Published in final edited form as:

J Abnorm Child Psychol. 2014 April ; 42(3): 383–398. doi:10.1007/s10802-013-9724-1.

Evaluation of a Booster Intervention Three Years after Acute Treatment for Early-Onset Disruptive Behavior Disorders

David Kolko, Ph.D., ABPP,

Western Psychiatric Institute and Clinic, University of Pittsburgh School of Medicine, 3811 O'Hara Street, Pittsburgh, PA 15213, Phone: 412-246-5888

Oliver Lindhiem, PhD,

University of Pittsburgh School of Medicine, Department of Psychiatry, 3811 O'Hara Street, Pittsburgh, PA 15213, Phone: 412-246-5909

Jonathan Hart, MS, and

University of Pittsburgh Medical Center, Pittsburgh, PA 15213, Phone: 412-246-5895

Oscar G. Bukstein, MD, MPH

University of Texas Health Sciences Center at Houston, Dept. of Psychiatry, Houston, TX 77030, Phone: 713-486-2611

David Kolko: kolkodj@upmc.edu; Oliver Lindhiem: lindhiemoj@upmc.edu; Jonathan Hart: hartj2@upmc.edu; Oscar G. Bukstein: Oscar.G.Bukstein@uth.tmc.edu

Abstract

This study examines the impact of a brief booster treatment administered three years after the delivery of an acute treatment in a group ($N = 118$) of clinically referred boys and girls (ages 6 to 11) originally diagnosed with Oppositional Defiant Disorder (ODD) or Conduct Disorder (CD). At the conclusion of the acute treatment and three-year follow-up period (i.e., study month 42), the sample was re-randomized into Booster treatment or Enhanced Usual Care and then assessed at four later timepoints (i.e., post-booster, and 6-, 12- and 24-month booster follow-up). Booster treatment was directed towards addressing individualized problems and some unique developmental issues of adolescence based on the same original protocol content and treatment setting, whereas the no-booster condition involved providing clinical recommendations based on the assessment and an outside referral for services. HLM analyses identified no significant group differences and few time effects across child, parent, and teacher reports on a broad range of child functioning and impairment outcomes. Analyses examining the role of putative moderators or mediators (e.g., severity of externalizing behavior, dose of treatment) were likewise non-significant. We discuss the nature and implications of these novel findings regarding the role and timing of booster treatment to address the continuity of DBD over time.

Keywords

Booster Treatment; Maintenance Treatment; Treatment of Disruptive Behavior Disorders; Conduct Disorder; Oppositional Defiant Disorder; Outcome Studies; Clinical Trials

Numerous evidence-based treatments (EBTs) that teach skills to caregivers and their children have been conducted in clinic and community settings to treat children's externalizing problems or disruptive behavior disorders (DBD). Studies evaluating these

EBTs have reported significant improvements in various behavior problems (Mean effect sizes [ES] = .40 – .49; see McCart, Priester, Davies, & Azen, 2006), many of which have reported maintenance effects. These significant improvements notwithstanding, limited initial response or remission rates have been reported (Eyberg, Nelson, & Boggs, 2008; Weisz, Jensen-Doss, & Hawley, 2006), with low to high rates of non-response found for preschoolers (25%; Reid, Webster-Stratton, & Hammond, 2003) and school age children (57–78%; Kazdin, Bass, Siegel, & Thomas, 1989; 63%; Luk et al., 2001). Similarly, low to high remission rates have been reported for ODD (31–57%; Kolko et al., 2009; 50%; Nelson-Gray et al., 2006) which is consistent with persistence rates from longitudinal studies showing persistence for ODD (57%; August, Realmuto, Joyce, & Hektner, 1999) and CD (88%; Lahey, Loeber, Burke, Rathouz, & McBurnett, 2002). Thus, there is room for improvement in treatment response and maintenance in DBD.

Besides their temporal persistence, behavior problems contribute to adolescent dysfunction, including delinquency, physical and sexual aggression/violence (Broidy et al., 2003), substance use/abuse (Pardini & Fite, 2010), internalizing problems, especially suicidality and self-injury (Brent et al., 2002; Pardini & Fite, 2010), and academic problems (Fergusson, Boden, & Horwood, 2010), all of which reflect refractory problems. For example, gun access may be a risk factor for continued antisocial behavior, gang membership, and street crime, and, ultimately, a predictor of poor treatment outcome (Loeber, Farrington, Stouthamer-Loeber, & Van Kammen, 1998). Likewise, CD and impulsive aggression may predict suicide attempts (see Brent et al., 2002). Because of their increased risk for dysfunctional and deviant outcomes in adolescence, behavior problems may reflect a chronic or recurrent condition (Kazdin, 2002).

The persistence of child behavior problems and their role in the development of later clinical problems highlights the need to enhance the maintenance of acute treatment gains. The notion of treatment continuity is a fundamental principle of a chronic care model that emphasizes the provision of ongoing or intermittent services (Kazdin, 2002). Indeed, efforts to maximize the benefits of initial treatment include extending treatment into a maintenance period or conducting booster sessions during follow-up that occur either immediately or after a longer delay (see Eyberg, Edwards, Boggs, & Foote, 1998). Numerous studies with adults show the benefits of maintenance therapies or booster sessions (Dunner et al., 2007; Frank et al., 2007; Petersen et al., 2010), with some exceptions (Hodgins, Currie, Currie, & Fick, 2009).

Fewer studies have examined the role of maintenance treatment in children and adolescents extend the durability of treatment effects which have generally reflected booster sessions administered immediately or up to one year after acute treatment (Eyberg et al., 1998; Eyberg et al., 2008). Clarke, Rohde, Lewinsohn, Hops, and Seeley (1999) reported perhaps the most rigorous application of an integrated booster treatment conducted *immediately* after acute treatment (group CBT with or without a parent group vs. wait-list control) in which treated depressed adolescents were re-randomized to one of three maintenance enhancement conditions: 1) assessments every four months with booster sessions (1–2 group meetings for skills training), 2) assessments every four months, and 3) assessments every 12 months. Although booster sessions did not reduce recurrence rates in follow-up, they accelerated recovery in those who remained depressed after acute treatment.

A few studies with DBD children have evaluated booster or maintenance treatment applied *well after* acute treatment has ended, with one small report evaluating booster sessions three-years later (Edwards, 1998). Lochman (1992) found that booster sessions (about 6 weekly child groups and 5 parent-training workshops) with a small subgroup ($n = 12$) of aggressive boys who had received a school-based anger-coping intervention and parent-management

groups one year earlier were associated with greater maintenance of classroom behavior improvement, but not of other gains (e.g., general deviance, substance use). A larger study by Tolan et al. (2009) randomized at-risk children who had received an initial family focused prevention program focusing on educational and behavioral development (SAFEChildren) to a booster or no-booster intervention one year after the original intervention. The booster condition was associated with greater one-year improvement in child impulsivity, but not in other domains (i.e., academic achievement, aggression, hyperactivity, social skills, parenting practices, family cohesion). The effects of booster intervention varies by externalizing behavior (e.g., reduced impulsivity among children with lower initial aggression) and family risk (e.g., better family structure for those with lower family risk), suggesting the presence of treatment moderation.

These few applications with children provide suggestive evidence of the potential benefits of booster intervention on treatment maintenance (Eyberg et al., 2008), but it is worth noting that they were based primarily on group-based interventions, conducted in classrooms, and directed towards high-risk populations, began shortly after acute treatment ended, and involved an extended time period (1–2 yrs.). Because the booster condition was contiguous with acute treatment and lengthy in duration, it is unclear if booster treatments applied in the long-run are similarly efficacious. In addition, only two of these studies were randomized trials (Clarke et al., 1999; Tolan et al., 2009) and most included young samples that had not yet reached the age of heightened risk for delinquency. Thus, studies are needed to understand the timing, scope, and effects of booster treatment methods in clinically referred DBD children.

Current Study

This study evaluates the efficacy of a brief but flexibly-tailored booster treatment designed to maintain existing gains and prevent other adverse outcomes in the same clinically referred sample of children whose acute treatment in the community (COMM) or a clinic (CLINIC) was completed three years earlier (Kolko, Dorn, Bukstein, & Burke, 2008; Kolko et al., 2009). Results evaluating the acute treatment phase revealed significant improvements in the severity of behavioral dysfunction (e.g., externalizing behavior, hyperactivity) and individualized goals for COMM and CLINIC, but no significant group differences. By 3-year follow-up, 37% of COMM and 47% of CLINIC patients no longer met criteria for either ODD or CD, and 48% and 57% of those in the two respective conditions had levels of externalizing behavior problems in the normal range. The inclusion of clinical measures from several informants (e.g., psychopathic features) collected at study intake, after acute treatment, and during the three-year follow-up prior to the booster phase was expected to enrich the use of multivariate models designed to evaluate the children's outcomes after the booster phase. The study provides a unique opportunity to examine the incremental benefit of an extended follow-up booster treatment (vs. Enhanced Usual Care [EUC]) on measures from several domains across a two-year follow-up.

