11.88; $F(1,136)=12.34$, $p=.001$, $d=.60$)—likely influenced by cases who terminated prior to therapists' attempts to record.

MI Competence.—Therapists completed the Video Assessment of Simulated Encounters-Revised (VASE-R; Rosengren, Hartzler, Baer, Wells, & Dunn, 2008) immediately post-training in a group setting. The instrument possesses 18 video items that prompt participants to offer written therapeutic responses. The VASE-R was scored by two trained research coders. The VASE-R has excellent psychometric properties (Rosengren et al., 2008). In this study, 20% of tests were randomly selected for double coding and inter-rater reliability. Average Intraclass Correlation (ICC) was .98 indicating "almost perfect" inter-rater reliability (Landis & Koch, 1977). To assess competency, the VASE-R full score was computed for each therapist.

ADHD Symptoms.—Parent report of IN symptom severity on a DSM-5 ADHD checklist was the primary outcome (Sibley & Kuriyan, 2016). Respondents rated symptoms as 0 (*not at all*) to 3 (v*ery much*). Symptom severity was the mean level (0–3) of subscale items. Psychometric properties of the measure are very good, with empirical support for an internally consistent 9-item IN subscale (Sibley & Kuriyan, 2016). In this sample, ADHD subscale alpha was 91. Hyperactive/impulsive symptoms are not considered a primary outcome in this trial as many of the participants (see Table 1) do not possess these symptoms and STAND primarily treats IN.

Impairment.—Grade Point Average (GPA) was derived from report cards that were obtained directly from the school district. GPA for each academic quarter was calculated by converting class grades (e.g., English, Math) to a 5-point scale (i.e., 4.0=A to 0.0=F). Grades were not weighted for class difficulty. At each assessment, GPA was calculated for the immediately preceding academic quarter. For family impairments, the parent version of the *Conflict Behavior Questionnaire-20* (CBQ-20) assessed parent-teen conflict (Robin & Foster, 2002). Parents rated statements about the parent-teen relationship on a five-point scale from 1- *strongly agree* to 5-*strongly disagree*. In this study, alpha was .93.

Patient, Therapist, and Service Delivery Predictors.—Therapist years of experience, therapist licensure, and whether the therapist was bilingual were self-reported by

therapists at baseline. Percentage of office-based sessions and percentage of sessions attended by a parent were service-delivery moderators that were collected from the electronic health record. Patient characteristics included adolescent age, Oppositional Defiant Disorder (ODD) diagnosis, parent English proficiency, and parent education level and were collected at study baseline.

Analytic Plan

Prior to conducting analyses, we considered whether clustering would be an appropriate analytic strategy for this study. Intraclass correlations and design effects for adolescent-level outcomes revealed that all design effects were < 2. As a result, we elected not to include clustering in the analysis based on the recommendation of Muthen and Satorra (1995).

Fidelity over Time.—To examine change in community therapist-reported fidelity over time, linear mixed models (LMMs) with random intercepts were conducted in SPSS 25 to examine the linear effect of session (1–10) on adherence to the STAND fidelity checklist (N=96). A full information robust Maximum Likelihood estimator was employed. To account for agency-specific effects, we included three dummy codes with agency 1 (largest) serving as the reference group. Cohen's d effect size was calculated for the linear effect of session on fidelity. Session by session raw means were also computed to demonstrate cross-session variability in fidelity scores. The raw residual between linear estimated marginal means and observed scores was calculated for each session and divided by the session's standard deviation to calculate a z-score that identifies sessions with particularly high or low fidelity in consideration of the linear trend.

Next, the LMM was repeated with inclusion of patient, therapist, and service delivery predictors of fidelity trajectories. Main effects of the predictor indicated the effect of predictor on the fidelity intercept (i.e., fidelity at the initial session). Two-way interactions of moderator x session indicated whether the slope in fidelity over time varied by the moderator level. Each predictor was tested in a separate model and false discovery rate corrections were applied within levels of predictors (i.e., patient, therapist, and service delivery).

