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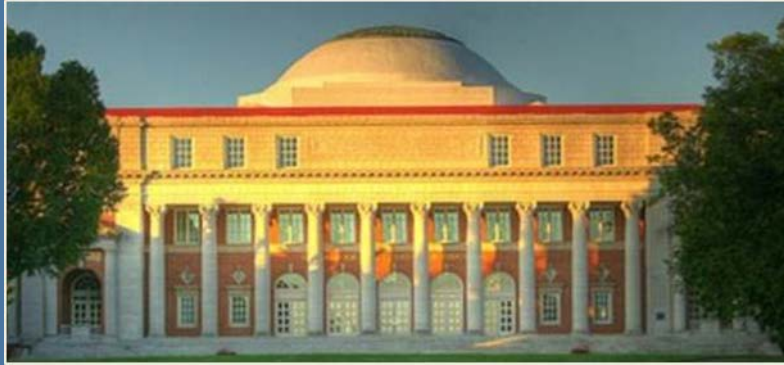
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Adolescent Substance Use Treatment Effectiveness: A Systematic Review and Meta-Analysis

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Structured Abstract

Objectives. This meta-analysis quantitatively synthesized findings from the most current evidence base of adolescent substance use treatment effectiveness research. The objectives of the meta-analysis were to examine the effects of substance use treatment programs on adolescents' subsequent substance use; and to explore variability in these effects across key features of the adolescent populations and treatment programs. To address these objectives, we synthesized results from randomized and controlled quasi-experimental design studies that reported on the effects of substance use treatment programs located in the United States or Canada.

Search methods. We conducted a comprehensive and systematic literature search to identify all relevant studies (published or unpublished) that met our prespecified eligibility criteria, and the literature search is current through December 2014. We searched several electronic databases, supplemented with searches of websites, research registers, reference lists, and hand-searches of key journals and conference proceedings.

Data collection and analysis. Standard systematic review practices were used for data collection and analysis. Titles, abstracts, and full-text reports were screened independently by two researchers; a third author resolved any disagreements about eligibility for inclusion. Studies eligible for inclusion were independently coded by two researchers, and a third author resolved any coding disagreements. All data extraction followed a standardized coding protocol, with data entered directly into a FileMaker Pro database. Random-effects meta-regression models with robust variance estimates were used to estimate overall mean effect sizes and explore variability in effects across study characteristics. Contour-enhanced funnel plots were used to assess for publication bias in the posttest effect sizes; there was no clear asymmetry in the funnel plot, thus providing some reassurances against the possibility of publication or small study bias.

Results. An extensive literature search located 61 eligible experimental or quasi-experimental studies reporting 95 treatment-comparison group pairs. Many of the comparison groups received another type of active treatment. The first analysis examined 506 effect sizes for the post-treatment substance use outcomes of adolescents receiving different types of treatment relative to the respective comparison groups. Overall, assertive continuing care, behavioral therapy, cognitive-behavioral therapy (CBT), motivational enhancement therapy (MET), and family therapy had the strongest evidence of effectiveness. Generic practice as usual conditions, which typically involved referral to standard community services, were consistently the least effective conditions. There was mixed and/or sparse evidence for other treatment types (e.g., group/mixed counseling, MET/CBT, multiservice packages).

A second analysis examined 380 pretest–posttest effect sizes indexing changes in substance use for each of the treatment arms in these studies. The results from this analysis indicated that adolescents in almost all types of treatment showed reductions in substance use. The largest reductions were observed for MET/CBT, family therapy, and CBT programs. There was no evidence that other treatment characteristics or participant characteristics were associated with pretest–posttest changes in substance use.

Conclusions. Most substance use treatment programs were beneficial in helping adolescents reduce their substance use when those treatment programs provide tailored treatment services beyond standard community services. Family therapy and CBT programs showed particular promise of effectiveness, and no program types showed evidence of harmful effects.

Implications for guidelines. Juvenile drug courts should refer youth to substance treatment programs that use family therapy, MET, or CBT treatment modalities. Ideally, these programs should follow standardized treatment manuals or protocols. Juvenile drug courts should avoid referring youth to standard community services, stand-alone self-help treatment, or generic counseling programs that do not incorporate family therapy, MET, and/or CBT components.

Introduction

Approximately 5% of adolescents ages 12–17 (1.3 million youth) met past year criteria for a substance use disorder in 2014 (Center for Behavioral Health Statistics and Quality, 2015). Almost 7% of the approximately 1.75 million admissions into substance use treatment programs in 2012 were for adolescents ages 12–17. **Most of these adolescents presented to treatment with marijuana/hashish as the primary substance abused** (Substance Abuse and Mental Health Services Administration, 2014). Given the large numbers of adolescents in need of or enrolled in formal substance use treatment, it is therefore crucial to understand what types of treatments are most effective in reducing substance use among adolescents. The current systematic review and meta-analysis thus aimed to provide a comprehensive synthesis of the adolescent substance use treatment effectiveness literature, with a particular emphasis on examining the comparative effectiveness of different treatment types.

Substance Use Treatment for Adolescents

Adolescents with substance use disorders often differ from adults with substance use disorders and thus have unique developmental needs when it comes to treatment models. For instance, adolescents are often highly susceptible to peer influences, may suffer increased adverse effects from substances due to body size and tolerance levels, and may experience greater long-term cognitive consequences given their developing brain (Peeters, Vollebergh, Wiers, & Field, 2014; Tapert, Caldwell, & Burke, 2004; Winward, Hanson, Tapert, & Brown, 2014).

Numerous treatment modalities have been used in an attempt to reduce or treat substance use among adolescents, which can vary widely in theoretical approach and assumed targets for behavior change. This review will focus on the following treatment modalities (and their combinations):

- *Assertive continuing care* programs provide integrated and coordinated case management services for youth after discharge from outpatient or inpatient treatment, including home visits, client advocacy for support services, and integrated social support services.
- *Behavioral or contingency management* programs are based on operant behavioral principles that use incentives (e.g., gift certificates) to reward abstinence and/or treatment compliance.
- *Cognitive-behavioral therapy (CBT)* programs are based on theories of classical conditioning, and focus on teaching adolescents coping skills, problem-solving skills, and cognitive restructuring techniques for dealing with stimuli that trigger substance use or cravings.
- *Family therapy* programs are based on ecological approaches that actively involve family members in treatment and address issues of family functioning, parenting skills, and family communication skills.
- *Motivational enhancement therapy (MET)* programs use supportive and nonconfrontational therapeutic techniques to encourage motivation to change based on clients' readiness to change and self-efficacy for behavior change.

