An Intensive Summer Treatment Program for ADHD Reduces Parent–Adolescent Conflict

**Margaret H. Sibley · J. Megan Ross · Elizabeth M. Gnagy ·
Laura J. Dixon · Bradfield Conn · William E. Pelham Jr.**

Abstract There are currently almost no treatment efforts to reduce parent–adolescent conflict in adolescents with ADHD. As such, this study investigated the effect of an intensive Summer Treatment Program for Adolescents with ADHD (STP-A) on parent–adolescent conflict. Twenty adolescents and their parents completed the 8 week behavioral treatment program, which included 320 hours of adolescent-directed treatment, 15 hours of parent behavior management training, and daily feedback from staff on parent implementation of a home-based behavioral contract. Results indicated that 70–85 % of adolescents who attended the STP-A demonstrated reliable improvement in parent–adolescent conflict from baseline to post-treatment. Treatment response was associated with higher levels of conflict at baseline, but not adolescent ODD severity or parent ADHD severity. Several patterns of treatment non-response were detected through visual examination of weekly conflict scores during the STP-A. Discussion suggests that intensive, parent-involved treatment programs may be necessary to improve home-conflict in adolescents with ADHD.

Keywords ADHD · Family conflict · Behavioral treatment

M. H. Sibley (✉) · J. M. Ross · E. M. Gnagy · W. E. Pelham Jr.
FIU Center for Children and Families,
AHC-1 Room 146, 11200 SW 8th Street,
Miami, FL 33199, USA
e-mail: msibley@fiu.edu

L. J. Dixon
University of Wyoming,
Laramie, WY, USA

B. Conn
Alliant International University,
San Diego, CA, USA

For typically developing youth, adolescence represents a time of increased parent–child conflict as teens strive to increase autonomy in the face of parental limits (Larson et al. 1996; Laurensen et al. 1998; Steinberg and Morris 2001). Compared to same-aged dyads, adolescents with Attention Deficit/Hyperactivity Disorder (ADHD; American Psychiatric Association 2000) and their parents engage in further elevated conflict, exhibiting more intense arguments, less effective communication skills, and fewer positive statements during discussions (Barkley et al. 1992a; Pelham et al. 2012). Increased parent–adolescent conflict is not unexpected in youth with ADHD. These adolescents display low frustration tolerance, poor interpersonal and conflict resolution skills, and a high incidence of comorbid Oppositional Defiant Disorder (ODD; Anderson et al. 1987; Cantwell 1986; Fletcher et al. 1996; Sobanski et al. 2010; Wehmeier et al. 2010) and these factors exacerbate strained relationships between adolescents and adult family members (Evans et al. 2009). Accordingly, dysfunctional parent–adolescent relationships are one of the most impaired domains for adolescents with ADHD (Barkley et al. 1992a; Edwards et al. 2001; Montemayor and Hanson 1985).

Parent–adolescent relationship quality may be a particularly meaningful domain of intervention for adolescents with ADHD. For example, a distressed parent–adolescent relationship increases risk for adolescent substance use (Farrell and White 1998), delinquency (Moffitt and Caspi 2001), academic problems (Shek 1997) and poor psychological well-being (Steinberg 2001). Longitudinal follow-up studies of children with ADHD suggest that in adolescence, these youth display higher rates of risk behaviors, academic problems, and comorbid disorders than peers (Barkley et al. 1990; Mannuzza et al. 1993; Mikami et al. 2010; Molina et al. 2007). Consequently, reducing parent–adolescent conflict may improve a range of outcomes for adolescents with ADHD.

Unfortunately, treatments to reduce family conflict in adolescents with ADHD report limited success. Stimulant

medication is the most common treatment for ADHD in adolescence (Smith et al. 2000), but stimulant medication does not improve parent–adolescent conflict (Pelham et al. 2012). Barkley et al. (1992b) administered nine weekly sessions of intensive behavior management training (BMT), problem-solving and communication training (PSCT), and/or structured family therapy (SFT) to adolescents with ADHD and their parents. These authors found that although adolescents with ADHD displayed statistically significant improvement in home conflict following treatment, most did not show clinically significant improvement relative to the functioning of control children. Of the 61 teens targeted in therapy, only 5–30 % showed clinically significant improvements in the quantity of family arguments, and those improvements were maintained in only 5–20 % of this sample at a 3 month follow-up. These findings were replicated by Barkley et al. (2001) in a sample of comorbid ADHD/ODD adolescents and their parents. These authors increased the treatment dose (BMT and PSCT) to 18 sessions, but found that only 23 % of families demonstrated reliable change throughout treatment.

Traditional treatments for home conflict may show reduced effects in adolescents with ADHD due to population-specific parent and adolescent characteristics. For example, adolescent ODD and parent ADHD may be particularly prevalent in high-conflict dyads (Babinski et al. 2012; Fletcher et al. 1996). Previous work with ADHD adolescents suggests that comorbid ODD severity is associated with diminished behavioral treatment response (Sibley et al. 2012). Parent ADHD can also reduce treatment effects for parent-based interventions (Sonuga-Barke et al. 2002). Barkley and colleagues (1992b) examined predictors of treatment response and found no significant parent or adolescent effects; however, in this study, most families did not respond well to treatment. If predictors of treatment response are identified, they could promote effective intervention tailoring in this treatment resistant population.

Treatment delivery methods might also restrict therapy effects. For instance, it is possible that low treatment doses (i.e., 9 to 18 hours; Barkley et al. 1992b, 2001) are insufficient to produce meaningful changes in highly impaired dyads. In some cases, treatment effects also might be attenuated because therapy is ceased prior to the resolution of an extinction burst (Martin and Pear 1996). Namely, temporary intensification of conflict behavior can occur as adolescents test newly-placed limits on their freedom. If post-treatment measurements are obtained during an extinction burst, the adolescent will be prematurely classified as deteriorated or display latent treatment effects. Relatedly, it is possible that a traditional clinical setting (e.g., therapist's office) prevents application of skills to the home-setting. Thus, it may be helpful to increase treatment dose in a setting that promotes home generalization.