Hypotheses

We hypothesized that Booster treatment (vs. EUC) would be associated with 1) greater maintenance of gains on original outcomes collected since the study began (e.g., fewer child behavior problems, higher adjustment), and 2) greater gains on adolescent preventive outcomes collected during the booster phase (e.g., delinquent and violent activities, sexual aggression, suicidality, school problems). In addition, the study explores four potential moderators of outcome (i.e., initial severity of externalizing problems, comorbidity, acute treatment condition, acute treatment response) based on prior work (Eacott & Frydenberg, 2009; Tolan et al., 2009) and three putative child predictors of outcome (i.e., child age,

trauma history, callous unemotional traits) based on reviews of the treatment literature (see Lundahl, Risser, & Lovejoy, 2006; Reyno & McGrath, 2006).

Method

Participants

Of the 139 initial patient participants, 129 (93%) were still participating at the acute treatment 36-month follow-up assessment (i.e., 42 months since the start of the study) which served as the pre-booster assessment timepoint for the current study. Of these 129 patients, 118 were willing to be re-randomized to a Booster treatment condition or Enhanced Usual Care. The other 11 cases were willing to participate in the booster phase assessments. There were no significant differences between those cases that were or were not randomized based on a Bonferroni-adjusted significance level ($p < .001$).

As shown in Table 1, the randomized sample was composed mostly of males with an average age of 12.5 years. Slightly more than one-half of them were African-American or biracial, and less than one-half lived with two married adults. About 70% of the children met criteria for ADHD; 46% and 15% met criteria for ODD or CD, respectively. Twenty percent of the children reported any history of interpersonal trauma based on the 4 items reflecting this construct on the Traumatic Events Screening Inventory (Ford et al., 1999). Mean family socioeconomic status score (Hollingshead 2-factor method) reflected a low to modest level of income. The sample included a comparable proportion of cases that were randomized to CLINIC or COMM in the acute treatment phase.

The Original Acute Treatment Phase (Kolko et al., 2009)

During the acute treatment phase of the study (Kolko et al., 2009), families were randomized to Community (COMM) or Clinic (CLINIC) treatment. Families in both conditions received the same primary treatment content, but the two conditions differed in the context (site) where services were conducted and the manner in which they were applied. CLINIC sessions were conducted in the project office, whereas COMM sessions were provided in the child's ecology (e.g., home, school, community). Thus, session content in some modules varied by setting (e.g., CLINIC made phone calls to the teacher, whereas COMM conducted school visits). The seven original content modules were adapted from our work with behavior disorders and abusive/aggressive families (Kolko, 1996; Kolko & Swenson, 2002) that has been recently incorporated into an intervention called Alternatives for Families: A Cognitive Behavioral Therapy (AF-CBT; see www.afcbt.org). The content reflected the following domains: (1) Child CBT/skills training (e.g., anger control, social skills); (2) medication for ADHD (e.g., rating scales, medication algorithm); (3) parent management training or PMT (e.g., reinforcement, punishment; see Fleischman, Horne, & Arthur, 1983); (4) parent-child/family therapy (e.g., communication, problem-solving skills), (5) school programming or consultation (e.g., program suggestions, individualized behavioral programs), (6) peer relations/community activities (e.g., peer group support), and (7) case/crisis management. (e.g., safety plans, family advocacy). Treatment ended once the family met its goals or chose to terminate services.

Current Study Conditions

All caregivers/children signed approved consent/assent forms. The acute treatment 36-month follow-up assessment (Kolko et al., 2009) served as the pre-booster training assessment timepoint for the current study. Children who participated in the 36-month acute treatment follow-up and agreed to participate in the booster treatment phase were randomized to either Booster treatment ($n = 59$) or EUC ($n = 59$), stratified by acute treatment condition (COMM; CLINIC). Children in the two booster phase conditions were

comparable on all of the demographic and family background variables listed in Table 1. Figure 1 outlines the participation status of these patients. In general, a high proportion of the sample completed follow-up assessments and the rates of retention in the two conditions were comparable.

Booster treatment—All cases re-randomized to this new condition received booster sessions in the same setting where they received acute treatment (i.e., community or clinic) and from a study therapist who had at least two years of experience delivering the content from the same treatment condition, but who did not deliver the treatment to that family during acute treatment. This latter requirement was a practical necessity given that several prior therapists had left the program by the time this phase was initiated. Booster treatment was designed to address three general goals: a) clarify current child and parent/family problems based on the pre-booster (i.e., 36-month acute treatment follow-up) assessment and family preferences regarding target problems, b) apply relevant old and/or new content modules in the protocol, and c) provide the family with clinical recommendations and information to promote maintenance in targeted outcomes to prevent any deterioration in clinical functioning.

A treatment plan was based on the identification of a new set of individualized goals. For each goal, the therapist could review prior content or administer newly revised material designed to address common adolescent issues (e.g., managing coercive or hostile family interactions, addressing deviant peer relations or peer pressure, promoting school attendance and homework completion, managing risky situations involving sexual activity, drug use, or gun or gang involvement). Age-appropriate methods (e.g., problem solving, contracting, rules, community activities) were applied to specific problematic situations identified by the family.

The dose and spacing of booster sessions also could vary due to case needs and preferences; specifically, treatment was administered until symptom or problem resolution was achieved, for up to a maximum dose of 15 hours of direct service. Cases that continued to exhibit heightened clinical dysfunction could receive updated treatment suggestions and/or referral to alternative services, such as those with anxiety or depression that was not responsive to booster treatment. Treatment integrity was monitored by a supervisor who completed ratings based on a review of case notes and session videotapes, consistent with the procedures used in the acute treatment phase. In that phase, integrity ratings reflected highly competent therapist performances (compliance ratings >90%), although the content to be administered during the booster phase could vary across cases to address different treatment targets.

Enhanced Usual Care (EUC)—All cases randomized to this condition participated in a review of the assessment results and treatment recommendations. Specifically, these families received a written summary of the 36-month follow-up evaluation, a referral letter that outlined the child's diagnoses, individualized goals, and some recommendations for treatment, a list of appropriate providers in the community, and a release signed by the assessor. The assessor also attempted to contact the outside referral source within two weeks of the initial referral to provide any information and answer any questions. Caregivers were contacted six months later to identify the names and contact information of any providers the child had seen for services.

Assessment Procedures

Questionnaires were administered at pre-booster assessment (i.e., acute phase 36-month follow-up), post-booster assessment six months later, and at 12-month and 24-month booster treatment follow-ups. Thus, the final booster phase 24-month follow-up was conducted six

years after the acute treatment phase baseline (month 72). Assessments with the child and primary caregiver (mostly mothers) were conducted by separate trained research assistants in the project office; teachers who knew the child best returned their questionnaires by mail. Diagnostic interviews were conducted by a trained, master's-level clinician. All research assessors and teachers were unaware of the child's treatment status.

Child and parent informants in the DBD groups were paid \$10 each for completing measures at intake. Teachers who completed an assessment received a \$10 gift certificate. Families were informed of our intention to re-assess all cases. We used several procedures to locate families (e.g., social security number, names of relatives, visits to last known address).

Treatment Parameters and Status at Discharge

Dose and content—The clinician completed a Services Provided Log that documented the details of each treatment contact (e.g., attendance, duration, procedures used). In addition to attendance rates, we report the duration of primary treatment provided in the first six protocol modules and of adjunctive services delivered (crisis, case management), based on similar measures in other studies (Burns, Farmer, Angold, Costello, & Behar, 1996).

Discharge summary—The Treatment Summary Report (TSR) was completed by clinicians to document impressions of the course and outcome of the case after treatment. The TSR included items that rated final case status at termination (e.g., completer), reasons for termination (e.g., successful treatment response), level of improvement on any targeted child behavior problems or any caregiver problems related to the child's behavior problems (e.g., negative parenting practices; 1–5 pt. Likert scales), any follow-up referral needed, and a listing of discharge recommendations (e.g., medication referral).

Consumer satisfaction—Parents completed the Client Satisfaction Questionnaire (CSQ-8) to evaluate general satisfaction with treatment at posttreatment (Attkisson & Greenfield, 1996). The CSQ-8 yields an overall score ($\alpha = .87$; scale range = 8–32).

Outcome Measures Continued from the Acute Treatment Phase

Individualized goal achievement ratings (IGAR-Acute)—Parents completed an interview in which they identified and then rated up to five individualized child problem behaviors to be targeted by treatment using an Individualized Goal Achievement Ratings (IGAR) form which was adapted from our prior outcome studies (Kolko, 1996, 2001). Each behavior was described and then rated for problem severity (1 = not at all; 7 = very serious). The IGAR was used to capture change in individualized treatment targets (e.g., “fighting with sister”). These goals were used by the therapist to guide treatment delivery and monitor treatment progress.