- *MET/CBT* programs use a combination of motivational enhancement and cognitive behavioral therapy techniques.
- *Pharmacological therapy* programs use pharmaceutical drugs designed to reduce substance use cravings (e.g., atomoxetine, naltrexone, pemoline) alone or in combination with other therapeutic techniques.
- *Psychoeducational therapy (PET)* programs use didactic approaches to provide information and education about the harms and consequences of substance use.
- *Group/mixed counseling* programs use a variety of therapeutic behavior change techniques in individual or group counseling settings.
- *Multi-service package* programs use a combination of behavioral, CBT, family therapy, MET, pharmacological, PET, and/or group and mixed counseling in a comprehensive package.

Given the diverse types of treatment available for adolescents with substance use disorders, understanding the most (and least) effective treatment approaches is critical for ensuring positive outcomes for youth receiving treatment.

Prior Reviews of Adolescent Substance Use Treatment Effectiveness

Numerous systematic reviews and meta-analyses have synthesized the research evidence on adolescent substance use treatment effectiveness. Although conclusions vary across reviews given their diverse scopes, overall, prior research syntheses have suggested that adolescent substance use treatment programs can be effective in reducing substance use (Bettmann & Jaspersen, 2009; Deas, 2008; Williams & Chang, 2000), particularly for programs that use family therapy techniques (Deas & Thomas, 2001; Hogue & Liddle, 2009).

For instance, in the largest meta-analysis to date (and the meta-analysis which the current study updates), Tanner-Smith, Wilson, and Lipsey (2013) synthesized findings from 45 outpatient substance use treatment programs, current through 2008. They found that family therapy programs were more effective than the other types of treatments with which they were compared, and family therapy and general counseling programs yielded the largest changes in substance use over time. These findings were consistent with the findings from a prior meta-analysis examining the effects from 17 trials, which found that family therapy and CBT programs were the most effective (Waldron & Turner, 2008).

These prior reviews of the literature are not up to date with the most current evidence on adolescent substance use treatment program effectiveness, however, and thus they do not include evidence from recent studies (e.g., Kaminer, Burleson, Burke, & Litt, 2014). Other reviews have focused only on a narrow category of substance use treatment (e.g., family therapy; Lindström et al., 2013) or a specific subpopulation of adolescents (e.g., opiate-dependent; Minozzi, Amato, Bellisario, & Davoli, 2014), thereby precluding any statements about comparative effectiveness of different treatment modalities.

Objectives

This meta-analysis sought to quantitatively synthesize findings from the current evidence base of adolescent substance use effectiveness research, with particular emphasis on examining variability in effects across treatment types. Specifically, this meta-analysis examined (1) the comparative effectiveness of different treatment modalities on adolescents' substance use, (2) changes in adolescents' substance use after entry into treatment, and (3) variability in these changes across participant and treatment characteristics. We addressed the first aim by examining the comparative effectiveness of different treatment modalities represented in eligible experimental and quasi-experimental studies. We addressed the second and third aims by synthesizing findings from the individual treatment arms in each of the eligible studies.

Methods

Protocol and Registration

The current study updates findings from a prior meta-analysis on adolescent substance use treatment effectiveness (Tanner-Smith et al., 2013). Thus, the current study generally followed the protocol for the original meta-analysis, with few minor modifications to the inclusion/exclusion criteria, described next.

Inclusion and Exclusion Criteria

The population of eligible studies for this meta-analysis was experimental and controlled quasi-experimental evaluations of substance use treatment for adolescents. To be eligible for inclusion, studies had to (1) evaluate a substance use treatment program, defined as any program with the explicit aim of reducing, remediating, or eliminating alcohol or illicit substance use among youth (early interventions or prevention programs were excluded, tobacco/caffeine focused programs were excluded); (2) include a comparison condition that could receive no treatment or an alternative treatment; (3) measure substance use at least once after the completion of the treatment program; (4) report findings on a study sample of youth ages 12–18 with current or recent substance use disorder diagnoses (at-risk or preclinical samples were excluded); (5) be published during or after 1980; (6) be conducted in the United States or Canada; and (7) use an appropriate research design.

Appropriate research designs included experiments with the following characteristics:

- Youth were randomly assigned to conditions.
- Quasi-experiments matched participants on at least one baseline measure of substance use.
- Quasi-experiments used statistical controls to adjust for baseline differences in participants' substance use.
- Quasi-experiments provided enough information to permit calculation of effect sizes indexing baseline differences in participants' substance use (which we could then use to adjust the posttest effect sizes).

We excluded studies that had fewer than 10 adolescents in each condition at the time of assignment to study conditions. There were no other restrictions on eligibility, and studies were not excluded based on their publication status.

Search Strategy

A comprehensive search strategy was used to identify studies that met the aforementioned inclusion criteria. The original literature search was completed in 2008 (see Tanner-Smith et al., 2013, for more details). For the current study, we updated the literature search through December 2014. The following electronic database were searched using ProQuest: ERIC, International Bibliography of Social Sciences, ProQuest Criminal Justice, ProQuest Education, ProQuest Family Health, ProQuest Health & Medical Complete, ProQuest Health Management, ProQuest Nursing & Allied Health, ProQuest Psychology, ProQuest Science, ProQuest Social Science, ProQuest Sociology, ProQuest Dissertations & Theses (United States, United Kingdom, and Ireland), PsycARTICLES, PsycINFO, and Sociological Abstracts; we also searched PubMed. We conducted extensive supplementary searches of the following research registers and websites: Campbell Collaboration Library, Cochrane Collaboration Library, CrimeSolutions.gov, International Clinical Trials Registry, National Criminal Justice Reference Services, National Registry of Evidence-based Programs and Practices, Chestnut Health Systems, RAND Drug Policy Research Center, and the Substance Abuse and Mental Health Services Administration. We checked the bibliographies of all screened and eligible studies, as well as the bibliographies of prior narrative reviews and meta-analyses. We also conducted hand-searches of 2010–2014 conference proceedings from the American Society of Criminology, College on Problems of Drug Dependence, and Joint Meeting on Adolescent Treatment Effectiveness. We conducted hand-searches of manuscripts published in the *Journal of Consulting and Clinical Psychology* and the *Journal of Substance Abuse Treatment*.