The Summer Treatment Program-Adolescent (STP-A) is an intensive behavioral day treatment program for adolescents with ADHD that includes an active parent involvement component (Sibley et al. 2011; Smith et al. 1998). During the STP-A, adolescents receive over 300 hours of treatment focused on improving skills in academic, social, and family domains. In addition, parents participate in 15 hours of behavior management training, 8-weeks of daily practice implementing a home behavioral contract, and ongoing daily support from a trained clinician. The STP-A shows evidence of improving the social behavior and academic functioning of adolescents with ADHD (Sibley et al. 2011, 2012), but its impact on parent–adolescent conflict remains unevaluated.

As such, this study evaluated whether the STP-A treatment package improved parent–adolescent conflict in 20 adolescents with ADHD. First we examined parent and adolescent report of home conflict during the final 3 weeks of the school year (baseline). We hypothesized that parents and adolescents would report arguments across a range of issues and that compared to adolescents, parents would report significantly greater conflict (as adolescents with ADHD tend to under-report impairment; Fischer et al. 1993). Second, we examined whether the STP-A reduced parent–adolescent conflict from baseline to post-treatment. We hypothesized that at follow-up, adolescents would engage in significantly fewer and less intense arguments. We also hypothesized that the majority of adolescents would display reliable improvement on both indices. Next, we examined predictors of improved parent–adolescent conflict, hypothesizing that improvements in home behavior would be associated with lower levels of reported conflict at baseline and lower levels of parent ADHD. We also conducted an exploratory, uncontrolled analysis of the effect of stimulant medication use on improvement. Finally, for adolescents who displayed deterioration during treatment, we examined visual plots of weekly home-conflict during the STP-A to detect common patterns of deterioration.

Method

Participants

Participants were 20 adolescents with ADHD between ages 12 and 16 ($M = 13.87$, $SD = 1.29$) who participated in the STP-A at a large university clinic in urban South Florida. Participants were required to (a) meet DSM-IV-TR (American Psychiatric Association 2000) diagnostic criteria for

ADHD, (b) be at least 12 years of age, (c) have a Verbal IQ higher than 80, and (d) have no conditions that precluded full participation in the STP-A activities. Thirty adolescents attended the STP-A. Three families declined participation in the research study, four families did not provide sufficient data for inclusion in analyses, and three adolescents enrolled in the STP-A too late to provide prospective baseline data. Participants and non-participants in the study were compared on eight demographic, diagnostic, and treatment history variables. Only one comparison was statistically significant ($p=0.10$). Sixty percent of participants were Hispanic, compared to 90 % of non-participants. Table 1 displays demographic and diagnostic characteristics of the sample.

Parents and teachers of adolescents completed an application that contained behavioral rating scales, a demographic questionnaire, and a treatment history form. Parents also were

Table 1 Demographic and diagnostic characteristics of the sample

Demographic	
Age M (SD)	13.87 (1.29)
Gender (%)	
Male	65.0
Female	35.0
Ethnicity (%)	
Hispanic	60.0
Non-Hispanic	40.0
Race (%)	
White	85.0
Black	10.0
Asian	5.0
Parent Education Level	
Some college or less	15.0
Bachelor's degree	50.0
Master's degree or higher	35.0
Single parent household (%)	35.0
Diagnostic	
Estimated full scale IQ M (SD)	104.45 (12.86)
Reading achievement standard score M (SD)	106.05 (12.06)
Math achievement standard score M (SD)	104.75 (15.55)
ADHD Diagnosis (%)	
ADHD-PI	40.0
ADHD-C	55.5
ADHD-NOS[a]	5.0
ODD (%)	50.0
CD (%)	5.0
Current stimulant medication (%)	45.0

[a] One female adolescent exhibited a history of ADHD and current ADHD-related impairment but was one symptom short of the DSM-IV-TR A-criteria symptom threshold

administered the Disruptive Behavior Disorders Interview (DBD; Pelham et al. 1992a), a semi-structured interview with supplemental probes for symptom severity and situational variability. Through dual clinician review, participants were accepted to the STP-A if parent and teacher reports indicated the presence of clinically significant symptoms (assessed by Disruptive Behavior Disorder Rating Scale; Pelham et al. 1992b) and cross-situational impairment (assessed by Impairment Rating Scale; Fabiano et al. 2006) consistent with a diagnosis of ADHD. Adolescents were administered the Wechsler Abbreviated Scale of Intelligence (WASI; Weschler 1999) to obtain an estimated IQ score. Participants were also administered the Word Reading, Spelling, and Mathematics subtests of the Wechsler Individual Achievement Test-II (Wechsler 2002) to assess achievement. Adolescents were excluded from the program if they qualified for a diagnosis of pervasive developmental disorder, a psychotic disorder, or possessed an IQ score lower than 80. Parents signed informed consent and adolescents signed youth assent forms prior to the start of treatment.