Child externalizing dysfunction—The primary caretaker completed the Child Behavior Checklist (CBCL) to assess an array of behavioral and emotional problems, and social competencies (Achenbach, 1991). Teachers completed the Teacher Report Form (TRF; Achenbach, 1991) to assess behavior problems at school. We report raw scores for the externalizing behavior scales (scale ranges = 0–68 for TRF; 0–66 for CBCL). The teacher also completed the Antisocial Processes Screening Device (APSD; Frick, 1994) to assess the interpersonal and affective features of psychopathy in youth. We report the 6-item callous/unemotional traits scale ($\alpha = .68$; scale range = 0–12).

DSM-IV diagnoses—The Schedule for Affective Disorders and Schizophrenia for School-Aged Children for DSM-IV—Present and Lifetime (K-SADS; J. Kaufman,

Birmaher, Brent, Rao, & Ryan, 1996; v. 10/1/96) diagnostic interview was administered to the child and caregiver to evaluate the presence of child psychiatric disorders. Inter-rater reliabilities at intake were moderate to high ($n = 71$; $k's = .74, .79, .83$) for the three primary disorders (ADHD, ODD, CD) and were high for a small sample of interviews ($n = 16$) conducted at pre-booster assessment ($k's = .85, .88, 1.00$). The measure yielded a symptom count for ODD and CD to reflect the total number of clinically significant DBD symptoms (scale range = 0–23).

Child impairment/competence—We computed the parent-rated CBCL total competence raw score (scale range = 0–28) to assess overall level of adaptive behavior and the academic competence subscale score (Achenbach, 1991). Parents also completed the 13-item Columbia Impairment Scale (CIS; Bird, Shaffer, Fisher, & Gould, 1993) to capture total child impairment in 4 areas of functioning (e.g., family, peer, work, school; scale range = 0–52). The CIS has good psychometrics and a clinical cutoff (15).

Preventive Outcome Measures Obtained During Booster Phase

New treatment goals for the booster phase (IGAR-Booster)—We administered the same IGAR interview during the booster phase to identify any new problems to be targeted by treatment. Each caregiver identified and then rated up to five new treatment targets on the same 7-pt scale. The individual targets were coded into the following five content themes: 1) ADHD-related (64.9%, 74/114); 2) ODD-related (75.4%, 86/114); 3) CD-related (48.2%, 55/114); 4) Miscellaneous child related problems (school, hygiene, social, etc.; 36.8%, 42/114); and 5) Miscellaneous parent/family related (sibling rivalry, parent child conflict; 65.8%, 75/114).

Antisocial behavior and gun ownership/possession—The Parent Daily Report (PDR) evaluates the severity of 31 child problem behaviors (0–2 pt. scale) in the home from different domains (e.g., aggression, immaturity, unsocialized, retaliation) as reported by parents (Chamberlain & Reid, 1987). The overall item mean score has good reliability and discriminant validity in clinical samples (Moore, Thompson-Pope, & Whited, 1994). We also included an item to capture gun ownership (Do you yourself have any sort of weapon like a handgun, pistol, revolver, shotgun, rifle, knife, club, bat?) or possession of a weapon (Do you yourself carry any of these weapons from your household with you for protection?) based on a prior measure (Loeber et al., 1998) which has good construct and predictive validity.

Deviant sexual behavior—Parents completed the 38-item Adolescent Sexual Behavior Inventory (ASBI) designed to evaluate several aspects of adolescent sexual behavior (Friedrich et al., 2001). The instrument has good reliability and validity with sexually abusive adolescents (Friedrich et al., 2001). We report the only factor that showed a modest distribution of scores in this sample (deviant sexual interests; $\alpha = .44$; scale range = 0–16) to reflect this domain.

Drug use—We administered the Substance Use Screening Interview (SUSI) to assess for the presence of nine categories of drug/substance use which was simplified from a related screening measure (Martin, Garske, & Davis, 2000). The adolescent was asked about any use (n/y), use within the past year, and amount of use in each category (e.g., alcohol, tobacco, marijuana, stimulants, opioids). We report the proportion of drug categories used ($\alpha = .70$).

Self-injurious behaviors—The 15-item Suicide Ideation Questionnaire (SIQ-JR) was completed to evaluate overall level of current suicidal ideation (W.M. Reynolds, 1987).

Items are rated on 7-pt. scales (0–6) and reflect suicide cognitions and their frequency over the past month (W. M. Reynolds & Mazza, 1999). The SIQ has a clinical-cut off (31) and strong psychometric properties, including test-retest reliability, and both predictive and discriminant validity (W. M. Reynolds & Mazza, 1999). For this study, the alpha was high ($\alpha = .88$; scale range = 15–105)

Posttraumatic stress symptoms—We administered the Trauma Symptom Checklist for Children (TSCC; Briere, 1996) to capture the severity of trauma-related symptoms they experience (0 = *never*; 3 = *almost all the time*). The TSCC provides norms (t -score $M = 50$; $SD = 10$) and clinical cutoff scores, and has good internal consistency, and concurrent and predictive validity (Nilsson, Wadsby, & Svedin, 2008). We report scores on the posttraumatic stress scale ($\alpha = .83$) given the role of trauma and conduct disorder (see Brent et al., 2002).

Service use and system involvement—Parents were interviewed using the Service Assessment for Children and Adolescents (SACA; Hoagwood et al., 2000) to identify any services received. The questions examine nine overnight (e.g., psychiatric hospital, group home), 12 outpatient (e.g., community mental health center, in-home therapy), and four school-based services (e.g., special school, counseling in school). Other questions examined any child welfare or juvenile court involvement. We report the proportion of cases reporting any services in each context in each assessment interval.

Data Analyses

Preliminary data analyses were conducted using SPSS (PASW 18). Our primary analyses to detect booster effects were conducted using hierarchical linear modeling (HLM; S. W. Raudenbush & Bryk, 2002) with time nested within participants. We used full maximum likelihood estimation for all models. The level 1 equations for the unconditional models were $Y_{ti} = \pi_{0i} + \pi_{1i} (\text{Booster Phase}) + \pi_{2i} (\text{Follow-up}) + e_{ti}$, where Y_{ti} is the observed outcome score at time t for participant i . The “Booster Phase” variable was coded 0, 1, 1, 1, and 1 for each on the five time points. This allowed for the estimated treatment slope to be interpreted as change from pre-booster phase to post-booster treatment. The “Follow-up” variable was coded 0, 0, 1, 2, and 4 for each of the five time points to allow for the estimated follow-up slope to be interpreted as the average amount of change in a six-month period during follow-up. To examine booster effects, booster phase condition was entered as a level-2 variable (Booster = “1”; EUC = “0”).

Given the large number of EUC cases that lacked data from the TSR on treatment parameters and service use, we conducted baseline equivalence analyses for those EUC cases that did ($n=23$) and did not ($n=36$) have these TSR data to look for differences in demographic variables or baseline versions of all outcome variables. After applying a Bonferroni correction for the number of tests, there were no significant differences between EUC cases with and without TSR data. A similar set of missing data analyses was run to compare all cases from both conditions that did ($n=43$) and did not ($n=75$) have complete data over all five assessments. There were no significant differences between cases with and without complete data over time

Moderator Effects

Exploratory moderator analyses were conducted by entering each moderator variable and a “moderator X booster condition” interaction term at level-2. The four variables that we examined were, 1) acute treatment setting, 2) response to acute treatment phase, 3) severity of externalizing problems at the beginning of the booster phase, and 4) number of comorbid conditions. Acute treatment setting was defined as either clinic (coded “1”) or community

(coded “0”). Response to the acute phase of treatment was operationalized as the difference between the pre and post score for each variable from the acute phase of treatment (Acute Pre minus Acute Post). This moderator variable could only be examined for variables obtained the initial study (i.e. acute phase and initial follow-up). Severity at the start of the booster phase was defined as the score on the outcome variable at the beginning of this phase (Acute FU36/Pre-Booster). The number of comorbid conditions was operationalized as the number of Axis I disorders identified at the start of the booster phase (Acute FU36/Pre-Booster).

Predictors of Outcome

We also conducted a piecewise model in HLM to examine overall predictors of three key outcomes: CBCL externalizing problems, overall average IGAR ratings, and the total number of symptoms of ODD and CD. Since two of the three predictor variables were skewed or had a cutoff score, they were dichotomized, as follows: child age at the pre-booster phase pre-assessment (9–11 vs. 12–15), callous-unemotional traits on the APSD (median split at ≥ 8), and the presence of any interpersonal trauma from the four relevant items on the TESI. Condition was not entered as part of the HLM models. Each of the three key outcomes was predicted separately by a model that included all of the three predictors in the model simultaneously.