Screening and Coding Procedures

Under the supervision of the first author, a team of master's-level research assistants conducted all eligibility screening and coding. First, all abstracts and titles were screened independently by two researchers; we retrieved the full text for any report deemed potentially eligible by at least one researcher. Next, all retrieved full-text reports were screened for eligibility independently by two researchers; the first author resolved any disagreements about eligibility. Finally, the studies deemed eligible for inclusion were independently coded by two researchers, and the first author resolved any coding disagreements.

All data extraction followed a standardized coding protocol, and data were entered directly into a FileMaker Pro database. The coding protocol was an abbreviated version of the one used in the original meta-analyses (Tanner-Smith et al., 2013), and it provided detailed instructions for extracting data related to general study characteristics, participant groups, the treatment conditions, outcome measures, and statistical data needed for effect size calculations.

Statistical Procedures

Effect size metric. Most included studies reported continuous measures for substance use outcomes (e.g., number of days used), so we used the small-sample corrected standardized mean

difference effect size (Hedges' g) to index the effects of post-treatment differences in substance use. Effect sizes were coded such that positive values (greater than zero) indicated beneficial treatment effects for the focal treatment program. For the studies that measured outcomes on a binary scale (e.g., abstinence), we calculated an odds ratio effect size and used the Cox transformation to convert those to standardized mean difference effect sizes (Sánchez-Meca, Marín-Martínez, & Chacón-Moscoso, 2003). We examined the distribution of effect sizes and sample sizes for outliers, but no outliers were identified.

Because some studies had three or more treatment conditions or groups being compared, group comparison effect sizes were available for 95 different treatment–comparison group pairs. These 95 treatment–comparison pairs were all unique combinations of experimental groups, but they were not independent because some pairs included the same comparison group arm. For instance, one study may have contributed three unique pairs based on three treatment conditions: family therapy versus control condition, CBT versus control condition, and family therapy versus CBT. The substance use outcomes reported for the 95 treatment–comparison combinations were coded into 506 standardized mean difference effect sizes representing post-treatment differences in substance use between the conditions compared.

Moderator variables. We measured a wide range of moderator variables indexing various general study, method, treatment, and participant characteristics. The general study method characteristics included publication type (journal article vs. other), publication year, country, study design (randomized experiment vs. quasi-experiment), attrition (overall and differential), possible implementation problems (yes, no/unclear), and baseline effect sizes measuring group equivalence on age, risk level, race, and sex.

Characteristics of the treatment programs included level of care (inpatient, outpatient, continuing care), delivery in a group setting, level of family involvement, total duration between first and last session (in days), average level of treatment contact per week (in hours), frequency of treatment contact each week, whether the program followed a manualized treatment protocol, whether the treatment was explicitly tailored to address the developmentally unique needs of adolescents, and whether it was tailored to address the unique needs of youth with psychiatric comorbidities.

Finally, characteristics of the youth included the sex composition of the sample (percentage male), racial/ethnic composition of the sample (percentage Black, Hispanic, White), average age of participants, presence of any psychiatric comorbidity, and level of prior delinquency or police contact.

Missing data. A small number of missing values on method, participant, or treatment variables used in the final analyses were imputed using the expectation-maximization algorithm (Graham, Cumsille, & Elek-Fisk, 2003).

Analytic strategies. All eligible effect sizes were included in each analysis, which in most cases, meant multiple effect sizes from the same participant sample and, in some cases, effect sizes that shared a comparison group (e.g., when three conditions were compared pairwise with each other). These statistical dependencies were handled using robust variance estimation techniques to adjust all estimated standard errors for the correlated error terms arising from these

dependencies (Hedges, Tipton, & Johnson, 2010). All analyses were weighted using inverse variance weights (Hedges & Olkin, 1985; Lipsey & Wilson, 2001), using the weighting functions recommended by Hedges et al. (2010) in the presence of correlated effect sizes.

The quality of the research evidence was assessed for the totality of the body of evidence (rather than for each mean effect size, given the large number of mean effect sizes comparing different treatment programs). All studies included in this meta-analysis were required to meet a minimum quality and design threshold (i.e., randomized or well-controlled quasi-experimental designs). Thus, the overall study design, attrition, and baseline equivalence of groups was assessed and summarized for the totality of the body of research literature.

Results

Literature Search

We identified 7,369 candidate reports in the updated literature search; 520 reports were duplicates that were dropped from consideration and 5,704 reports were screened as ineligible at the abstract level (Exhibit 1). Of the 1,145 articles retrieved in full text, 829 articles were deemed ineligible. The final meta-analysis includes findings from 61 independent study samples (reported in 316 documents).

Description of Included Studies

Exhibit 2 provides a brief summary of the 61 samples included in the meta-analysis (see Appendix A for a list of references to included studies and Appendix B for a description of the included studies). Most of the studies (90%) were published in journal articles and all (100%) were conducted in the United States. The methodological quality of the studies was generally high; most studies (90%) randomly allocated participants to conditions. The average overall attrition rate was 0.19 (standard deviation [*SD*] = 0.18), the average differential attrition between groups was 0.05 (*SD* = 0.07), and only 15% of studies reported possible implementation problems. Although the groups were generally equivalent on pretest measures of substance use (mean Hedges' g = 0.00) and baseline measures of age (mean Hedges' g = -0.03), the focal treatment conditions tended to be at lower risk than comparison groups on measures of baseline risk, racial composition, and sex composition. All baseline difference effect sizes were coded such that positive values ($g > 0$, odds ratio > 1) indicated the participants in the focal treatment conditions were at lower risk of substance. Thus, compared with participants in the comparison conditions, the focal treatment participants tended to be at significantly lower risk, were more likely to be racial minorities, and more likely to be female.