Fidelity Predicting Effectiveness.—We examined the effect of four indices of fidelity on treatment effectiveness: MI relational components, MI technical components, MI competence, and STAND content fidelity. For each component of fidelity, we assessed effects on three outcomes over time using LMMs: GPA, parent-teen conflict, and IN symptoms. Agency-specific dummy codes, as well as ADHD medication use at baseline (0=unmedicated, 1=medicated) were included in the models as covariates. For the STAND content fidelity model, number of sessions with fidelity ratings was also entered as a covariate. Time values at PT and FU were coded as a continuous, subject-specific measure reflecting months since BL (BL time=0). Fidelity x time interaction terms assessed whether fidelity scores predicted magnitude of change in outcomes from BL to PT to FU, after controlling for BL levels of the outcome and covariates. A false-discovery rate correction was applied within outcome domain for all analyses (Benjamini & Hochberg, 1995).

Results

Fidelity over Time.

LMM results (see Figure 1) indicated a significant negative linear effect of session for therapist adherence to the STAND fidelity checklist (b=−.059, SE=.00, p<.001; d=−1.23) with the strongest therapist-reported fidelity for session 1 of STAND (M=.89, SD=.17) and weakest for session 10 (M=.48, SD=.46). After accounting for the downward linear trend, raw residual z-scores indicated that fidelity was particularly poor for Session 7 (z=−.34; "Engaging the School") and Session 3 (z=−.27; "Partnership Skills"). In contrast fidelity was particularly strong for Session 5 (z=.39; "Skill Module: Family Choice") and Session 10 (z=.27; "Keeping Momentum"). All other raw residual z-scores were negligible (range: z=.00 to z=.18).

Significant effects indicated that adolescents with higher parental attendance demonstrated significantly lower fidelity at the outset of treatment (b=−.51, SE=.14, p<.001, 95% CI: −.79 to −.23) and significantly smaller reductions in fidelity over time (b=.17, SE=.02, p<.001, 95% CI: .12 to .21). When adolescents received a higher percentage of sessions in the office setting (versus at home, school, or community locations like the library), the therapist demonstrated significantly smaller reductions in fidelity over time (b=.03, SE=.01, p<.001, 95% CI: .02 to .06). No other predictors demonstrated significant effects on fidelity intercept or slope over time.

Fidelity predicting Effectiveness.

For MI relational components, LMM results (see Table 2) indicated a significant effect on parent-teen conflict over time (b=.02, SE=.01, p=.014), indicating that lower MI relational scores were associated with greater reductions in family conflict over time (see Figure 2a). For MI relational scores, the simple slopes represent the change in units of parent-teen conflict per month for adolescents with an average therapist relational score (M=3.38, SD=.70) versus coded sessions that were 1 SD above the mean (high) and 1 SD below the mean (low). Adolescents with a low therapist MI relational score demonstrated a decrease in parent-teen conflict of .04 points per month, or a .47-point reduction from BL to FU. Adolescents with an average therapist MI relational score demonstrated a decrease in parent-teen conflict of .02 points per month, or a .27-point reduction from BL to FU. Adolescents with a high therapist MI relational score demonstrated a decrease in parent-teen conflict of .01 points per month, or a .08-point reduction from BL to FU. The standardized difference score for the MI relational score x time interaction was .50, indicating a medium effect on parent-teen conflict for adolescents with high versus low therapist MI relational scores. There was no significant effect of MI relational score on GPA or IN symptoms.

For STAND content fidelity, there was a significant positive effect on GPA over time (b=.10, SE=.03, p=.005), indicating that average to high fidelity scores were associated with increases in GPA over time, but low fidelity scores were associated with decreases in GPA over time (see Figure 3). For content fidelity, the simple slopes represent the change in units of GPA per month for adolescents with an average therapist fidelity score (M=.70, SD=.22) versus coded sessions that were 1 SD above the mean (high) and 1 SD below the mean

(low). Adolescents with low therapist fidelity scores demonstrated a decrease in GPA of .01 points per month, or a .14-point reduction from BL to FU. Adolescents with average therapist fidelity scores demonstrated an increase in GPA of .02 points per month, or a .21-point increase from BL to FU. Adolescents with high therapist fidelity scores demonstrated an increase in GPA of .04 points per month, or a .48-point increase from BL to FU. The standardized difference score for the fidelity x time interaction was .73, indicating a medium effect on GPA for adolescents with high versus low therapist content fidelity scores. There was no significant effect of content fidelity on parent-teen conflict or IN symptoms.

There was no effect of MI technical components or MI competence on any outcome over time.