Procedure

All procedures were approved by the Florida International University Institutional Review Board. The STP-A is an 8-week intensive summer treatment program for adolescents with ADHD. The program is fully described in a manual available from the authors (Pelham et al. 2010). Adolescents attended the program from 8:00 am to 5:00 pm each day and participated in modules designed to mimic a secondary school setting. The STP-A teaches academic and organizational skills that are relevant to secondary school (i.e., note-taking, study skills, writing skills, daily planner use, binder organization) to foster generalization of therapeutic gains. STP-A modules also include daily jobs, substance use prevention (i.e., Life Skills Training; Botvin 2004), and leadership training to teach life skills and prevent maladaptive outcomes such as deviant peer affiliation, substance use, and delinquency. The STP-A behavioral feedback system is sensitive to adolescent social norms. Because ADHD is a heterogeneous disorder, individualized treatment plans and adjunct treatments are used as needed to customize treatment to the unique deficits of each participant. Adolescents were in groups of 9 to 11 similar age peers and each group was staffed by a graduate student counselor and three undergraduate counselors. To promote treatment fidelity, staff members received 60 hours of pre-service training and were required to pass a STP-A procedural test. Staff were supervised by Ph.D.-level mental health professionals and trained fidelity observers. Clinical supervisors and fidelity observers completed standardized dichotomous fidelity checklists and provided daily feedback about adherence to manualized procedures and inter-observer reliability. Across treatment

fidelity checklists, average fidelity scores were above 90 %. Staff also were required to complete weekly treatment fidelity quizzes on STP-A procedures. If any score on a treatment fidelity checklist or weekly quiz was below 100 %, it was immediately addressed with remedial procedures. These procedures included take-home tests on manual procedures, correcting missed quiz-items, additional supervision meetings, and role-play activities.

To enhance efficacy and generalizability, the STP-A requires active parent involvement, parent–teen contracting, and group-based parent training. Prior to the STP-A, parents are required to participate in an individual meeting with a clinician to discuss goals for their adolescent and develop a home privilege program (Patterson and Forgatch 1987). The home privilege program serves in tandem with the STP-A privilege levels system to reinforce progress during the STP-A. Under the guidance of the clinician, parents and teens develop daily and weekly privilege levels based on the adolescent's performance on program goals. During weekly group sessions, parents learn home behavior management strategies and receive staff support for the STP-A home privilege program. At the end of the summer, all parents and teens participate in individual sessions with a clinician to develop a privilege program for the upcoming school year. In this meeting, target goals are formulated, home privileges for meeting goals are chosen, and parents and teens discuss adaptation of STP-A interventions to the upcoming school year.

During baseline (the last 3 weeks of the school year), the 8 weeks of the STP-A, and post-treatment (the first 3 weeks of the new school year), adolescents and their primary caregiver completed the abbreviated Issues Checklist (IC-a). These ratings were collected through a secure, password protected website. Each Saturday, the primary caregiver received an email prompt for both the adolescent and the parent to complete the IC-a. During baseline and post-treatment, families that did not complete the IC-a over the weekend were given a telephone prompt to complete the rating on Mondays. To maintain accurate prospective data, ratings were not accepted more than 6 days after the due date. Each week of the STP-A, families who failed to complete ratings over the weekend completed paper–pencil ratings on Mondays at STP-A pick-up. To maximize the stability of baseline and post-treatment IC-a estimates, baseline and post-treatment ratings were collected for multiple weeks when possible and baseline/post-treatment mean scores were calculated by combining reports across all available weeks. For baseline, the number of provided reports varied by family and was largely dependent on the date a family enrolled in the STP-A (three reports = 10 %, two reports = 35 %, one report = 55 %). For post-treatment, three weekly reports were available for 90 % of families (10 % provided one weekly report). Week 1 of post-treatment began 10 days after the end of the STP-A.

Measures

Issues Checklist-Abbreviated The IC-a is comprised of 10 issues that are a common source of conflict between parents and adolescents (see Table 2). Raters assess the frequency and perceived anger-intensity (rated on a 5-point scale; 1 = calm and 5 = angry) of specific disputes over the course of the last week. The IC-a is an abbreviated form of the IC that was adapted for brief weekly measurement. The IC discriminates between distressed and non-distressed families and correlates with other self-report and observational family interaction measures (Robin and Koepke 1990; Robin and Weiss 1980). Two scores were computed for evaluation. First, average anger intensity was obtained by calculating the mean anger intensity score for each endorsed issue. In addition, the total quantity of arguments was obtained by summing the number of arguments reported for each issue (Barkley et al. 1999). To measure treatment response, parent reports were utilized because adolescents with ADHD characteristically under-report impairment (Sibley et al. 2012) and over-report their improvement in treatment (Sibley et al. 2011).

Adolescent ODD Severity During the STP-A intake assessment, we measured ODD symptoms using the Disruptive Behavior Disorders Interview (DBD; Pelham et al. 1992b). The DBD interview is a clinician administered semi-structured clinical interview that lists the DSM-III-R and DSM-IV symptoms of ADHD, ODD, and CD with supplemental probes for severity and situational variability. At intake, clinicians provided ratings of (0) not at all, (1) just a little, (2) pretty much, or (3) very much for each symptom on the scale based on information gathered during the parent interview. The psychometric properties of the DBD are strong in childhood and adolescent samples, with empirical support for distinguishing factors of inattention, hyperactivity/impulsivity, ODD, and CD, and internally consistent subscales with alphas above 0.95 (Molina et al. 2001; Pelham et al. 1992a, b; Pillow et al. 1998; Wright et al. 2007). We obtained a dimensional severity score for ODD by summing ratings for each symptom on the subscale and dividing by the total number of subscale items. In the current study, Cronbach's alpha for the ODD subscale of the DBD was 0.87.