Most of the effect sizes reported in the studies indexed differences on measures of mixed substance use (46%), the average time span covered by outcomes was 63 days (*SD* = 65.78), and the average length of follow-up was 38 weeks (*SD* = 32.02).

Study samples were predominantly male (M = 71%) and White (M = 52%); the average age was 16.04 (*SD* = 0.97). Most youth had some level of prior police contact or official delinquency (57%), and most youth had diagnosed psychiatric comorbidities.

The included studies were primarily delivered at an outpatient level of care (82%). One third (33%) included treatment services delivered in a group setting, and 29% involved families in most treatment sessions. On average, the treatments were delivered during the span of 104 days ($SD = 62.54$), with approximately 1.73 contact hours per week ($SD = 1.59$), and delivered in several sessions per week. Most of the treatment programs (76%) followed a treatment manual, but few explicitly reported using treatment programs that were tailored to address the unique developmental needs of adolescents (14%) or used treatment programs that were tailored to address the psychiatric comorbidities of adolescents (17%).

Comparative Treatment Effectiveness

Examining the comparative effectiveness of treatment for adolescent substance use is complicated by several issues. First, many studies compared different versions of similar treatments with each other (e.g., culturally accommodated CBT vs. standard CBT). Many of these effect sizes were, not surprisingly, small and often close to zero. In other cases, the treatment variants compared were not of general interest. Comparisons of such very similar treatments, therefore, were not included in this first meta-analysis and are not represented in any of the exhibits showing comparative effectiveness results.

Second, most of the included studies compared one or more treatment modalities with each other. Only a small number of studies utilized no-treatment control conditions (see Appendix B). For instance, 12 studies compared CBT with some other condition; only two of those involved a no treatment control group and the others compared CBT with another type of treatment, such as, family therapy or MET/CBT. (Exhibit 3, discussed in more detail later, shows the number of studies and effect sizes available for each comparison.) Many treatment–treatment combinations were not directly compared in the literature, however, (e.g., behavioral therapy vs. MET/CBT) and thus such direct comparisons between many treatment types could not be made.

To estimate the comparative effectiveness of different adolescent substance abuse treatment types from the data available, we employed a meta-regression model using robust standard errors. Given the variability in the methodological quality of the included studies, we used meta-regression models as well to estimate method adjusted results that adjusted for the potential confounding effects of differences across studies on key methodological characteristics. These covariate adjustments held all effect sizes at the modal follow-up timing (12.9 weeks), and the mean values across all studies for (a) attrition rate, (b) substance use outcome type (alcohol, marijuana, other drugs), (c) pretest differences, and (d) overall group equivalence on risk, race, and sex. The method-adjusted effect sizes were created by adding the residuals from the meta-regression model to a constant value calculated as the predicted value for each treatment type comparison holding the covariates in the model at the values noted above.

Exhibit 3 shows the random effects mean posttest effect sizes for each treatment type versus the other comparison conditions with which it was paired in the available studies (unadjusted effects are in the left panel, method-adjusted effects are in the right panel). Positive mean effect sizes indicate that the designated treatment type exhibited, on average, better outcomes than the comparison treatment type; negative mean effect sizes indicate the designated treatment type had worse outcomes. Note that the effect sizes for the identified treatment types shown in the

Exhibit 3 are not mutually exclusive (i.e., each treatment type was also represented as a comparison condition in a different mean effect size estimate).

Exhibit 3 also shows the 95% confidence intervals for each mean effect size. Those confidence intervals are wide because of the small number of unique treatment–comparison combinations available for most comparisons. Any consideration of the mean effect sizes in Exhibit 3, therefore, should recognize that even widely divergent mean values for different treatment–comparison pairs might have confidence intervals that overlap zero and each other.

Thus, although Exhibit 3 shows that some treatment types tended, on average, to show somewhat larger, smaller, or about the same effects as the aggregate of all the treatment conditions with which they were compared, most of those mean effect sizes were not statistically significant. Among the few exceptions was family therapy, which showed a positive mean effect size across all the comparisons in which it was involved with more than two independent samples. CBT and multiservice programs also showed positive effects relative to most of the comparisons in which they were involved. In contrast, the practice as usual and no-treatment control conditions were consistently less effective than the other treatments with which they were compared.

The small number of studies available for each comparison and the associated low statistical power for reliably detecting substance use outcome differences between different treatment conditions allows little differentiation of more and less effective types of treatment. Examining the direction and magnitude of the mean effect sizes for the different comparisons, however, does reveal a general pattern of four groupings. The four groupings are described as follows:

1. *No-treatment, practice as usual conditions.* These control conditions are presumptively less effective than other treatment conditions. Furthermore, the mean effect size for all the treatment types compared with a practice as usual condition is statistically significant (and negative), giving support to the view that most of the active treatment types produce better outcomes than generic practice as usual.
2. *Group/mixed counseling, PET, pharmacological, self-help conditions.* The outcomes of these treatments compare unfavorably with almost every treatment with which they are compared. They may be more effective than no-treatment control conditions, but the evidence for that is rather limited.
3. *MET/CBT, multiservice package.* These treatments are more effective than no-treatment control or practice as usual conditions but have minimal or small effects relative to other active treatment conditions. MET/CBT compares favorably with practice as usual conditions but unfavorably with the treatment types that fall in the fourth category below. Multiservice package programs compare favorably to no treatment but differ minimally from the other types of treatment with which they are compared.

4. *Assertive continuing care (ACC), behavioral therapy, CBT, MET, family therapy.* These treatment modalities tend to be more effective than the other modalities in the first three categories, with only modest differences from the other treatment types in this category. Overall, the mean effect sizes relative to practice as usual are in the 0.15–0.25 range. Using Cohen’s U3 index, these effects translate into a 5% to 10% improvement relative to participants in the comparison conditions. Using the results from the comparison conditions in studies reporting the number of days youth consumed marijuana in the past month, an effect size of 0.25 translates into a reduction from an average of 9.7 days in the past month to 7.2 days in the past month—a 25% reduction.

Overall, however, these comparisons of outcomes between different types of treatments do not provide much insight into the extent to which substance use is reduced after adolescents enroll in treatment. For that, we next examined pretest–posttest changes in substance use.