Discussion

The main results of this study were as follows. First, there was a significant decrement in fidelity over time when STAND was delivered by community therapists. This decrement was punctuated by particular difficulties implementing the third and seventh STAND sessions, but relative ease delivering the fifth and tenth sessions. Consistent with our observational data from recorded sessions (Sibley et al., 2020b), holding STAND sessions in office settings prevented reductions in fidelity over time. Although fidelity was initially lower for adolescents with high parent attendance, parental attendance also protected against waning fidelity. Second, when therapists self-reported lower content fidelity, treatment outcomes were poorer for academic impairment. Third, when therapists demonstrated higher MI relational scores, treatment outcomes were poorer for family impairment. We discuss these findings below.

Content fidelity data for STAND delivered by community therapists indicates that adherence was initially acceptable and similar to university trials (i.e., greater than 85%) but waned substantially over time (see Figure 1; d=−1.23). Although structured, skills-based protocols like STAND often promote higher fidelity in community settings (Perepletchikova, Treat, & Kazdin, 2007; Hallgren et al., 2018), community therapists struggled to sustain initially high fidelity over time—especially when delivering treatment in homes and schools (rather than quiet agency offices) and without the parent present. In addition to paper and pencil therapy materials (i.e., manual, record forms, family workbooks), community therapists randomized to STAND received 24 hours of initial training and 30 minutes of weekly face to face supervision while treating a study case. It is important to note that despite problems with fidelity, community therapists attended training and supervision activities at high rates, found STAND highly acceptable to deliver, and demonstrated superior MI implementation compared to UC (d=.21 to .79; Sibley et al., 2020b). Thus, the fidelity difficulties experienced by therapists do not appear to reflect lack of interest in delivering the intervention or poor engagement in the therapy delivery process. As a result, additional efforts to sustain fidelity might focus on preventing a decrement in therapist skills, rather than motivation to implement.

As an example, therapist skills can be enhanced by measurement-based practices (Lewis et al., 2019; Weisz et al., in press)—structured, high quality, supervision that includes

performance monitoring and feedback (Martino et al., 2016; Schoenwald, Sheidow, & Chapman, 2009; Webster-Stratton, Reid, & Marsenich, 2014). In STAND's university-based supervision protocol, measurement-based supervision was accomplished by audio recording all sessions, reviewing recordings with supervisors until fidelity benchmarks were consistently achieved, and receiving feedback and coaching on MI integrity and content fidelity (Sibley et al., 2013, 2016). However, the duration and comprehensiveness of these supervision activities were decreased by necessity when moving to the community context. Community supervisors possess insufficient time, training and resources to provide this recommended level of fidelity monitoring and feedback (Accurso, Taylor, & Garland, 2011). To preserve the ecological validity of our community-based STAND model, we trimmed measurement-based supervision components in line with stakeholder feedback prior to implementation (Sibley et al., 2020b). As a future direction, we suggest that technology might be leveraged to bolster therapist skills within the constraints of agency resources. Digitizing STAND training and delivery materials and task-shifting aspects of measurement-based supervision to artificial intelligence (Atkins, Steyvers, Imel, & Smyth, 2014) may support endogenous agency supervisors to enhance the quality of care in their agencies.

This study also documented an important link between community clinician fidelity and STAND effectiveness. Higher content fidelity is an indicator that skills-based components of STAND were implemented at a higher intensity—which appears to have directly translated to improved academic outcomes for adolescents (see Table 2 & Figure 2a). Given that academics are the chief domain of impairment for adolescents with ADHD (Kent et al., 2011), this finding supports the promise of community-delivered STAND if fidelity can be improved. Surprisingly, increased content fidelity did not influence ADHD symptom outcomes. This finding suggests that STAND treatment activities may have direct effects on impairment indices (e.g., GPA), above and beyond the treatment's effects on ADHD symptoms. For example, STAND's planning phase emphasizes skill generalization to home and school by building a daily routine, increasing parent communication with the school, and promoting home rewards to reinforce positive academic behaviors. In particular, Session 7 "Engaging the School" demonstrated relatively poor fidelity, which likely undermined skill generalization to the school context. Our results highlight the importance of planning phase activities in promoting maintenance of gains post-treatment.