Parent ADHD Severity The Adult ADHD Self-Report Scale (ASRS; Adler et al. 2006) was used to measure parent ADHD severity. Parents completed the Adult ADHD Symptom Rating Scale (ASRS) during the first week of the STP-A. The ASRS is an 18-item measure that contains adult-specific symptoms of ADHD. Each symptom is measured on a five-point scale (0 = Never to 4 = Very Often). Respondents are asked to rate the presence of each symptom

Table 2 Baseline scores on the abbreviated issues checklist

	Parent report		Adolescent report	
	Quantity M (SD)	Intensity M (SD)	Quantity M (SD)	Intensity M (SD)
Phone/Electronics use	2.45 (1.99)	2.51(0.95)	1.15 (2.12)	2.56 (1.59)
Bedtime	2.46 (1.89)	2.44 (1.17)	1.22 (2.06)	2.05 (1.26)
Personal hygiene	1.36 (1.70)	2.09 (0.96)	1.06 (2.23)	1.61 (0.93)
Fighting with siblings	1.40 (2.30)	3.14 (1.42)	2.96 (5.46)	3.22 (1.39)
Morning routine	1.62 (1.48)	2.73 (1.27)	1.99 (3.62)	2.17 (1.27)
Disrespectful comments to parents	1.56 (1.38)	3.32 (1.31)	3.52 (7.31)	3.00 (1.65)
Non-compliance	3.30 (2.72)	3.27 (1.18)	2.26 (2.72)	2.65 (1.43)
Picking up after self	2.82 (2.22)	2.89 (1.82)	2.10 (2.62)	2.09 (0.92)
Lying	0.73 (0.79)	2.54 (1.49)	0.81 (1.33)	1.70 (1.25)
Chores (i.e., feeding dog, clear table)	2.32 (2.14)	2.50 (1.09)	1.70 (2.33)	2.22 (1.30)
Weekly average	18.66 (12.08)	2.85 (0.89)	17.36 (18.26)	2.45 (1.05)

Parent and adolescent reports of total number of arguments (past week) and average heat of arguments were not significantly different

during the past 6 months. The ASRS self-report rating scale correlates highly with clinician ratings of ADHD and displays strong internal consistency (alpha=0.88; Adler et al. 2006). ADHD severity was calculated for each parent by calculating the mean score of the ASRS items. In the current study, Cronbach's alpha for the ASRS was 0.95.

Results

Baseline Home Conflict Scores Table 2 displays the average quantity and intensity scores reported at baseline for each issue. Within-subjects ANOVAs revealed that average quantity [$F(1,15)=0.47$, $p=0.50$, $d=0.28$] and intensity scores [$F(1,15)=1.97$, $p=0.18$, $d=0.49$] did not significantly vary as a function of informant (parent vs. adolescent).

Improvement in Home Conflict Within-subjects ANOVAs revealed that parent-reported average quantity [$F(1,19)=6.56$, $p=0.02$, $d=0.53$] and intensity scores [$F(1,19)=9.15$, $p<0.01$, $d=0.66$] showed statistically significant improvement from baseline to post-treatment (see Table 3). To evaluate clinical significance, reliable change index (RCI) was calculated using the Gulickson-Lord-Novick (GLN) method (Hsu 1999). The GLN method corrects the RCI for regression to the mean and is shown to provide a stable RCI that is consistent with other established RCI calculation methods (Atkins et al. 2005). The GLN RCI calculates the difference between baseline and post-treatment scores and divides this difference by the baseline SD. Table 3 presents the quantity and intensity RCI for each case in the study. Using the RCI classification paradigm outlined by Jacobson et al. (1999), each case was classified as recovered, improved, no change, or deteriorated according to 1) the

statistical significance, magnitude, and direction of the RCI and 2) an established cut-point for clinical recovery that defines functional from dysfunctional scores. We defined a statistically significant RCI at |0.2| according to Cohen's (1988) benchmarks. Jacobson's recommended recovery cut-point of 2 SDs above the mean of a non-clinical sample (2.72) was used for average IC-a intensity using previously reported mean intensity scores (Prinz et al. 1979). However, previous research indicates that distressed and non-distressed families do not show significant differences on IC-a quantity scores (Prinz et al. 1979). In such cases, it is recommended that an alternate cut-point is chosen to represent meaningful clinical change (Kazdin 1977). Therefore, instead of calculating a recovery cut-point, we established a quantity score cut-point of RCI = 0.45 to represent meaningful change, which is the average behavioral treatment effect reported for family functioning in adolescents with ADHD (Smith et al. 2000). For argument quantity, baseline to post-treatment RCI classifications were: 47.4 % meaningful change, 26.3 % improved, and 26.3 % deteriorated. For argument intensity, baseline to post-treatment RCI classifications were: 45 % recovered, 10 % improved, 30 % no change, and 15 % deteriorated. From baseline to post-treatment, on at least one index of home conflict, 85 % of participants showed improvement and 70 % showed either meaningful change or recovery.

Predictors of Improvement We conducted investigatory hierarchical multiple regression analyses using baseline ODD ($M=1.31$, $SD=0.73$) and parent ASRS ($M=1.53$, $SD=0.79$) scores to predict RCI for IC-a quantity and intensity. In both models, baseline IC-a scores were entered at the first step. For IC-a quantity, results at Step 1 indicated that higher baseline conflict ($b=0.06$, $SE=0.01$, $\beta=0.77$, $p<0.01$) was

Table 3 Parent report of home arguments before and after the STP-A

	Average quantity				Average intensity			
	Baseline	Post-Tx	ES/RCI	Class	Baseline	Post-Tx	ES/RCI	Class
Sample moments:	18.66 (12.08)	12.24 (7.74)	0.53		2.85 (0.89)	2.26 (0.80)	0.66	
Case ID								
42001	8.00	3.33	0.39	I	2.30	1.44	0.96	R
42002	8.00	5.00	0.25	I	4.33	3.67	0.75	I
42003	17.50	13.67	0.32	I	3.14	3.33	−0.22	D
42004	39.00	7.50	2.61	MC	1.80	1.27	0.60	R
42007	33.00	16.33	1.38	MC	3.71	2.58	1.28	R
42008	27.00	19.67	0.61	MC	3.17	3.03	0.16	NC
42009	21.00	7.00	1.16	MC	1.55	1.30	0.28	R
42011	20.00	7.00	1.08	MC	4.23	3.47	0.85	I
42012	15.67	9.67	0.50	MC	1.83	1.07	0.07	NC
42013	1.00	4.67	−0.30	D	3.00	2.50	0.56	R
42014	30.00	9.67	1.68	MC	4.43	1.91	2.83	R
42015	31.50	24.67	0.57	MC	2.83	2.71	0.13	NC
42016	9.00	13.00	−0.33	D	1.82	2.32	−0.57	D
42017	34.00	31.33	0.22	I	2.67	1.90	0.86	R
42018	32.50	6.33	2.17	MC	1.84	1.70	0.16	NC
42019	3.00	6.33	−0.28	D	3.33	1.17	2.43	R
42020	16.00	18.67	−0.22	D	2.90	2.96	−0.07	NC
42022	19.00	14.33	0.39	I	2.38	2.27	0.12	NC
42023	8.00	22.00	−1.16	D	2.25	2.78	−0.60	D
42027[a]	–	–	–		3.44	1.17	2.56	R