Changes in Substance Use

To examine pretest–posttest changes in substance use, the treatment and comparison arms of the 95 treatment–comparison group pairs from the 61 studies used in the first analysis were separated to create pretest–posttest effect sizes representing change between the beginning and end of the treatment period. Some of the 190 individual arms of those 95 pairs from the 61 studies were duplicates originating from studies in which more than one treatment was contrasted with the same comparison condition. In other instances, the pretest baseline means were not reported for substance use outcomes that contributed to the prior analysis. Pre–post effect sizes, therefore, could be computed for only 98 treatment and comparison group arms from only 49 of the 61 studies contributing to the first analysis described previously. Those adolescent samples provided 380 pre–post effect sizes for analysis. The inability to represent all the study arms and all the substance use outcomes that had contributed to the previous group comparison analysis in the pre–post analysis reported next means the results of the two are not fully comparable. Differences can come from the different analysis approaches used as well as from the fact that the same studies and outcomes are not represented in both analyses.

Across all the 380 pre–post substance use effect sizes, the random effects mean was 0.54 ($p < .001$; 95% CI [0.38, 0.71]), indicating that adolescents exhibited significant decreases in their substance use after entry into treatment. The mean reductions were greatest for mixed substance use ($\bar{g} = 0.63$, $p < .001$, 95% CI [0.42, 0.84]) and marijuana use ($\bar{g} = 0.36$, $p = .006$, 95% CI [0.13, 0.58]). The mean reductions were nonsignificant for alcohol ($\bar{g} = 0.22$, $p = .06$, 95% CI [-0.01, 0.45]) and other specific (e.g., cocaine) substance use ($\bar{g} = 0.42$, $p = .08$, 95% CI [-0.26, 1.09]). There was evidence of substantial heterogeneity in the pretest–posttest effect sizes ($\chi^2 = 568.81$, $p < .001$, $\tau^2 = 0.25$; $I^2 = 50.08\%$), indicating that differences across the arms influence the magnitude of adolescents’ reductions in substance use after entry into treatment.

Various method, participant, and treatment characteristics of the different study arms may account for at least some of the variation in the observed pre–post effect sizes. To examine the influence of such characteristics, we selected variables representing three distinct categories of study characteristics: those related to the study methods, the nature of the adolescent participants, and features of the treatment. We then fit a series of nested meta-regression models that examined the contribution of each of these sets of variables. Model I included methodological

variables and assessed the potential for method differences to be confounded with the substantive variables of interest. Model II then added demographic characteristics of the participants to examine whether gender, race/ethnicity, age, comorbidity, or delinquency distinguished adolescents who typically responded better or worse to treatment irrespective of the nature of the treatment. Model III then added two general characteristics of the treatment provided to those participants—duration of treatment and frequency of contact. This model allowed assessment of the general contribution of the amount of treatment irrespective of the specific treatment modality, participant demographics, or methodological variables. Finally, Model IV then added dummy codes for the treatment modality represented in each treatment arm; the treatment frequency and duration variables were excluded from this model in order to provide a test of comparative effects of treatment modalities without adjusting for differences in duration across modalities. All models controlled for substance use outcome type and whether the treatment arms were indicated in the original studies as those of focal interest or as comparison conditions.

Exhibit 4 presents the unstandardized regression coefficients (b) from these models along with their robust standard errors and standardized regression coefficients (β). As shown in Model I, treatments that were in the “focal” arm of a study exhibited significantly larger pretest–posttest improvement effect sizes, whereas treatment arms from randomized controlled trials exhibited significantly smaller improvements over time. There was no evidence that outcome type, pretest–posttest interval, attrition, or implementation problems were associated with larger or smaller improvements.

The Model II results show that none of the characteristics of the participant samples that were examined—gender, race/ethnicity, age, clinical comorbidity, or delinquency—were significantly associated with reductions in substance use, net of the method quality characteristics. Model III also indicated that, net of the method and participant characteristics, neither frequency of treatment contact nor treatment duration had significant independent relationships with pre–post improvement.

The primary contribution of the first three regression models summarized in Exhibit 4, however, is not so much the identification of specific variables with independent relationships to pre–post improvement. More important for present purposes is the ability of the full set of variables in Model III to control for more general differences between the treatment arms that might be confounded with the effects of the specific treatment types of interest from a comparative effectiveness perspective. Though most of the method, participant, and general treatment characteristics were not significantly related to pre–post effect sizes, some of that is due to low statistical power, as suggested by the standardized coefficients that show relationships of moderate magnitude that are, nonetheless, not statistically significant.

To estimate the substance use reduction associated with each treatment type while adjusting for any potential confounding with the variables shown in Exhibit 4, covariate-adjusted pre–post effect sizes were estimated from the meta-regression shown in Model II. Note that this model does not include the treatment dummy indicators or the two variables added in Model III (frequency of treatment contact, treatment duration). We did not want to hold these variables constant in this analysis because they refer to inherent characteristics of each treatment modality as delivered. Controlling out these differences between treatments, therefore, could control out some of the distinctive characteristics of the treatment modalities on which this analysis focuses.

To obtain covariate-adjusted pre–post effect sizes for each treatment modality, the residual from Model II was added to the constant value for the predicted effect size when the other predictors were held at their weighted overall mean values. Exhibit 5 shows the random effects means and 95% confidence intervals for these covariate-adjusted pre–post effect sizes for the treatment types, listed in ascending order of mean effect size. The vertical line at zero represents no improvement from pretest to posttest, and the mean effect sizes to the right of that line indicate that, on average, there were improvements such as increases in abstinence and decreases in frequency of use. Confidence intervals that do not include zero indicate that the mean pre–post effect size was statistically significant. As Exhibit 5 shows, all the treatment types exhibited both positive and statistically significant improvements in substance use over time, ranging from 0.86 to 1.38 standard deviation improvements at posttest.

Especially notable in Exhibit 5 is the overlap in confidence intervals for many of the treatment types and the no-treatment control arms from those studies that used such controls. The regression coefficients on the treatment type dummy codes for Model IV in Exhibit 4 directly test the difference between the mean covariate-adjusted effect size for each treatment type shown and the mean for the no-treatment control groups (omitted as the reference category in that regression), net of the other treatment types.