Results

Preliminary Analyses and Descriptive Statistics

Demographic and descriptive variables for participants in each of the two conditions are summarized in Table 1. The two groups did not differ on any variable, and all $ps > .05$. Means and standard deviations for each of the primary outcome measures at each time point are summarized in Table 2. Bivariate correlations between each of the variables at the acute 36-month follow-up/pre-booster assessment are presented in Table 3. In general, most of the correlations were in the low to modest range.

Booster Phase Treatment Parameters

We first summarized the treatment parameters documented on the TSR by study clinicians ($n = 57$) whose booster treatment was documented in the medical record after each session and by a subset of outside providers who accepted the case upon referral and were willing to provide us with this information ($n = 23$). There were no significant group differences between those EUC cases with vs. without TSR data based on the Bonferroni adjusted significance level ($p < .002$). Based on those reports, 91% (52/57) and 96% (22/23) of the cases in the Booster and EUC conditions received at least some service during the booster phase. Cases in the Booster and EUC conditions had comparable numbers of weeks in treatment (means of 19.5 and 16.9), and they also had similar proportions of cases receiving at least 5 hours of services (49% or 28/52 vs. 61% or 14/23). The ranges of the number of service hours were considerable for both Booster (one to 29) and EUC (one to 800; including a few cases in wrap-around care). It should be noted that 14 Booster cases got additional services from outside providers that surpassed the hours provided by Booster staff, but the analyses here focus on the services provided by our staff as part of the Booster condition. Booster cases were more likely to receive treatment that was psychosocial in nature (56% or 29/52 vs. 24% or 6/24; $p = .012$), whereas EUC cases were more likely to receive treatment that was focused on medication (0% or 0/52 vs. 28% or 6/24; $p = .001$).

EUC providers reported focusing on child problems more frequently than did Booster providers (62% or 32/52 vs. 96% or 23/24; $p = .002$), but providers in both groups reported comparable frequencies of focusing on any adult problems (e.g., inconsistent parenting)

(67% or 35/52 vs. 57% or 13/23). Both groups had a similar proportion of cases with medication that was continued upon discharge (48% or 22/46 vs. 57% or 11/20). A significant difference ($p = .000$) was found in how Booster and EUC cases were classified in terms of their treatment status by the time of post-booster assessment. Specifically, a higher proportion of Booster vs. EUC cases had completed their expected course of treatment (60% or 31/52, vs. 4% or 1/23) or had left early (31% or 16/52 vs. 9% or 2/23), whereas EUC cases were more likely to be in ongoing treatment (6% or 3/52 vs. 74% or 17/23) or their treatment status was uncertain (4% or 2/52 vs. 13% or 3/23). Finally, the difference in parental satisfaction with booster treatment (vs. EUC) only approached significance ($p < .08$).

Booster Phase Treatment Effects on Clinical Outcome Measures and Service Use

Initial effects—Parameter estimates for unconditional HLM models are summarized in Table 4. Three variables evidenced improvement from pre-booster to post-booster, $p < .05$, specifically, scores on suicidal ideation (SIQ Total), individualized treatment goals (IGAR New), and post-traumatic stress symptoms (TSCC). However, only the improvement on individualized goals (IGAR New) remained significant after applying the Bonferroni correction for multiple tests ($p < .0033$). Furthermore, no Booster condition effects were detected (all $ps > .05$), indicating that any pre-post changes were the same for the Booster and EUC conditions. Figures 2 and 3 provide representative graphical displays of changes in severity of externalizing behavior problems (CBCL) and treatment goals (IGAR), respectively, throughout the acute and booster phases of treatment. Treatment-control (i.e. booster-EUC) effect sizes for the 15 outcome variables at post-booster are included in Table 2 and ranged from $-.31$ to $.32$ ($M = -0.03$)

Follow-up effects—Over the course of the 2-year follow-up period, several variables evidenced a significant slope, $p < .05$. After applying the Bonferroni correction for multiple tests ($p < .0033$), four of these effects remained significant. Specifically, there were increases in parent-reported competence (CBCL Total Competence) and decreases in suicidal ideation (SIQ Total), individualized treatment goals (IGAR New), and parent-reported behavior problems (PDR Total). These main effects for time did not differ significantly by treatment condition (Booster vs. EUC; all $ps > .05$).

Given the inclusion of nine follow-up assessments over a 6-year period, we also calculated the proportion of cases who met two clinical cutoff criteria. For the Booster and EUC conditions, a comparable proportion of cases met the cutoff for heightened externalizing problems at the booster 12-month (33%, 35%; ns) and 24-month follow-ups (37% vs. 43%, ns), respectively. Likewise, the proportions of cases that met criteria for ODD in the two conditions were also moderate, but similar, at the booster 12-month (47% vs. 43%; ns) and 24-month follow-ups (32% vs. 39%; ns).

Finally, we conducted secondary analyses to examine the impact of condition on subsequent service use at booster 24-month follow-up. Specifically, the Booster and EUC conditions reported comparable rates of involvement with outpatient (54 vs. 47%; 29/54 vs. 26/55), school-based (57 vs. 58%; 31/54 vs. 32/55), and overnight services (22 vs. 11%; 12/54 vs. 6/55), and involvement with social services (33 vs. 20%; 18/54 vs. 11/55). However, the Booster (vs. EUC) condition had a higher rate of later court involvement (37% vs. 15%; 20/54 vs. 8/55), $\chi^2(1, N = 109) = 7.22, p = .009$.

Moderator Effects

Exploratory moderator analyses were conducted to examine the potential moderating effects of acute treatment setting, initial response to the acute phase of treatment, severity at the

beginning of the booster phase, and number of comorbid conditions. Of the 83 interaction terms examined, four were significant at $p < .05$, all of which occurred during the booster phase portion (i.e., acute condition x booster condition for callous/unemotional traits and drug use, booster phase severity x booster condition for TRF externalizing, and number of comorbid conditions x booster condition for callous/unemotional traits;). None of these results were significant after applying the Bonferroni correction ($p < .0006$) or even a more liberal $p < .01$.

Childhood Predictors of Outcome

We also examined three child variables (age, callous/unemotional traits, trauma symptoms) as predictors of overall change in three primary outcomes (externalizing behavior [CBCL-ext score], individualized treatment goals [IGAR New], and number symptoms of ODD and CD. Analyses were conducted using repeated measures HLMs after the predictor variables were all dichotomized. None of the results were statistically significant, and all $ps > .05$.

Discussion

This study examines the short- and long-term effects of a brief booster intervention that was implemented three years after an acute treatment phase in which a modular protocol was applied in the community (COMM) or a clinic (CLINIC). Three and a half years after initial baseline in the acute treatment phase, 118 of 129 clinically referred children diagnosed with ODD or CD were re-randomized to either booster treatment or enhanced usual care. Both original and new preventive outcomes were collected at pre-booster assessment (i.e., acute phase 36-month follow-up), post-booster assessment six months later, and at 1- and 2-year follow-ups. Using growth curve modeling, we found few additional improvements over time, no effects of booster treatment, and no proposed moderator or predictor effects. Both conditions showed improvements on four outcome measures two years at 2-year follow-up. We discuss the implications and limitations of these findings in the context of the acute treatment condition and the general literature on maintenance effects in disruptive behavior disorders.

The Booster and EUC conditions were comparable on nearly every treatment parameter (e.g., service rate, dose, duration, attendance rate), which suggests that most of the families who were randomly assigned to these conditions were able to participate actively in this phase of treatment. Thus, both the Booster intervention and the EUC condition in which families received a comprehensive assessment within a week, written recommendations that include a feedback session, and a facilitated referral to a local provider with relevant expertise appeared to be highly acceptable to the families of ODD or CD children, which parallels other similar intervention programs (Van Ryzin, Stormshak, & Dishion, 2012).

Of course, perhaps the main finding of this study was the lack of any significant improvements on measures of clinical functioning and service use for the extended booster intervention relative to a condition involving the completion of a follow-up assessment and referral to a local provider. Six months after the start of the two booster phase interventions, there were no further improvements over time or condition-by-time interactions that remained significant, with one exception. Both groups showed a significant improvement in the new IGARs that were developed at pre-booster assessment. The absence of group differences during the booster phase parallels the absence of group differences between the community and clinic treatment conditions during the acute treatment phase (Kolko et al., 2009).