Sample moments represent *M, SD*, and Cohen's *d*

R recovered (intensity only); *MC* meaningful change (quantity only); *I* improved; *NC* no change; *D* deteriorated

[a] Quantity data not available for 42027 at baseline

significantly associated with a positive RCI [R^2=0.59, F(1,17)=24.52, p<0.01]. Neither ODD nor parent ADHD were significant predictors at Step 2 and the test of change was non-significant [$R^2\Delta$=0.10, $F\Delta$(2,15)=2.26, p=0.14]. For IC-a intensity, Step 1 indicated that higher baseline conflict (b=0.64, SE=0.21, β=0.59, p=0.01), was significantly associated with a positive RCI [R^2=0.34, F(1,18)=9.41, p=0.01]. Neither ODD nor parent ADHD were significant predictors at Step 2 and the test of change was non-significant [$R^2\Delta$=0.04, $F\Delta$(2,16)=0.46, p=0.64]. Thus, for IC-a quantity and intensity, adolescents with more severe conflict behavior at baseline made larger improvements during the STP-A. Adolescent ODD severity and parent ADHD severity did not significantly impact treatment effects.

Medication Use Forty-five percent of participants received stimulant medication steadily through baseline, the STP, and post-treatment (see Table 1). We conducted exploratory multiple regression analyses for quantity and intensity RCIs, entering baseline conflict scores at Step 1 and stimulant medication use (0 = no, 1 = yes) as a dummy-coded variable at Step 2. For the quantity of arguments RCI, results indicated that after controlling for baseline conflict, stimulant medication use (b=−0.66, SE=0.27, β=−0.36, p=0.03) was associated with lower RCIs [$R^2\Delta$=0.11, $F\Delta$(1,16)=5.99, p=0.03]. Results indicated no relationship between stimulant medication use and argument intensity RCI.

Patterns of Deterioration Six adolescents showed deteriorated functioning from baseline to post-treatment. Table 4 displays weekly IC-a scores from baseline, the STP-A, and post-treatment for participants with statistically significant negative RCIs. A similar pattern of response (see Table 4) emerged for 83.3 % of deteriorated participants: participants displayed steady increases in IC-a severity scores (i.e., quantity and/or intensity) followed by steady decreases in these scores. However, by the end of the measurement period, scores still exceeded baseline estimates. In other words, these participants appeared to display an extinction burst that was not resolved by the end of the STP-A.

Table 4 Patterns of home conflict amongst deteriorated participants

	Argument Frequency during STP-A	Argument Intensity during STP-A
42003	Improved	
42013		Recovered
42016		
42019		Recovered
42020		No Change
42023		

Graphs display weekly Issues Checklist Data for participants with deteriorated functioning. Data was collected at baseline, during the STP-A, and post-treatment

Discussion

The primary findings of this study were that: (a) adolescents with ADHD and their parents reported arguing about a range of issues at an elevated intensity prior to the STP-A, (b) home-conflict decreased from baseline to post-treatment with reliable change for 70–85 % of families, (c) higher conflict at baseline was associated with greater improvements during the STP-A, and (d) treatment non-responders tended to display unresolved extinction bursts during the STP-A, indicating a need for further implementation of behavioral approaches. We discuss each of these findings below.

At baseline (see Table 2), dyads reported two to three daily arguments of above average intensity each day (Prinz

et al. 1979). Noncompliance, disrespectful comments to parents, and fighting with siblings emerged as the most frequent and intense parent–adolescent arguments. These topics reflect home behavior problems frequently exhibited by children with ADHD (Johnston and Mash 2001) and our findings suggest that these behavior problems are also impairing in adolescence. Adolescents and parents reported similar levels of home-conflict, which is contrary to previous findings that adolescents with ADHD under-report their behavior problems (Fischer et al. 1993; Sibley et al. 2010). It may be the case that IC items, which are worded to query the dyad's mutual behavior and do not attribute blame for arguments, elicit more accurate responses from adolescents than standard self-report rating scales. In support of this hypothesis, Pelham and colleagues (2012) reported that adolescents with ADHD reported higher levels of home conflict than their parents.

After attending the STP-A (see Table 3), 70–85 % of adolescents displayed reliable improvement in home-conflict behavior with parents. Previous attempts to improve home conflict in adolescents with ADHD indicated reliable improvement rates below 30 % (Barkley et al. 1992b, 2001; Pelham et al. 2012). We attribute our higher improvement rates to the intensity and setting of treatment: parents and adolescents were given 8 weeks of continuous practice implementing behavioral skills at home with daily feedback from STP-A staff. Home behavior problems displayed by adolescents with ADHD (Barkley et al. 1992a) appear to be more intractable than those of children with ADHD. Therefore, more intensive treatments, such as the STP-A, may be necessary to garner meaningful treatment effects. Behavioral treatments can also be difficult to implement with adolescents, who possess the cognitive maturity to challenge home interventions and effectively resist their implementation. Thus, when implementing behavioral treatments, parents of adolescents may require more therapist support than parents of younger children.