As shown in Exhibit 4 Model IV, none of the treatment types exhibited pre–post effect sizes that were significantly smaller than or larger than those for the no-treatment controls. Wald tests contrasting the treatment types to each other also provided little evidence of significant differences in improvements across treatment types. The only exceptions to this were that treatment as usual arms exhibited significantly smaller improvements than CBT ($\chi^2 = 3.86$, $p = .04$) and the other or mixed-treatment arms ($\chi^2 = 6.61$, $p = .01$). Overall, the comparisons of the effects of the various treatment types resulting from this pre–post change analysis were substantially similar to those resulting from the group comparison analysis reported earlier.

Summary

This study synthesized findings from 61 controlled studies examining the effects of substance use treatment for adolescents. The first aim of this study was to examine the comparative effectiveness of different treatment modalities represented in the literature. Given the ethical and practical dilemmas of using no-treatment control conditions, not surprisingly, most studies examined the comparative effects of two or more treatment types. Using data from the controlled comparisons in studies, as well as the pre–post changes in the arms of these studies, we found evidence of effectiveness for several treatment modalities. ACC, behavioral therapy, CBT, MET, and family therapy had the strongest direct evidence of effectiveness in the literature. Generic practice as usual conditions, which typically involved referral to standard community services, were consistently less effective than these treatment types. There was mixed and/or sparse evidence of effectiveness for other treatment types (e.g., group/mixed counseling, MET/CBT, multiservice packages).

Overall, the results from the meta-analysis provide evidence for the general efficacy of active treatment relative to no treatment or practice as usual, with no indication that these treatment programs produce worse outcomes. Nevertheless, results from the pre–post analysis indicated an

almost universal reduction in substance use between treatment entry and termination regardless of treatment type (with reductions in substance use observed even for the no treatment conditions). This could, of course, result largely or entirely from spontaneous remission on the part of the adolescent participants or even regression to the mean given that entry into treatment is likely to come at a point where substance use problems are especially severe. Nonetheless, given the indications that at least some treatments are effective in reducing substance use, it is encouraging to see widespread improvements among the adolescents in the research studies.

The results from the meta-analysis yielded minimal differentiation in the effects related to the characteristics of the adolescent samples used in these studies. Indeed, the analysis of pre-post reductions in substance use showed no evidence of differences related to gender, race/ethnicity, age, comorbidity, or delinquency level. This somewhat surprising lack of relationships between participant characteristics and treatment effects is perhaps an encouraging finding. It indicates that treatments are relatively robust in their effects, that is, produce similar outcomes for adolescents with different demographic characteristics and histories. These conclusions are only speculative, however, and are based on the correlational meta-regression models from aggregated data (rather than subgroup results reported in individual studies).

Treatment providers tasked with selecting a substance use treatment model to use with adolescent clients can use the results from this meta-analysis to guide those decisions, but should of course consider other factors related to cost effectiveness, ease of implementation, and transportability to different settings. For instance, cost effectiveness research suggests that the costs per day of abstinence are significantly higher for branded family therapy programs relative to MET/CBT and behavioral therapy programs (Dennis et al., 2004); thus, providers should also consider these issues when selecting treatment modalities.

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Exhibit 1. Study Identification Flow Diagram

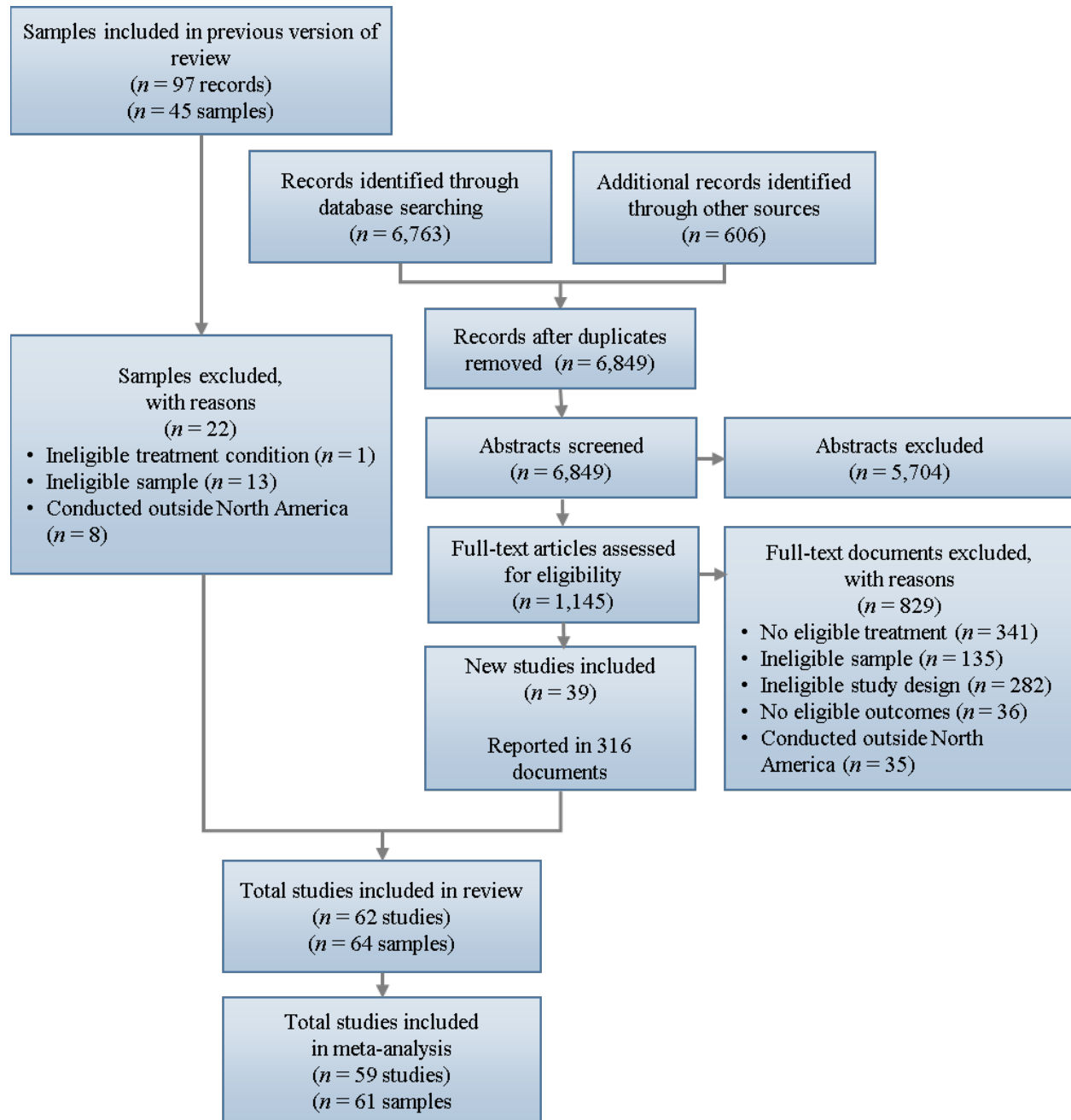


Exhibit 2. Key Features of the Studies, Outcomes, Participants, and Treatment Conditions ($k = 61$; $n = 506$)