Unexpectedly, higher-quality MI delivery did not improve treatment outcome when STAND was delivered by community therapists. We mainly speculate methodological explanations for this finding. For one, MI delivery scores represented only a single session of treatment. As a result, they may not be representative of therapist MI delivery across sessions, which can be highly variable (Small et al., 2020). Secondly, MI competence and delivery scores may have demonstrated restricted range given that few community therapists scored in the upper tiers of the measure (Sibley et al., 2020b). Nonetheless, it is striking that adolescents demonstrated greater decreases in parent-teen conflict over time when therapists demonstrated low MI relational scores (see Figure 2a). Because MI relational scores were not significantly related to BL conflict severity, it is unlikely that therapist MI delivery was driven by level of conflict in session. Therapists who are low on MI relational scores are less likely to explore personal material with the family in session, preferring discussion of factual information that lacks emotional depth (Moyers et al., 2014). They also may struggle to

surrender the expert role and fail to demonstrate a collaborative approach with family members, preferring reliance on education, dominating the conversation, and supplying knowledge or advice (Moyers et al., 2014). Thus, it is also possible that therapists with greater empathy and partnership skills evoke deeper exploration of family issues, producing greater engagement in conflict that could be iatrogenic (i.e., if issues cannot be resolved and increase relational strain) or therapeutic (i.e., if issues are resolved through negotiation). Future work should conduct a deeper examination of whether these non-adherent therapist behaviors might unexpectedly reduce ADHD-related conflict in parent-teen dyads.

There are several important limitations of this study. First, pragmatic community-based effectiveness trials often yield internal validity to preserve external validity (Aarons, Sklar, Mustanski, Benbow, & Brown, 2017; Godwin et al., 2003). In this trial, usable community therapist study data (70%–85%) was lower than in university trials (95%−100%). Some families discontinued treatment prior to the therapist attempting to record a session, some therapists objected to recording, and other tapes were inaudible—particularly when delivered in noisy home or school-based settings. Another limitation was that we were limited to reliance on therapist self-report of fidelity in this trial, due to the high participant burden that would have stemmed from requiring community therapists to record all sessions. There are documented limitations to therapist self-report of fidelity (Hogue, Dauber, Lichvar, Bobek, & Henderson, 2015; Hurlburt, Garland, Nguyen, & Brookman-Frazee, 2010), which were confirmed by our reliability probe (i.e., therapists over-reported fidelity relative to observers). Most importantly, self-reported fidelity represents perceptions of fidelity, rather than objective evaluations, and can be influenced by a therapist's knowledge of the treatment, desire to please the supervisor, or self-perception biases (Hogue et al., 2019). We speculate that some uncorroborated fidelity items may have been delivered, but at intensities that were unconvincing to trained raters using binary (yes/no) scales. Future work with intricate coding systems (i.e., non-binary tools) will clarify this question. Despite potential halo effects in their reporting (Hogue et al., 2019), therapists admitted to waning, and eventually, very poor fidelity in the later weeks of treatment. Thus, we do not believe this limitation undermines our main finding that fidelity to the EBT was suboptimal, particularly, in later sessions. Future work is needed to better understand the meaning and utility of therapist self-report of fidelity in community settings. We did not collect fidelity ratings after week 13 of therapy; thus, it is unclear if therapists, who were administering STAND at a slower pace (Sibley et al., 2020b), administered STAND modules past the expected timeline. Therapist participation in the study was voluntary; thus, we may have oversampled therapists with openness to learning evidence-based interventions. Similarly, it is possible that there was a selection bias in audio recording submitted by the therapists; therefore, performance on recordings should be considered an upper bound of the therapists' MI skills (rather than their average performance). As previously noted, the MI delivery scores were sampled from a single session and may not generalize across sessions (Small et al., 2020), leading to Type II errors.

Based on the findings of this study, we conclude that improving STAND's community-based implementation fidelity may be a strategic approach to improve effectiveness. In particular, efforts should focus on increasing content fidelity using known strategies to enhance fidelity such as measurement-based approaches (Lewis et al., 2019; Weisz et al., 2019) and de-

implementation of habitual low-value practices that may interfere with the delivery of evidence-based components (Prasad & Ioannidis, 2015; Wang, Maciejewski, Helfrich, &Weiner, 2018). Novel efforts (e.g., leveraging technology) will be needed to adapt fidelity strategies to the constraints of community-based contexts. STAND sessions with particularly low fidelity scores relative to linear trends over time should be analyzed to understand particular activities that may be challenging for community therapists to implement. By revising the community-based implementation strategy for STAND based on this work, future iterations of the treatment may demonstrate improved outcomes.