The absence of any booster intervention effects may relate to several considerations. First, acute treatment was associated with substantial initial improvements and the absence of

significant group differences between COMM and CLINIC (e.g., behavior problems, psychopathic features, rates of ODD and CD), with most gains maintained by three-year follow-up (see Kolko et al., 2009). Indeed, medium to large effects sizes were found in the short-term and, for the most part, in the long-term. Thus, it is possible that the level of initial improvement maintained for three years after acute treatment may have limited the possibility of making even further achievements or experiencing sufficient motivation during the subsequent booster treatment phase. Where acute treatment has been associated with limited improvement, more substantial booster phase effects have been found (Bundy, McWhirter, & McWhirter, 2011).

A related consideration involves the timing of the booster phase, which occurred three years after acute treatment. It is possible that conducting a booster phase so long after acute treatment made it difficult to promote any continuity of care, which has been suggested as a potential mechanism for the impact of a booster intervention (Tolan et al., 2009). By the time the booster phase was approved for funding, the children were already in a different developmental period that may have varied from the original need for referral. Indeed, studies of booster interventions in youth have included shorter delays reflecting a few weeks (West, Henry, & Pavuluri, 2007), 3 months (Piacentini et al., 2010), and 6 months to one year (Bundy et al., 2011; Eacott & Frydenberg, 2009; Tolan et al., 2009), which parallel the shorter intervals reported in adult maintenance treatment studies (Petersen et al., 2010; C. F. Reynolds et al., 2006). In addition, the booster intervention was conducted in the same setting as was assigned during acute treatment and relied upon the primary content of the original intervention protocol that was modified to be suitable for an older population. Perhaps the setting or content did not adequately address the children's or families' current service needs or treatment preferences.

It is also worth noting that the dose of booster intervention was briefer than the dose during acute treatment (minimum of 5 vs. 15 hrs.) and was meant to be more flexible in accord with the severity of the child's clinical needs and family's willingness to participate. Some of the child booster studies included fairly intensive group-based interventions (Bundy et al., 2011; Eacott & Frydenberg, 2009) which in one case included 22 family intervention sessions, 20 sessions of academic tutoring, a group reading program, and other activities delivered over a year-long interval (Tolan et al., 2009), whereas the ones that were more brief were administered on an individual basis (Piacentini et al., 2010; West et al., 2007). This parameter may have similarly limited exposure to sufficient clinical content and, ultimately, treatment impact. Finally, we included all cases in the booster intervention phase, similar to some studies (Tolan et al., 2009; West et al., 2007), whereas other studies have used booster sessions to target only responders (Piacentini et al., 2010) or poor responders (Eacott & Frydenberg, 2009). In general, booster or maintenance treatment has been directed towards responders or those who show diagnostic remission in adult psychotherapy studies (Frank et al., 2007; Petersen et al., 2010; C. F. Reynolds et al., 2006), with some exceptions (Dunner et al., 2007).

There were also no booster intervention effects through the final booster 24-month follow-up, although both conditions did report significant improvement through the end of the follow-up period in social competence, suicidality, individualized goals, and severity of child problems on the PDR. Only one of these four outcomes showed improvement by the immediate post-booster assessment. In contrast to the many significant time effects found after the prior acute treatment phase, the booster treatment phase yielded few significant improvements on various outcomes across follow-up assessments. Of course, it is not possible to definitively link these changes to what transpired during the booster treatment phase.

None of the proposed moderators (e.g., acute treatment, and follow-up response to acute treatment, initial severity) or predictors (e.g., callous/unemotional traits, trauma history) was related to the child's level of immediate or follow-up improvement on key clinical outcomes. Initial severity of behavioral dysfunction has often been one of the more robust predictors of outcome in the child therapy research literature (see Lundahl et al., 2006; Reyno & McGrath, 2006) and was found to be a significant moderator of outcome in two booster studies (Eacott & Frydenberg, 2009; Tolan et al., 2009). As suggested earlier, the relatively limited range of problems documented by the pre-booster baseline may have contributed to these findings.

This study reports one of the longest follow-up intervals for a treatment trial that began with clinically referred ODD or CD children (Eyberg et al., 2008). Our final, 24-month booster treatment follow-up was conducted six years after the initial acute treatment baseline assessment. By this follow-up, the findings indicated that 65% of these children no longer met criteria for ODD or CD. As a comparison, the remission rate for ODD or CD after acute treatment was 41%. These long-term rates also compare favorably to those reported for ODD (50%) following DBT (Nelson-Gray et al., 2006), though few outcome studies have documented the treatment course of these disorders. Likewise, 60% of the children fell below the clinical cutoff for externalizing problems on the CBCL, which compares to or exceeds the rates reported for other EBTs after generally shorter follow-up intervals, such as Incredible Years (Webster-Stratton, Reid, & Hammond, 2004), OSLC PMT (Martinez & Forgatch, 2001), PCIT (Nixon, Sweeny, Erickson, & Touyz, 2003), problem-solving skills training (PSST) and PMT (Kazdin et al., 1989; Kazdin & Whitley, 2006), Anger Coping (Lochman & Wells, 2003), and MST (Brown, Henggeler, Schoenwald, Brondino, & Pickrel, 1999). These long-term follow-up rates convey optimism about the course of DBD and the potential benefits of early modular intervention with this population, although the absence of a no-treatment comparison precludes any definitive conclusions about treatment effectiveness here.

Among the study's limitations, the use of content from the two original modular treatment protocols that was adapted for use with an older population may not have sufficiently addressed the adolescent's unique treatment needs during the booster phase. Greater emphasis could have been directed towards certain issues often reported among DBD children (e.g., sexuality, drug use, dating relationships, peer delinquency). Post-hoc power analyses using software specifically designed for use with HLM designs (S.W. Raudenbush et al., 2011) indicated that the present study had adequate power ($1-\beta = .80$) to detect an effect size of approximately .55 or higher; thus the current study had insufficient power to reliably detect potential booster effects that were in the small to medium range by conventional standards. Likewise, we did not include a no-treatment control condition which would have provided an important comparison condition, although our institutional review board expressed concern about not offering any service to a previously clinically needy population over such a lengthy time period. And, as noted earlier, the long delay prior to booster may have attenuated the potential impact of this intervention.

In summary, we evaluated the benefit of Booster treatment (vs. EUC) in a randomized trial conducted three years after initial randomization to a modular treatment applied in the community or a clinic among clinically referred children with early-onset DBD. There were no significant benefits for Booster treatment across outcome measures and the only significant improvement over time for all subjects that survived statistical adjustment was found for individualized goals obtained during the booster phase. The absence of expected time and condition-by-time effects during the booster treatment phase may be related to the achievement of significant improvements following the prior acute treatment phase. Still, the outcomes reported at the two-year booster phase follow-up revealed the maintenance of

several clinical improvements since the acute treatment phase baseline assessment conducted nearly six years earlier (e.g., individualized targets, externalizing behavior, psychopathic features, DBD remission). Further studies should determine under what conditions maintenance or booster interventions are most effective and whether they offer incremental benefit beyond acute treatment alone (see Eyberg et al., 2008). Ideally, such studies could vary the timing (immediate vs. delayed) and the content (continued protocol vs. novel content) of booster intervention, include both behavioral ratings and diagnostic interviews, and incorporate multiple outcomes (clinical status, impairment, service use) to extend the knowledge base on this topic.

Acknowledgments

This study was supported by a grant to the first author from the National Institute of Mental Health (MH 57727). We acknowledge the contributions of the research and clinical staff of the Resources to Enhance the Adjustment of Children (REACH) program, Drs. Lorah Dorn and John Lochman, Kevin Rumbarger, and Janelle Higa.