Baseline home conflict severity, but not adolescent ODD or parent ADHD, predicted treatment response. A previous evaluation of the STP-A (Sibley et al. 2012) suggested that adolescent ODD severity was associated with diminished response to treatment. Furthermore, parent ADHD is noted as an interfering factor in parent-based behavioral treatment programs for ADHD (Evans et al. 1994; Sonuga-Barke et al. 2002). However, our findings suggest that families' response to treatment occurred independent of these parent and adolescent characteristics. In fact, more impaired dyads appeared to benefit most from the STP-A. The STP-A presents parents with a well-organized blueprint for implementing a home behavioral contract. This approach may be most helpful to families who struggle with organization and maintaining structure in the home.

With respect to stimulant medication, our findings indicate that medicated adolescents engaged in fewer arguments at baseline, and subsequently displayed lower RCIs post-treatment. Although previous work suggests that stimulant medication does not directly improve parent–adolescent conflict behaviors (Pelham et al. 2012), it may indirectly reduce arguments by improving disruptive behavior (Evans et al. 2001; Smith et al. 1998), which is the source of most home arguments (see Table 2). Therefore, behavioral treatment effects may be smaller for medicated adolescents who displayed lower levels of disruptive behavior across measurement phases. Of course, our evaluation of medication effects was uncontrolled so it is also possible that extraneous variables associated with medication use contributed to its prediction of RCI. For example, adolescents with ADHD often refuse to take stimulant medication (Biswas et al. 2009). Thus, adolescents who are willing to receive stimulant medication may be more generally compliant with adult requests than their unmedicated peers.

Some dyads (15–30 %) did not display measurable improvement in home-conflict following the STP-A. Most participants who displayed deterioration (5 out of 6 %) exhibited an increase in home-conflict within the first 2 weeks of the STP-A. Following this burst, four participants showed a trend of decreasing home-conflict over the course of the STP-A, but demonstrated post-treatment conflict that exceeded baseline levels. Two participants displayed steady decreases in home-conflict behavior during the STP-A, but a sudden increase after the intervention terminated. Although we can only speculate, our clinical observations suggest that the former trend may emerge when parents and adolescents avoid interacting with each other (during baseline) to prevent conflict. Little conflict is reported at baseline, but when the STP-A requires dyads to implement a home behavioral contract, conflict emerges by nature of increased interactions. With respect to the latter trend, we observed that some parents struggled to maintain home interventions after the STP-A. In these cases, conflict may have increased when the structure of the STP-A and daily staff support was removed. Both patterns suggest that these cases needed further treatment to facilitate transfer of therapeutic gains post-STP-A.

This study possesses important limitations. First, our small sample size (N=20) limited our power, preventing detection of small and medium treatment effects in regression analyses. Second, multiple reports of baseline home-conflict behavior were only available for 45 % of participants, which may have reduced the stability of baseline home-conflict estimates. We also were unable to procure a recovery benchmark for the IC quantity variable using traditional methods (Jacobson et al. 1999), as typically developing teens display normative elevations in the home conflict quantity (Prinz et al. 1979). Because the STP-A was offered as a clinical service, participating families tended to be middle-class, educated, and likely possessed

high treatment motivation. Finally, without a control group, it is not possible to ascertain whether changes from baseline to post-treatment were a function of time or maturation.

Despite these limitations, we believe our study suggests the promise of the STP-A as an intervention to improve parent–adolescent conflict. Adolescents with ADHD display notorious resistance to medication and psychosocial treatments (Barkley 2004; Biswas et al. 2009; Smith et al. 2000). Therefore, successful treatment delivery in this population is encouraging. It is our hope that future investigations with larger, controlled, samples will continue to evaluate intensive, parent-involved treatment programs for adolescents with ADHD. It is our belief that a high dose of treatment and intensive work with parents is often necessary to create meaningful therapeutic gains for adolescents with ADHD. However, future intervention development is needed to promote maintenance of therapeutic gains after treatment terminates.

References

Adler, L. A., Spencer, T., Faraone, S. V., Kessler, R. C., Howes, M. J., Biederman, J., et al. (2006). Validity of pilot adult ADHD self-report scale (ASRS) to rate adult ADHD symptoms. *Annals of Clinical Psychiatry, 18*, 145–148.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders (4th ed-TR)*. Washington, DC: Author.

Anderson, J. C., Williams, S., McGee, R., & Silva, P. (1987). DSM-III disorders in preadolescent children. *Archives of General Psychiatry, 44*, 69–76.

Atkins, D. C., Bedics, J. D., Mcglinchey, J. B., & Beauchaine, T. P. (2005). Assessing clinical significance: does it matter which method we use? *Journal of Consulting and Clinical Psychology, 73*, 982–989.

Babinski, D. E., Pelham, W. E., Molina, B. S. G., Gnagy, E. M., Waschbusch, D. A., Wymbs, B. T., et al. (2012). Maternal ADHD and psychosocial functioning of mothers of adolescents with ADHD. *Journal of Attention Disorders.*

Barkley, R. (2004). Adolescents with attention-deficit/hyperactivity disorder: an overview of empirically based treatments. *Journal of Psychiatric Practice, 10*, 39–56.

Barkley, R., Fischer, M., Edelbrock, C., & Smallish, L. (1990). The adolescent outcome of hyperactive children diagnosed by research criteria: I. An 8-year prospective follow-up study. *Journal of the American Academy of Child & Adolescent Psychiatry, 29*, 546–557.

Barkley, R. A., Anastopoulos, A. D., Guevremont, D. C., & Fletcher, K. E. (1992a). Attention deficit hyperactivity disorder in adolescents: mother-adolescent interactions, family beliefs and conflicts, and maternal psychopathology. *Journal of Abnormal Child Psychology, 30*, 263–288.