Funding:

This trial was funded by the National Institute of Mental Health (R01 MH106587).

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Highlights

- Community therapists demonstrated waning treatment fidelity over time.
- Stronger fidelity scores predicted improvements in academics during treatment.
- Motivational Interviewing integrity did not predict treatment outcome.

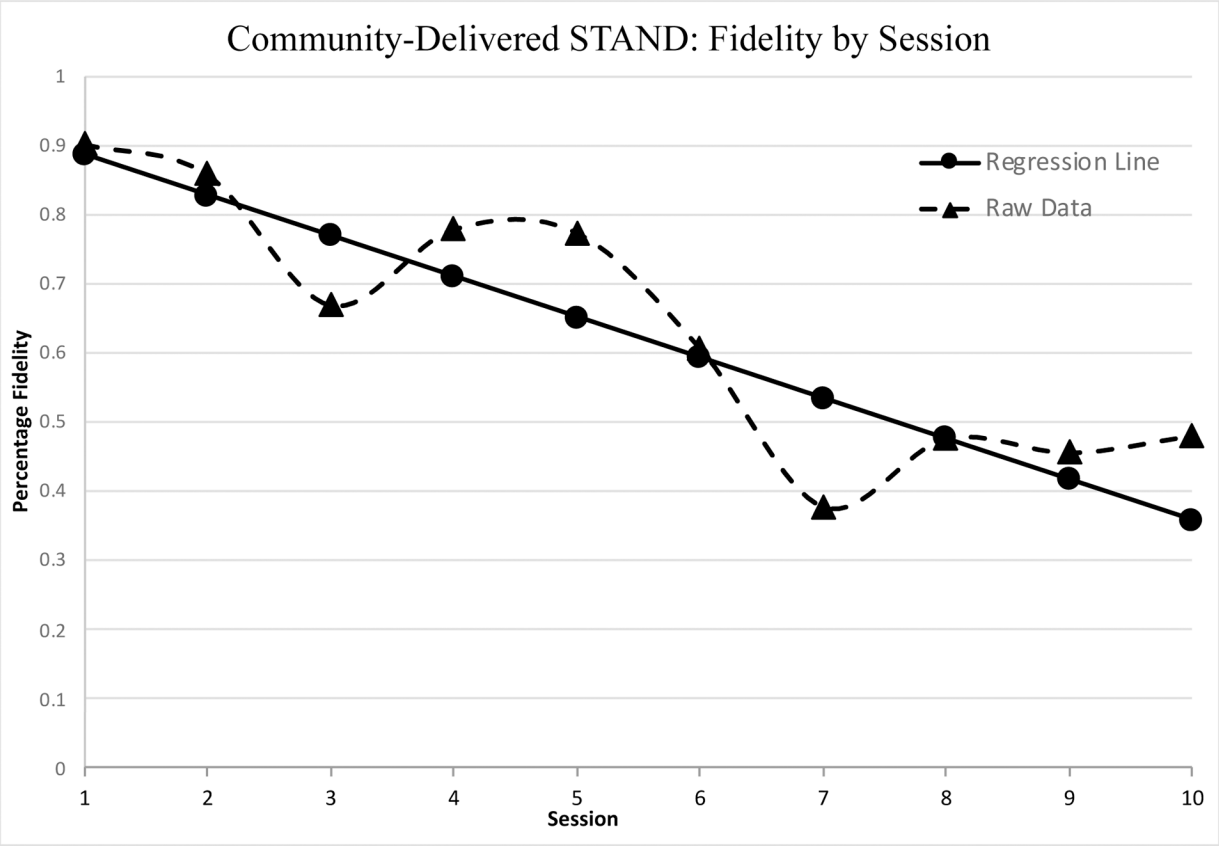

Figure 1. STAND Content Fidelity over Time as Reported by Community Therapists

Note. STAND=Supporting Teens' Autonomy Daily; Fidelity is measured on a scale from 0% to 100% with high values indicated stronger fidelity. Regression Line displays mean values during each week as derived from intercept and slopes of Linear Mixed Model. Raw Data demonstrates absolute means for all available sessions.