References

- Achenbach, TM. Integrative guide for the 1991 CBCL/4-18, YSR, and TRF profiles. Burlington, VT: University of Vermont, Department of Psychiatry; 1991.
- Attkisson, CC.; Greenfield, TK. The Client Satisfaction Questionnaire (CSQ) Scales and the Service Satisfaction Scale-30 (SSS-30). In: Sederer, LI.; Dickery, B., editors. Outcomes Assessment in Clinical Practice. Baltimore: Williams & Wilkins; 1996. p. 120-127.
- August, Gerald J.; Realmuto, George M.; Joyce, Tamara; Hektner, Joel M. Persistence and desistance of oppositional defiant disorder in a community sample of children with ADHD. *Journal of the American Academy of Child & Adolescent Psychiatry*. 1999; 38:1262–1270. [PubMed: 10517059]
- Bird H, Shaffer D, Fisher P, Gould MS. The Columbia impairment scale (CIS): Pilot findings on a measure of global impairment for children and adolescents. *International Journal of Methods in Psychiatric Research*. 1993; 3:167–176.
- Brent DA, Oquendo MA, Birmaher B, Greenhill L, Kolko DJ, Stanley B. Familial pathways to early-onset suicide attempt: A high-risk study. *Archives of General Psychiatry*. 2002; 59:801–807. [PubMed: 12215079]
- Briere, J. Trauma Symptom Checklist for Children: Professional manual. Odessa, Florida: Psychological Assessment Resources, Inc; 1996.
- Broidy, Lisa M.; Nagin, Daniel S.; Tremblay, Richard E.; Bates, JE.; Brame, Bobby; Dodge, Kenneth A. Developmental trajectories of childhood disruptive behaviors and adolescent delinquency: A six-site, cross-national study. *Developmental Psychology*. 2003; 39(2):222–245. [PubMed: 12661883]
- Brown TL, Henggeler SW, Schoenwald SK, Brondino Michael J, Pickrel Susan G. Multisystemic treatment of substance abusing and dependent juvenile delinquents: Effects on school attendance at posttreatment and 6-month follow-up. *Children's Services: Social Policy, Research, & Practice*. 1999; 2:81–93.
- Bundy A, McWhirter PT, McWhirter JJ. Anger and violence prevention: Enhancing treatment effects through booster sessions. *Education & Treatment of Children*. 2011; 34(1):1–14.
- Burns BJ, Farmer Elizabeth MZ, Angold Adrian, Costello E Jane, Behar Lenore. A randomized trial of case management for youths with serious emotional disturbance. *Journal of Clinical Child Psychology*. 1996; 25:476–486.
- Chamberlain, Patricia; Reid, JB. Parent observation and report of child symptoms. *Behavioral Assessment*. 1987; 9(1):97–109.
- Clarke GN, Rohde P, Lewinsohn PM, Hops H, Seeley JR. Cognitive-behavioral treatment of adolescent depression: Efficacy of acute group treatment and booster sessions. *Journal of the American Academy of Child & Adolescent Psychiatry*. 1999; 38(3):272–279. [PubMed: 10087688]

- Dunner DL, Blier P, Keller MB, Pollack MH, Thase ME, Zajecka JM. Preventing recurrent depression: Long-term treatment for major depressive disorder. *Journal of Clinical Psychiatry*. 2007; 68(4):619–630. [PubMed: 17474820]
- Eacott C, Frydenberg E. Promoting positive coping skills for rural youth: Benefits for at-risk young people. *Australian Journal of Rural Health*. 2009; 17(6):338–345. [PubMed: 19930201]
- Edwards, Daniel. Dissertation Abstracts International: Section B: the Sciences & Engineering. Vol. 58. US: Univ. Microfilms International; 1998. Long-term outcomes associated with Parent-Child Interaction Therapy and the impact of booster sessions in reinforcing treatment gains; p. 3919
- Eyberg SM, Edwards Daniel, Boggs Stephen R, Foote Rebecca. Maintaining the treatment effects of parental training: The role of booster sessions and other maintenance strategies. *Clinical Psychology-Science & Practice*. 1998; 5(4):544–554.
- Eyberg SM, Nelson MM, Boggs SR. Evidence-based psychosocial treatments for children and adolescents with disruptive behavior. *Journal of Clinical Child and Adolescent Psychology*. 2008; 37:215–237. [PubMed: 18444059]
- Fergusson DM, Boden JM, Horwood LJ. Classification of behavior disorders in adolescence: Scaling methods, predictive validity, and gender differences. *Journal of Abnormal Psychology*. 2010; 119(4):699–712.10.1037/a0018610 [PubMed: 20853914]
- Fleischman, MJ.; Horne, AM.; Arthur, JL. Troubled families: A treatment program. Champaign, IL: Research Press; 1983.
- Ford JD, Racusin R, Daviss WB, Ellis C, Thomas J, Rogers K. Trauma Exposure Among Children With Oppositional Defiant Disorder and Attention Deficit-Hyperactivity Disorder. *Journal of Consulting & Clinical Psychology*. 1999; 67:786–789. [PubMed: 10535245]
- Frank E, Kupfer DJ, Buysse DJ, Swartz HA, Pilkonis PA, Houck PR. Randomized trial of weekly, twice-monthly, and monthly interpersonal psychotherapy as maintenance treatment for women with recurrent depression. *American Journal of Psychiatry*. 2007; 164(5):761–767. [PubMed: 17475735]
- Frick PJ. Family dysfunction and the disruptive behavior disorders: A review of recent empirical findings. *Advances in Clinical Child Psychology*. 1994; 16:203–226.
- Friedrich WN, Fisher Jennifer L, Dittner Carrie Anne, Acton Robert, Berliner Lucy, Butler Judy. Child Sexual Behavior Inventory: Normative, psychiatric, and sexual abuse comparisons. *Journal of the American Professional Society on the Abuse of children*. 2001; 6(1):37–49.
- Hoagwood K, Horwitz S, Stiffman A, Weisz JR, Bean D, Rae D. Concordance between parent reports of children's mental health services and records: The services assessment for children and adolescents (SACA). *Journal of Child & Family Studies*. 2000; 9:315–331.
- Hodgins DC, Currie SR, Currie G, Fick GH. Randomized trial of brief motivational treatments for pathological gamblers: More is not necessarily better. *Journal of Consulting and Clinical Psychology*. 2009; 77(5):950–960.10.1037/a0016318 [PubMed: 19803574]
- Kaufman, AS.; Kaufman, NL. Kaufman Brief Intelligence Test. Circle Pines, MN: American Guidance Service, Inc; 1990.
- Kaufman, J.; Birmaher, B.; Brent, DA.; Rao, U.; Ryan, ND. KIDDIE-SADS-present and lifetime version (K-SADS-PL). Instrument developed at Western Psychiatric Institute and Clinic; Pittsburgh, PA: 1996.
- Kazdin, AE. Psychosocial treatments for conduct disorder in children and adolescents. In: Nathan, PE.; Gorman, JM., editors. *A guide to treatments that work*. 2. London: Oxford University Press; 2002. p. 57-85.
- Kazdin AE, Bass D, Siegel T, Thomas C. Cognitive-behavioral therapy and relationship therapy in the treatment of children referred for antisocial behavior. *Journal of Consulting and Clinical Psychology*. 1989; 4(4):522–535. [PubMed: 2768614]
- Kazdin AE, Whitley MK. Comorbidity, case complexity, and effects of evidence-based treatment for children referred for disruptive behavior. *Journal of Consulting and Clinical Psychology*. 2006; 74(3):455–467. [PubMed: 16822103]
- Kolko DJ. Individual cognitive-behavioral treatment and family therapy for physically abused children and their offending parents: A comparison of clinical outcomes. *Child Maltreatment*. 1996; 1:322–342.

- Kolko DJ. Efficacy of cognitive-behavioral treatment and fire safety education for firesetting children: Initial and follow-up outcomes. *Journal of Child Psychology and Psychiatry and Allied Disciplines*. 2001; 42:359–369.
- Kolko DJ, Dorn LD, Bukstein OG, Burke JD. Clinically referred ODD children with or without CD and healthy controls: Comparisons across contextual domains. *Journal of Child and Family Studies*. 2008; 17(5):21.
- Kolko DJ, Dorn LD, Bukstein OG, Pardini DA, Holden EA, Hart Jonathan A. Community vs. clinic-based modular treatment of children with early-onset ODD or CD: A clinical trial with three-year follow-up. *Journal of Abnormal Child Psychology*. 2009; 37:591–609. [PubMed: 19221871]
- Kolko, DJ.; Swenson, CC. Assessing and treating physically abused children and their families: A cognitive behavioral approach. Thousand Oaks, CA: Sage Publications; 2002.
- Lahey BB, Loeber R, Burke JD, Rathouz PJ, McBurnett Keith. Waxing and waning in concert: Dynamic comorbidity of conduct disorder with other disruptive and emotional problems over 17 years among clinic-referred boys. *Journal of Abnormal Psychology*. 2002; 111:556–567. [PubMed: 12428769]
- Lochman JE. Cognitive-behavioral intervention with aggressive boys: Three-year follow-up and preventive effects. *Journal of Consulting and Clinical Psychology*. 1992; 60(3):426–432. [PubMed: 1619096]
- Lochman JE, Wells KC. Effectiveness of the Coping Power Program and of classroom intervention with aggressive children: Outcomes at a 1-year follow-up. *Behavior Therapy*. 2003; 34:493–515.
- Loeber, R.; Farrington, DP.; Stouthamer-Loeber, M.; Van Kammen, WB. Antisocial behavior and mental health problems: Explanatory factors in childhood and adolescence (First volume of the Pittsburgh Youth Study). Mahwah, NJ: Lawrence Erlbaum; 1998.
- Luk, Ernest SL.; Staiger, Petra; Mathai, John; Wong, Lisa; Birleson, Peter; Adler, Robert. Evaluation of outcome in child and adolescent mental health services: Children with persistent conduct problems. *Clinical Child Psychology & Psychiatry*. 2001; 6(1):109–124.
- Lundahl, Brad; Risser, Heather J.; Lovejoy, M Christine. A meta-analysis of parent training: Moderators and follow-up effects. *Clinical Psychology Review*. 2006; 26(1):86–104.10.1016/j.cpr.2005.07.004 [PubMed: 16280191]
- Martin DJ, Garske JP, Davis KD. Relation of the therapeutic alliance with outcome and other variables: A meta-analytic review. *Journal of Consulting and Clinical Psychology*. 2000; 68:438–450. [PubMed: 10883561]
- Martinez CR Jr, Forgatch MS. Preventing problems with boys' noncompliance: Effects of a parent training intervention for divorcing mothers. *Journal of Consulting and Clinical Psychology*. 2001; 69:416–428. [PubMed: 11495171]
- McCart MR, Priester PE, Davies WH, Azen R. Differential effectiveness of behavioral parent-training and cognitive-behavioral therapy for antisocial youth: A meta-analysis. *Journal of Abnormal Child Psychology*. 2006; 34:527–543. [PubMed: 16838122]
- Moore JM, Thompson-Pope SK, Whited RM. MMPI-A profiles of adolescent boys with history of firesetting. *Journal of Personality Assessment*. 1994; 67:116–126. [PubMed: 8683421]
- Nelson-Gray RO, Keane SP, Hurst RM, Mitchell JT, Warburton JB, Chok JT. A modified DBT skills training program for oppositional defiant adolescents: Promising preliminary findings. *Behaviour Research and Therapy*. 2006; 44:1811–1820. [PubMed: 16579964]
- Nilsson D, Wadsby M, Svedin CG. The psychometric properties of the Trauma Symptom Checklist for Children (TSCC) in a sample of Swedish children. *Child Abuse & Neglect*. 2008; 32(6):627–636. [PubMed: 18584867]
- Nixon RDV, Sweeny L, Erickson DB, Touyz SW. Parent-child interaction therapy: A comparison of standard and abbreviated treatments for oppositional defiant preschoolers. *Journal of Consulting & Clinical Psychology*. 2003; 71:251–260. [PubMed: 12699020]
- Pardini DA, Fite PJ. Symptoms of conduct disorder, oppositional defiant disorder, attention-deficit hyperactivity disorder, and callous-unemotional traits as unique predictors of psychosocial maladjustment in males: Advancing an evidence base for DSM-V. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2010; 49:1134–1144. [PubMed: 20970701]