	Frequency (%)	Mean (SD)	Range
Study Characteristics			
Journal article	55 (90)		
Publication year		2006 (7.64)	1983–2015
Conducted in United States	61 (100)		
Method Quality Characteristics			
Randomized experiment	55 (90)		
Quasi-experiment	6 (10)		
Overall attrition ^a		0.19 (0.18)	0–0.77
Differential attrition ^a		0.05 (0.07)	0–0.41
Possible implementation problems	9 (15)		
Baseline differences in pretest (Hedges' g)		0.00 (0.30)	-0.79–0.94
Baseline differences in age (Hedges' g)		-0.03 (0.25)	-0.67–0.67
Baseline differences in risk level (Hedges' g)		1.66 (1.62)	0.30–11.45
Baseline differences in race (odds ratio)		1.13 (0.64)	0.02–2.87
Baseline differences in sex (odds ratio)		1.33 (0.64)	0.38–4.29
Outcome Characteristics ^a			
Alcohol use	126 (25)		
Marijuana use	113 (22)		
Other specific substance use	33 (7)		
Mixed substance use	234 (46)		
Time span of outcome measure (days)		62.88 (65.78)	0–540
Pretest–posttest interval (weeks)		37.63 (32.02)	2–310
Participant Characteristics			
Percent male		.71 (0.17)	0–1
Percent Black		.21 (0.22)	0–.75
Percent Hispanic		.30 (0.30)	0–1
Percent White		.52 (0.28)	0–1
Average age		16.04 (0.97)	13.7–19.5
Psychiatric comorbidity	39 (64)		
Delinquent sample	35 (57)		
Focal Treatment Characteristics			
Level of care			
Inpatient	4 (7)		
Outpatient	50 (82)		
Continuing care	7 (11)		
Delivered in group format ^a	25 (33)		
Family present for most sessions ^a	22 (29)		

	Frequency (%)	Mean (SD)	Range
Duration (days) ^a		104.14 (62.54)	1–365
Hours of contact per week ^a		1.73 (1.59)	1–10
Frequency of contact ^a		3.70 (1.01)	1–5
Manualized treatment ^a	58 (76)		
Developmentally tailored treatment ^a	11 (14)		
Psychiatric comorbidity tailored treatment ^a	13 (17)		

Note. SD = standard deviation. Means and standard deviations shown for continuous measures; frequencies and percentages shown for dichotomous measures. ^a = estimates calculated at the effect size level.

Exhibit 3. Mean Group Comparison Posttest Effect Sizes and 95% Confidence Intervals for Each Treatment Category versus Available Comparison Conditions

			Unadjusted		Method Adjusted	
Treatment Combination	<i>n</i>	<i>k</i>	Mean	95% CI	Mean	95% CI
ACC						
vs. Behavioral	6	1	0.21		-0.25	
vs. Practice as usual	9	2	0.30	[-0.14, 0.74]	0.24	[0.05, 0.42]
vs. All of the above	15	2	0.20	[-0.58, 0.99]	0.16	[-0.93, 1.25]
Behavioral Therapy						
vs. ACC	6	1	-0.21		0.25	
vs. Family	6	1	-0.24		0.25	
vs. MET	6	1	0.05		-0.26	
vs. Practice as usual	5	2	0.41	[-0.55, 1.37]	0.27	[-0.76, 1.29]
vs. All of the above	23	3	0.24	[-0.10, 0.57]	0.14	[-0.35, 0.64]
Behavioral + ACC						
vs. Practice as usual	6	2	0.09	[-0.32, 0.50]	0.13	[-0.29, 0.56]
CBT						
vs. Behavioral + MET	11	1	0.33		0.33	
vs. Family	31	3	-0.33	[-1.72, 1.06]	-0.14	[-1.39, 1.11]
vs. Group and mixed counseling	14	2	0.91	[-1.61, 3.43]	0.64	[-4.23, 5.50]
vs. MET/CBT	1	1	0.00		-0.01	
vs. PET	7	1	0.24		0.05	
vs. Practice as usual	6	2	0.83	[-1.48, 3.13]	0.37	[-1.89, 2.62]
vs. No treatment	5	2	0.80	[-6.15, 7.75]	0.61	[-4.97, 6.19]
vs. All of the above	75	12	0.25	[-0.15, 0.64]	0.14	[-0.13, 0.41]
Family Therapy						
vs. Behavioral	6	1	0.24		-0.25	
vs. CBT	31	3	0.33	[-1.06, 1.72]	0.14	[-1.11, 1.39]
vs. CBT + family	1	1	0.26		0.11	
vs. Group and mixed counseling	3	1	0.46		0.50	
vs. MET	6	1	-0.19		-0.30	
vs. MET/CBT	18	3	0.15	[-0.59, 0.90]	0.05	[-0.54, 0.63]
vs. MET/CBT + family	3	1	0.16		0.07	
vs. Multiservice package	12	1	-0.12		-0.14	
vs. Multiservice package + family	3	1	0.63		-0.67	
vs. PET	7	3	0.40	[-0.18, 0.99]	0.25	[-0.21, 0.72]
vs. PET + Family	3	1	0.69		0.47	
vs. Self-help	3	2	0.79	[-3.50, 5.08]	0.67	[-2.94, 4.27]
vs. Practice as usual	42	5	0.21	[-0.10, 0.52]	0.14	[-0.16, 0.44]