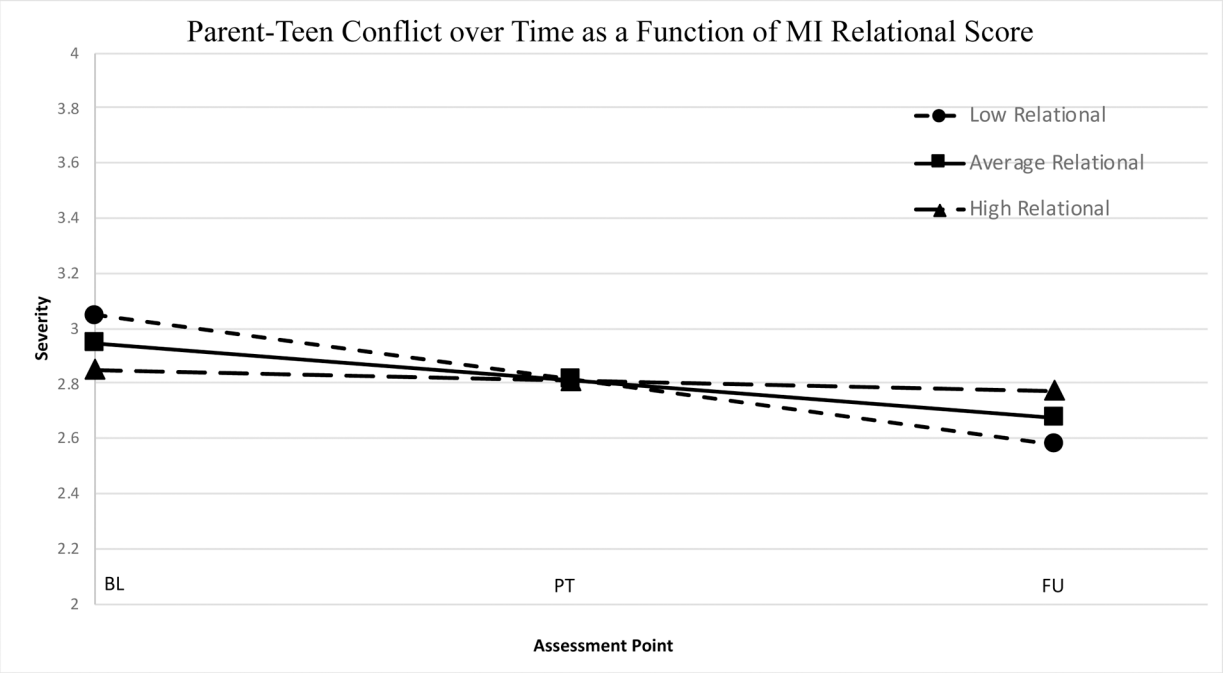

Figure 2.

Note. MI=Motivational Interviewing; BL=baseline, PT=post-treatment, FU=follow-up; PT and FU represent mean functioning for each group at the mean number of months since BL that PT and FU assessments occurred. High Relational scores are represented by one standard deviation above the sample mean. Low Relational scores are represented by one standard deviation below the sample mean. Regression line is graphed at the mean values of all covariates.