Barkley, R. A., Guevremont, D. C., Anastopoulos, A. D., & Fletcher, K. E. (1992b). A comparison of three family therapy programs for treating family conflicts in adolescents with attention-deficit hyperactivity disorder. *Journal of Consulting and Clinical Psychology, 60*, 450–462.

Barkley, R. A., Edwards, G. H., & Robin, A. L. (1999). *Defiant teens: A clinicians manual for assessment of family intervention*. New York: Guilford Press.

Barkley, R., Edwards, G., Laneri, M., Fletcher, K., & Metevia, L. (2001). The efficacy of problem-solving communication training alone, behavior management training alone, and their combination for parent–adolescent conflict in teenagers with ADHD and ODD. *Journal of Consulting and Clinical Psychology, 69*, 926–941.

Biswas, A., Gnagy, E, Molina, B., & Pelham, W. (2009). *Examining the decline of treatment usage in adolescents with Attention Deficit Hyperactivity Disorder*. Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, New York, NY.

Botvin, G. J. (2004). *Life skills training: Middle school*. White Plains: Princeton Health Press.

Cantwell, D. P. (1986). Attention deficit disorder in adolescents. *Clinical Psychology Review, 6*, 237–247.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale: Erlbaum.

Edwards, G., Barkley, R., Laneri, M., Fletcher, K., & Metevia, L. (2001). Parent–adolescent conflict in teenagers with ADHD and ODD. *Journal of Abnormal Child Psychology., 29*, 557–572.

Evans, S. W., Vallano, G., & Pelham, W. (1994). Treatment of parenting behavior with a psychostimulant: a case study of an adult with attention-deficit hyperactivity disorder. *Journal of Child and Adolescent Psychopharmacology, 4*(1), 63–69.

Evans, S., Pelham, W., Smith, B., Bukstein, O., Gnagy, E., Greiner, A., et al. (2001). Dose–response effects of methylphenidate on ecologically valid measures of academic performance and classroom behavior in adolescents with ADHD. *Experimental and Clinical Psychopharmacology, 9*, 163–175.

Evans, S. W., Sibley, M. H., & Serpell, Z. N. (2009). Changes in caregiver strain over time in young adolescents with ADHD. *Journal of Attention Disorders, 12*, 516–524.

Fabiano, G. A., Pelham, W. E., Waschbusch, D. A., Gnagy, E. M., Lahey, B. B., Chronis, A. M., et al. (2006). A practical measure of impairment: psychometric properties of the Impairment Rating Scale in samples of children with attention deficit hyperactivity disorder and two school-based samples. *Journal of Clinical Child and Adolescent Psychology, 35*, 369–385.

Farrell, A. D., & White, K. S. (1998). Peer influences and drug use among urban adolescents: family structure and parent–adolescent relationship as protective factors. *Journal Of Consulting And Clinical Psychology, 66*, 248–258.

Fischer, M., Barkley, R., Fletcher, K., & Smallish, L. (1993). The stability of dimensions of behavior in ADHD and normal children over an 8-year followup. *Journal of Abnormal Child Psychology, 21*, 315–337.

Fletcher, K. E., Fischer, M., Barkley, R. A., & Smallish, L. (1996). A sequential analysis of the mother–adolescent interactions of ADHD, ADHD/ODD, and normal teenagers during neutral and conflict discussions. *Journal of Abnormal Child Psychology, 24*, 271–297.

Hsu, L. M. (1999). Caveats concerning comparisons of change rates obtained with five methods of identifying significant client changes: comment on Speer and Greenbaum (1995). *Journal of Consulting and Clinical Psychology, 67*, 594–598.

Jacobson, N. S., Roberts, L. J., Berns, S. B., & McGlinchey, J. B. (1999). Methods for defining and determining the clinical significance of treatment effects: description, application, and alternatives. *Journal of Consulting and Clinical Psychology, 67*(3), 300–307.

Johnston, C., & Mash, E. J. (2001). Families of children with Attention-Deficit/Hyperactivity Disorder: Review and recommendations for future research. *Clinical Child And Family Psychology Review, 4*, 183–207.

Kazdin, A. E. (1977). Assessing the clinical or applied importance of behavior change through social validation. *Behavior Modification, 1*, 427–452.

Larson, R. W., Richards, M. H., Moneta, G., Holmbeck, G., & Duckett, E. (1996). Changes in adolescents' daily interactions with their families from ages 10 to 18: disengagement and transformation. *Developmental Psychology, 32*, 744–754.

Laurensen, B., Coy, K., & Collins, A. (1998). Reconsidering changes in parent–child conflict across adolescence: a meta-analysis. *Child Development, 69*, 817–832.

Mannuzza, S., Gittelman-Klein, R., Bessler, A., Malloy, P., & LaPadula, M. (1993). Adult outcome of hyperactive boys: educational achievement, occupational rank, and psychiatric status. *Archives of General Psychiatry, 50*, 565–576.

Martin, G., & Pear, J. (1996). *Behavior modification: What it is and how to do it* (5th ed.). Englewood Cliffs: Prentice-Hall.

Mikami, A., Hinshaw, S. P., Arnold, L., Hoza, B., Hechtman, L., Newcorn, J. H., et al. (2010). Bulimia nervosa symptoms in the multimodal treatment study of children with ADHD. *International Journal of Eating Disorders, 43*, 248–259.

Moffitt, T., & Caspi, A. (2001). Childhood predictors differentiate life-course persistent and adolescence-limited antisocial pathways among males and females. *Development and Psychopathology, 13*, 355–375.

Molina, B. S. G., Smith, B. H., & Pelham, W. E. (2001). Factor structure and criterion validity of secondary school teacher ratings of ADHD and ODD. *Journal of Abnormal Child Psychology, 29* (1), 71–82.