- Petersen TJ, Pava JA, Buchin J, Matthews JD, Papakostas GI, Nierenberg AA. The role of cognitive-behavioral therapy and fluoxetine in prevention of recurrence of major depressive disorder. *Cognitive Therapy and Research*. 2010; 34(1):13–23.
- Piacentini J, Woods DW, Scahill L, Wilhelm S, Peterson AL, Chang S. Behavior therapy for children with Tourette disorder: A randomized controlled trial. *Journal of the American Medical Association*. 2010; 303(19):1929–1937. [PubMed: 20483969]
- Raudenbush, SW.; Bryk, AS. *Hierarchical linear models: Applications and data analysis methods*. 2. Thousand Oaks, CA: Sage Publications, Inc; 2002.
- Raudenbush, SW.; Spybrook, JR.; Congdon, Liu X.; Martinez, A.; Bloom, H. *Optimal Design Plus Empirical Evidence (Version 3.0)* [Computer software]: HLM Software. 2011. Retrieved from <http://www.wtgrantfoundation.org/resources/consultation-service-and-optimal-design>
- Reid MJ, Webster-Stratton C, Hammond M. Follow-up of children who received the Incredible Years Intervention for oppositional-defiant disorder: Maintenance and prediction of 2-year outcome. *Behavior Therapy*. 2003; 34(4):471–491.
- Reyno SM, McGrath PJ. Predictors of parent training efficacy for child externalizing behavior problem: A meta-analytic review. *Journal of Child Psychology and Psychiatry*. 2006; 47(1):99–111.10.1111/J.1469-7610.2005.01544.X [PubMed: 16405646]
- Reynolds CF, Dew MA, Pollock BG, Mulsant BH, Frank E, Miller MD. Maintenance treatment of major depression in old age. *New England Journal of Medicine*. 2006; 354:1130–1138. [PubMed: 16540613]
- Reynolds WM, Mazza JJ. Assessment of suicidal ideation in inner-city children and young adolescents: Reliability and validity of the Suicidal Ideation Questionnaire-JR. *School Psychology Review*. 1999; 28(1):17–30.
- Reynolds, WM. *Suicidal Ideation Questionnaire*. Odessa, FL: Psychological Assessment Resources; 1987.
- Tolan PH, Gorman-Smith D, Henry D, Schoeny M. The benefits of booster interventions: Evidence from a family-focused prevention program. *Prevention Science*. 2009; 10:287–297.10.1007/s11121-009-0139-8 [PubMed: 19513845]
- Van Ryzin, Mark J.; Stormshak, Elizabeth A.; Dishion, Thomas J. Engaging parents in the Family Check-Up in middle school: Longitudinal effects on family conflict and problem behavior through the high school transition. *Journal of Adolescent Health*. 2012; 50(6):627–633. [PubMed: 22626491]
- Webster-Stratton C, Reid MJ, Hammond M. Treating children with early-onset conduct problems: Intervention outcomes for parent, child, and teacher training. *Journal of Clinical Child and Adolescent Psychology*. 2004; 33:105–124. [PubMed: 15028546]
- Weisz JR, Jensen-Doss A, Hawley KM. Evidence-based youth psychotherapies versus usual clinical care: A meta-analysis of direct comparisons. *American Psychologist*. 2006; 61(7):671, 689.10.1037/0003-066X.61.7.671 [PubMed: 17032068]
- West AE, Henry DB, Pavuluri MN. Maintenance model of integrated psychosocial treatment in pediatric bipolar disorder: A pilot feasibility. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2007; 46(2):205–212. [PubMed: 17242624]

Figure 1.
Study status and flow of study cases through all assessments that occurred in the acute and booster treatment phases.

Figure 2.
Trajectories of Child Behavior Checklist Externalizing Behavior Raw Scores for the Acute and Booster Treatment Phases.

Figure 3. Trajectories of Scores on Original (Acute Phase) and New (Booster Phase) Individualized Goal Attainment Ratings.

Table 1

Demographics of the Booster and Enhanced Usual Care Groups

Variable	Booster Phase Treatment Group			
	Booster (<i>n</i> = 59)		EUC (<i>n</i> = 59)	
	% or <i>M</i>	<i>N</i> or <i>SD</i>	% or <i>M</i>	<i>N</i> or <i>SD</i>
Age in years (M, SD)	12.5	1.7	12.5	1.7
Gender – male	86.4	51/59	79.7	47/59
Race – minority	50.8	30/59	62.7	37/59
Child IQ composite (M, SD) ^a	100.3	12.1	97.2	13.6
DBD diagnosis				
ODD	40.7	24/59	47.5	28/59
CD	16.9	10/59	13.6	8/59
ADHD	67.8	40/59	71.2	42/59
CBCL externalizing (cutoff %)	42.4	24/59	18.6	11/59
TRF externalizing (cutoff %)	38.2		48.7	
Any interpersonal trauma ^b	25.9%	15/58	25.4%	15/53
Respondent – mother	83.1	49/59	84.7	50/59
SES score (M, SD)	36.6	11.3	34.5	11.8
Two adults in home	39.0	23/59	54.2	32/59
Caregiver – married	33.9	20/59	47.5	28/59
Caregiver attended college	76.3	45/59	66.1	39/59
Acute phase – clinic	50.8	30/59	50.8	30/59

Note. None of the group differences are significantly different at $p < .05$ (p's ranged from .96 to .09).

^aWechsler Intelligence Scale for Children-III Vocabulary and Block Design subset administered at initial study intake to provide composite score.

^bTESI = A yes to any of four interpersonal trauma items from the Traumatic Events Screening Inventory (see Ford et al., 2008).