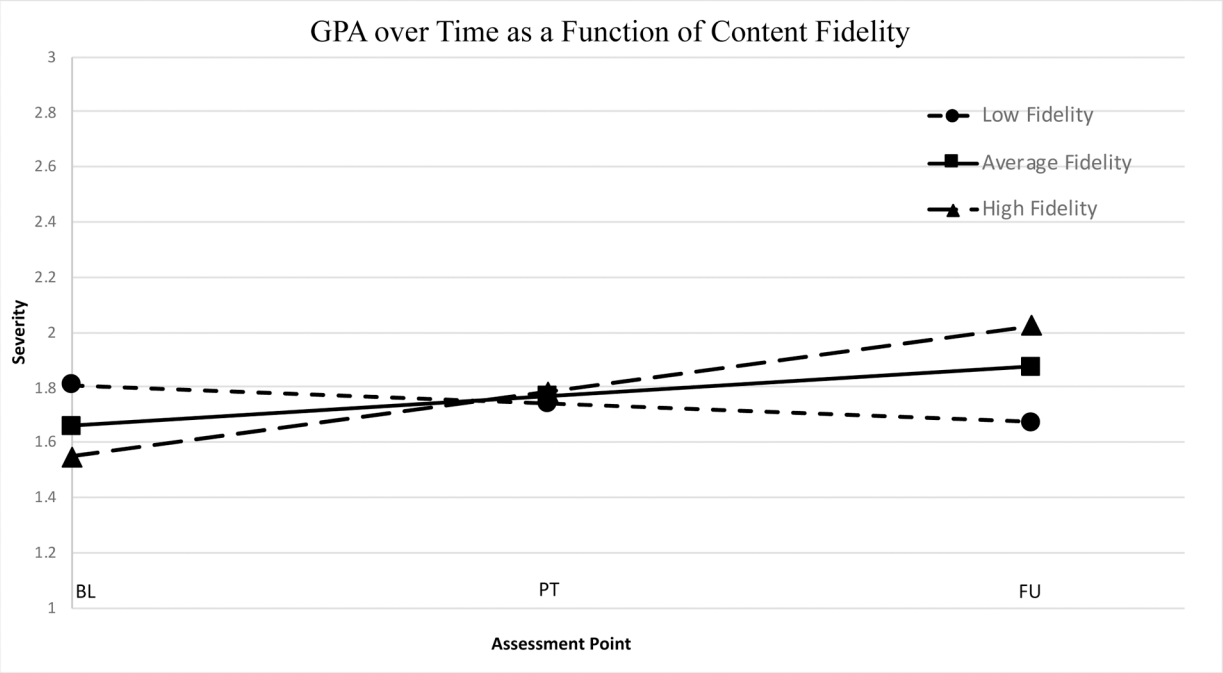

Figure 3.

Note. BL=baseline, PT=post-treatment, FU=follow-up; PT and FU represent mean functioning for each group at the mean number of months since BL that PT and FU assessments occurred. High Fidelity scores are represented by one standard deviation above the sample mean. Low Fidelity scores are represented by one standard deviation below the sample mean. Regression line is graphed at the mean values of all covariates.

Table 1.

Baseline Characteristics of Adolescent Subsample (N=114)

Diagnostic Variables	
WASI estimated Full-Scale IQ *M*(*SD*)	94.42(13.85)
ADHD Subtype	
ADHD-Predominantly Inattentive (%)	48.2
ADHD-Combined (%)	51.8
ODD/CD (%)	52.6
Current ADHD Medication (%)	31.6
Demographic Variables	
Age *M*(*SD*)	13.96(1.49)
Male (%)	70.2
Race/Ethnicity (%)	
White Non-Hispanic	4.4
Black Non-Hispanic	17.5
Hispanic Any Race	77.2
Other	0.9
Single Parent (%)	32.5
Parent Language: Spanish (%)	36.8
Billing Source (%)	
Medicaid	57.0
State/County Subsidy	12.2
Sliding Scale	29.8
Private Insurance	0.9
Parent Education Level	
High School Grad, GED, or less (%)	22.8
Part College or Specialized Training (%)	31.6
College or University Grad (%)	35.1
Graduate Professional Training (%)	10.5

Note. WASI=Wechsler Abbreviated Scale of Intelligence; ODD=Oppositional Defiant Disorder; IQ=Intelligence Quotient; ADHD=Attention Deficit Hyperactivity Disorder; *M*=Mean, *SD*=Standard Deviation; CD=Conduct Disorder; GED=General Educational Diploma

Table 2.

Relationship between Fidelity and Effectiveness

	GPA				Parent-Teen Conflict				IN Severity			
	b	***SE***	***p***	***95% CI***	***b***	***SE***	***p***	***95% CI***	***b***	***SE***	***p***	***95% CI***
Fidelity Index												
MI Relational	.00	.01	.670	−.02 to .03	.02	.01	**.014**	.00 to .04	.00	.01	.904	−.02 to .02
MI Technical	.01	.01	.372	−.01 to .04	.00	.01	.720	−.02 to .03	−.02	.01	.085	−.04 to .00
MI Competence	.00	.00	.264	.00 to .00	.00	.00	.957	.00 to .00	.00	.00	.938	.00 to .00
STAND Content	.10	.03	**.005**	.03 to .17	.01	.03	.817	−.05 to .06	.02	.03	.510	−.04 to .08

Note. GPA=grade point average, IN=Inattention; MI=Motivational Interviewing; STAND=Supporting Teens' Autonomy Daily; b=unstandardized beta; *SE*= standard error; *CI*=Confidence Interval Significant p-values noted in bold. *alpha*=05.