Molina, B. S. G., Pelham, W. E., Gnagy, E. M., Thompson, A. L., & Marshal, M. P. (2007). Attention-deficit/hyperactivity disorder risk for heavy drinking and alcohol use disorder is age specific. *Alcoholism: Clinical and Experimental Research, 31*, 643–654.

Montemayor, R., & Hanson, E. (1985). A naturalistic view of conflict between adolescents and their parents and siblings. *Journal of Early Adolescence, 5*, 23–30.

Patterson, G. R., & Forgatch, M. S. (1987). *Parents and adolescents: Living together, The Basics*. Eugene, OR: Castalia.

Pelham, W. E., Evans, S. W., Gnagy, E. M., & Greenslade, K. E. (1992a). Teacher ratings of DSM-III-R symptoms for the disruptive behavior disorders: prevalence, factor analyses, and conditional probabilities in a special education sample. *School Psychology Review, 21*(2), 285–299.

Pelham, W., Gnagy, E., Greenslade, K., & Milich, R. (1992b). Teacher ratings of DSM-III-R symptoms for the disruptive behavior disorders. *Journal of the American Academy of Child & Adolescent Psychiatry, 31*, 210–218.

Pelham, W. E., Sibley, M. H., Evans, S. W., Smith, B. H., Gnagy, E. M., & Greiner, A. R. (2010). *Summer treatment program for adolescents.* Available from authors.

Pelham, W. E., Meichenbaum, D., Smith, B., Sibley, M. H., Gnagy, E., & Bukstein, O. (2012). The effect of MPH on parent-directed conflict behavior in adolescents with ADHD. *Paper submitted for publication.*

Pillow, D. R., Pelham, W. E., Hoza, B., Molina, B. S. G., & Stultz, C. H. (1998). Confirmatory factor analyses examining attention deficit hyperactivity disorder symptoms and other childhood disruptive behaviors. *Journal of Abnormal Child Psychology, 26*, 293–309.

Prinz, R. J., Foster, S. L., Kent, R. N., & O'Leary, K. D. (1979). Multivariate assessment of conflict in distressed and nondistressed mother–adolescent dyads. *Journal of Applied Behavior Analysis, 12*, 691–700.

Robin, A. L., & Koepke, T. (1990). Behavioral assessment and treatment of parent–adolescent conflict. *Annual Review of Psychology, 25*, 178–215.

Robin, A. L., & Weiss, J. G. (1980). Criterion-validity of behavioral and self-report measures of problem-solving communication skills in distressed and non-distressed parent–adolescent dyads. *Behavioral Assessment, 2*, 339–352.

Shek, D. L. (1997). The relation of family functioning to adolescent psychological well-being, school adjustment, and problem behavior. *Journal of Genetic Psychology, 158*, 467–479.

Sibley, M. H., Pelham, W. E., Molina, B. S. G., Waschbusch, D. A., Gnagy, E., Babinski, D. E., et al. (2010). Inconsistent self-report of delinquency by adolescents and young adults with ADHD. *Journal of Abnormal Child Psychology, 38*, 645–656.

Sibley, M. H., Pelham, W. E., Evans, S. W., Gnagy, E. M., Ross, J. M., & Greiner, A. R. (2011). Evaluation of a summer treatment program for adolescents with attention deficit/hyperactivity disorder. *Cognitive and Behavioral Practice, 18*, 530–544.

Sibley, M. H., Smith, B. H., Evans, S. W., Pelham, W. E., & Gnagy, E. M. (2012). Treatment response to an intensive adolescent-directed intervention for ADHD. *Journal of Attention Disorders, 16*, 443–448.

Smith, B. H., Pelham, W. E., Evans, S. W., Gnagy, E., Molina, B. S. G., Bukstein, O. G., et al. (1998). Dosage effects of methylphenidate on the social behavior of adolescents diagnosed with attention-deficit hyperactivity disorder. *Experimental and Clinical Pscyhopharmacology, 6*, 187–204.

Smith, B., Waschbusch, D., Willoughby, M., & Evans, S. (2000). The efficacy, safety and practicality of treatments for adolescents with attention-deficit/hyperactivity disorder (ADHD). *Clinical Child and Family Psychology Review, 3*, 243–267.

Sobanski, E., Banaschewski, T., Asherson, P., Buitelaar, J., Chen, W., Franke, B., et al. (2010). Emotional lability in children and adolescents with attention deficit hyperactivity disorder (ADHD): clinical correlates and familial prevalence. *Journal of Child Psychology and Psychiatry, 51*, 915–923.

Sonuga-Barke, E. S., Daley, D., & Thompson, M. (2002). Does maternal ADHD reduce the effectiveness of parent training for preschool children's ADHD? *Journal of the American Academy of Child & Adolescent Psychiatry, 41*, 696–702.

Steinberg, L. (2001). We know some things: parent–adolescent relationships in retrospect and prospect. *Journal of Research On Adolescence, 11*, 1–19.

Steinberg, L., & Morris, A. S. (2001). Adolescent development. *Annual Review of Psychology, 52*, 83–110.

Wechsler, D. (2002). *Wechsler individual achievement tests* (2nd ed.). San Antonio: The Psychological Corporation.

Wehmeier, P. M., Schacht, A., & Barkley, R. A. (2010). Social and emotional impairment in children and adolescents with ADHD and the impact on quality of life. *Journal of Adolescent Health, 46*, 209–217.

Weschler, D. (1999). *Wechsler abbreviated scale of intelligence*. New York: Psychological Corporation.

Wright, K. D., Waschbusch, D. A., & Frankland, B. W. (2007). Combining data from parent ratings and parent interview when assessing ADHD. *Journal of Psychopathology and Behavioral Assessment, 29*, 141–148.