Table 2

Descriptive Statistics for All Assessments in the Booster Treatment Phase

Measure	Acute FU36/Pre-Booster		Post-Booster		Booster FU6		Booster FU12		Booster FU24		ES
	Mean (SD)		Mean (SD)		Mean (SD)		Mean (SD)		Mean (SD)		
<u>Original REACH Measures</u>											
IGAR	3.69 (1.67)	3.46 (1.74)	3.41 (1.71)	3.40 (1.66)	3.28 (1.77)	3.40 (1.90)	3.23 (1.75)	3.34 (1.81)	3.33 (2.04)	3.27 (1.99)	-0.01
CIS Total	17.32 (12.39)	15.97 (8.40)	16.49 (9.89)	15.69 (8.92)	16.81 (10.17)	15.94 (10.86)	14.87 (9.50)	14.48 (10.16)	16.61 (11.07)	14.95 (11.74)	-0.09
DBD Symptoms	4.71 (3.85)	5.02 (3.29)	4.65 (3.13)	4.44 (3.53)	-	-	4.55 (3.46)	4.07 (3.46)	3.87 (3.87)	3.98 (3.65)	-0.06
PSDT Callous/Unemotional	5.80 (2.81)	5.32 (2.35)	5.11 (2.77)	5.82 (2.62)	6.06 (2.63)	5.70 (2.40)	5.64 (2.23)	6.47 (2.77)	5.83 (2.77)	5.72 (2.54)	0.26
TRF Externalizing Total	18.33 (14.89)	21.35 (14.73)	17.72 (16.02)	15.80 (13.60)	18.77 (17.97)	18.33 (16.27)	19.69 (14.59)	21.30 (15.33)	19.00 (19.44)	19.43 (16.27)	-0.13
CBCL Externalizing Total	19.47 (12.63)	19.29 (8.91)	18.32 (9.97)	18.37 (10.86)	18.96 (10.29)	17.62 (12.63)	17.37 (9.65)	16.19 (11.27)	15.51 (10.42)	17.14 (13.78)	0.01
CBCL Total Competence	14.75 (3.07)	15.72 (2.62)	14.95 (3.13)	15.76 (2.71)	15.23 (2.99)	15.60 (2.35)	15.78 (3.14)	15.87 (2.37)	16.53 (2.68)	16.83 (2.90)	-0.28
CBCL Academic	3.23 (1.35)	3.82 (1.20)	3.40 (1.31)	3.29 (1.26)	3.36 (1.28)	3.25 (1.44)	3.64 (1.29)	3.44 (1.25)	3.39 (1.57)	3.44 (1.56)	0.09
<u>Booster Only Measures</u>											
SUSI Drugs	3.63 (7.42)	4.85 (8.44)	3.32 (6.41)	1.85 (5.03)	7.88 (9.16)	5.06 (7.34)	5.72 (10.74)	4.72 (9.46)	5.77 (7.83)	6.21 (10.97)	-0.26
GUN-R Any Weapon	0.11 (0.31)	0.12 (0.33)	0.06 (0.24)	0.13 (0.34)	0.04 (0.20)	0.12 (0.33)	0.08 (0.27)	0.11 (0.32)	0.08 (0.27)	0.07 (0.26)	0.24
SIQ Total	18.43 (7.17)	18.32 (4.84)	18.49 (10.42)	18.36 (9.93)	18.71 (9.43)	16.38 (3.45)	17.96 (10.55)	18.93 (10.64)	16.12 (2.80)	15.71 (1.88)	-0.01
IGAR New	4.98 (1.49)	5.38 (1.30)	4.05 (1.80)	4.61 (1.72)	4.12 (1.75)	4.26 (1.88)	4.17 (1.82)	3.67 (1.74)	3.72 (2.24)	3.48 (2.02)	0.32
TSCC Posttraumatic Stress	41.32 (7.22)	41.11 (6.92)	39.48 (4.59)	39.30 (4.84)	40.36 (7.90)	38.90 (3.87)	38.65 (4.63)	39.90 (5.85)	38.96 (4.11)	38.86 (3.52)	-0.04
ASBP Deviant Sex Interests	0.97 (1.30)	1.12 (1.39)	1.56 (1.62)	1.11 (1.26)	1.77 (1.75)	1.41 (1.55)	1.85 (1.92)	1.28 (1.68)	2.04 (2.08)	1.84 (2.06)	-0.31
PDR Total	0.26 (0.21)	0.29 (0.18)	0.29 (0.22)	0.26 (0.20)	0.26 (0.20)	0.27 (0.18)	0.21 (0.17)	0.22 (0.21)	0.21 (0.22)	0.19 (0.17)	-0.14

IGAR = Individual Goal Achievement Rating; CIS = Columbia Impairment Scale; DBD = Disruptive Behavior Disorders; PSYT = Psychopathology Screening Device; TRF = Teacher Report Form; CBCL = Child Behavior Checklist; SUSI = Substance Use Survey Interview; GUN = Gun Exposure/Use Inventory; SIQ = Suicide Ideation Questionnaire; TSCC = Trauma Symptom Checklist for Children; ASBP = Adolescent Sexual Behavior Inventory—Parent version; PDR = Parent Daily Report; ES = effect size

Table 3
Bivariate Correlations at Acute Treatment Follow-up-36/Pre-Booster Assessment

	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. IGAR	.48**	.50**	.17	.02	.44**	-.23*	-.13	-.02	-.13	.21*	.22*	.15	.02	.40**
2. CIS Total		.58**	.34**	.22*	.79**	-.59**	-.36**	-.01	-.05	.15	.32**	.21*	.26**	.58**
3. DBD Symptoms			.27**	.27**	.60**	-.24*	-.20*	.10	.03	.16	.31**	.22*	.19*	.55**
4. PSDT Callous/Unemotional				.45**	.24*	-.21*	-.26*	.05	.12	.18	.16	.08	.12	.11
5. TRF Externalizing Total					.14	-.12	-.26*	-.01	.17	-.03	-.04	-.06	.04	.07
6. CBCL Externalizing Total						-.47**	-.32**	.05	.02	.10	.22*	.12	.19*	.51**
7. CBCL Total Competence							.60**	-.10	.03	-.14	-.20*	-.07	-.21*	-.24**
8. CBCL Academic								-.12	-.02	-.07	-.14	-.05	-.24**	-.15
9. SUSI Drugs									.25**	.13	-.07	.06	.26**	-.10
10. GUN-R Any Weapon										.07	-.07	.15	.24**	-.09
11. SIQ Total											.00	.47**	.13	.03
12. IGAR New												.08	-.01	.23*
13. TSCC Post Traumatic Stress													.09	.15
14. ASBP Deviant Sex Interests														.00
15. PDR Total														

IGAR = Individual Goal Achievement Rating; CIS = Columbia Impairment Scale; DBD = Disruptive Behavior Disorders; PSDT = Psychopathology Screening Device; TRF = Teacher Report Form; CBCL = Child Behavior Checklist; SUSI = Substance Use Survey Interview; GUN = Gun Exposure/Use Inventory; SIQ = Suicide Ideation Questionnaire; TSCC = Trauma Symptom Checklist for Children; ASBP = Adolescent Sexual Behavior Inventory—Parent version; PDR = Parent Daily Report

*
p < .05;

**
p < .01.

Table 4

Summary of Unconditional HLM Models

Outcome Variable	Unconditional pre-post slope				Unconditional follow-up slope			
	B	SE	T	p	B	SE	t	p
<u>Original Acute Phase Measures</u>								
IGAR	−0.20	0.22	−0.90	.372	−0.04	0.05	−0.71	.477
CIS Total	−0.65	1.31	−0.50	.620	−0.12	0.29	−0.40	.687
DBD Symptoms	−0.29	0.47	−0.61	.541	−0.15	0.10	−1.53	.128
PSDT Callous/Unemotional	0.05	0.33	0.15	.884	0.08	0.09	0.85	.395
TRF Externalizing Total	−2.46	1.97	−1.24	.216	0.89	0.41	2.15	.033
CBCL Externalizing Total	−1.11	1.32	−0.84	.405	−0.30	0.29	−1.03	.305
CBCL Total Competence	0.01	0.38	0.04	.972	0.36	0.07	5.05	.000
CBCL Academic	−0.16	0.16	−0.98	.329	0.02	0.04	0.60	.548
<u>Booster Only Measures</u>								
SUSI Drugs	−0.30	0.97	−0.31	.760	0.61	0.26	2.39	.019
GUN-R Any Weapon	−0.02	0.04	−0.41	.679	0.00	0.01	−0.48	.630
SIQ Total	−0.13	0.06	−2.31	.023	−0.06	0.01	−4.19	.000
IGAR New	−0.84	0.20	−4.26	.000	−0.19	0.06	−3.22	.002
TSCC Post Traumatic Stress	−1.69	0.78	−2.15	.033	−0.13	0.15	−0.88	.380
ASBP Deviant Sex Interests	0.35	0.19	1.87	.063	0.15	0.05	3.01	.004
PDR Total	0.00	0.02	−0.29	.775	−0.02	0.00	−3.73	.000

IGAR = Individual Goal Achievement Rating; CIS = Columbia Impairment Scale; DBD = Disruptive Behavior Disorders; PSDT = Psychopathology Screening Device; TRF = Teacher Report Form; CBCL = Child Behavior Checklist; SUSI = Substance Use Survey Interview; GUN = Gun Exposure/Use Inventory; SIQ = Suicide Ideation Questionnaire; TSCC = Trauma Symptom Checklist for Children; ASBP = Adolescent Sexual Behavior Inventory—Parent version; PDR = Parent Daily Report