			Unadjusted		Method Adjusted	
Treatment Combination	<i>n</i>	<i>k</i>	Mean	95% CI	Mean	95% CI
vs. All of the above	138	18	0.18	[0.01, 0.35]	0.08	[-0.07, 0.24]
Group and Mixed Counseling						
vs. CBT	14	2	-0.91	[-3.43, 1.61]	-0.64	[-5.50, 4.23]
vs. Family	3	1	-0.46		-0.50	
vs. Family + PET	3	1	-0.21		0.13	
vs. PET	4	2	0.19	[-6.30, 6.68]	0.16	[-6.78, 7.10]
vs. Pharmacological	36	1	0.40		-0.33	
vs. All of the above	60	6	-0.25	[-0.91, 0.40]	-0.19	[-0.80, 0.43]
MET						
vs. Behavioral	6	1	-0.05		0.26	
vs. Family	6	1	0.19		0.30	
vs. PET	3	1	-0.28		-0.21	
vs. No treatment	7	2	0.42	[-4.42, 5.25]	0.38	[-3.12, 3.89]
vs. All of the above	22	4	0.11	[-0.55, 0.76]	0.17	[-0.41, 0.74]
MET/CBT						
vs. Behavioral + MET	18	2	-0.02	[-0.58, 0.53]	0.02	[-1.36, 1.41]
vs. CBT	1	1	0.00		0.01	
vs. Family	18	3	-0.15	[-0.90, 0.59]	-0.05	[-0.63, 0.54]
vs. Family + MET/CBT	3	1	-0.50		-0.47	
vs. Multi-service package	30	4	-0.04	[-0.16, 0.08]	-0.01	[-0.10, 0.09]
vs. PET	3	1	-0.17		-0.34	
vs. Practice as usual	26	2	0.35	[-1.23, 1.93]	0.15	[-2.73, 3.03]
vs. All of the above	99	10	0.02	[-0.11, 0.15]	0.01	[-0.09, 0.12]
MET/CBT + Pharmacological						
vs. No treatment	12	3	0.07	[-0.26, 0.41]	0.07	[-0.59, 0.73]
Multiservice package						
vs. Family	12	1	0.12		0.14	
vs. MET/CBT	30	4	0.04	[-0.08, 0.16]	0.01	[-0.09, 0.10]
vs. Behavioral + family	5	1	0.07		0.06	
vs. Behavioral + MET	26	2	0.02	[-0.45, 0.49]	-0.03	[-0.18, 0.12]
vs. Practice as usual	5	3	0.03	[-0.68, 0.75]	0.10	[-0.68, 0.88]
vs. No treatment	14	1	0.43		0.56	
vs. All of the above	92	10	0.07	[-0.09, 0.23]	0.08	[-0.08, 0.25]
PET						
vs. CBT	7	1	-0.24		-0.05	
vs. CBT + Family	11	1	0.84		0.42	
vs. Family	7	3	-0.40	[-0.99, 0.18]	-0.25	[-0.72, 0.21]

			Unadjusted		Method Adjusted	
Treatment Combination	<i>n</i>	<i>k</i>	Mean	95% CI	Mean	95% CI
vs. Family + MET/CBT	3	1	0.33		-0.10	
vs. Group and mixed counseling	4	2	-0.19	[-6.68, 6.30]	-0.16	[-7.10, 6.78]
vs. MET	3	1	0.28		0.21	
vs. MET/CBT	3	1	0.17		0.34	
vs. All of the above	38	7	-0.26	[-0.63, 0.10]	-0.15	[-0.48, 0.17]
Pharmacological Treatment						
vs. Group and mixed counseling	36	1	-0.40		0.33	
vs. No treatment (placebo)	8	4	-0.09	[-0.91, 0.73]	-0.12	[-0.76, 0.52]
vs. All of the above	44	5	0.03	[-0.56, 0.61]	-0.01	[-0.49, 0.47]
Self-help						
vs. Family	3	2	-0.79	[-5.08, 3.50]	-0.67	[-4.27, 2.94]
Practice as Usual						
vs. Behavioral	5	2	-0.41	[-1.37, 0.55]	-0.27	
vs. CBT	6	2	-0.83	[-3.13, 1.48]	-0.37	[-2.62, 1.89]
vs. CBT + family	1	1	0.04		-0.03	
vs. Family	42	5	-0.21	[-0.52, 0.10]	-0.14	[0.44, 0.16]
vs. MET/CBT	26	2	-0.35	[-1.93, 1.23]	-0.15	[-3.03, 2.73]
vs. Multiservice	5	3	-0.03	[-0.75, 0.68]	-0.10	[-0.88, 0.68]
vs. Occupational skills training	25	1	0.18		-0.07	
vs. ACC	9	2	-0.30	[-0.74, 0.14]	-0.24	[-0.42, -0.05]
vs. Behavioral + ACC	6	2	-0.09	[-0.50, 0.32]	-0.13	[-0.56, 0.29]
vs. All of the above	125	17	-0.20	[-0.33, -0.07]	-0.14	[-0.27, -0.02]
No Treatment						
vs. CBT	5	2	-0.80	[-7.75, 6.15]	-0.61	[-6.19, 4.97]
vs. CBT + pharmacological	4	1	-0.19		-0.17	
vs. MET	7	2	-0.42	[-5.25, 4.42]	-0.38	[-3.89, 3.12]
vs. MET/CBT + pharmacological	12	3	0.07	[-0.26, 0.41]	-0.07	[-0.73, 0.59]
vs. Multiservice	14	1	-0.43		-0.56	
vs. Pharmacological	8	4	0.09	[-0.73, 0.91]	0.12	[-0.52, 0.76]
vs. All of the above	50	13	-0.15	[-0.38, 0.08]	-0.07	[-0.27, 0.14]

Note. ACC = assertive continuing care; CBT = cognitive-behavioral therapy; CI = confidence interval; *k* = number of studies; MET = motivational enhancement therapy; *n* = number of effect sizes; PET = psychoeducational therapy. All estimates adjusted for baseline group equivalence and pretest differences, pretest-posttest time interval, overall attrition rate, implementation problems, and substance use outcome type (alcohol, marijuana, other drugs).

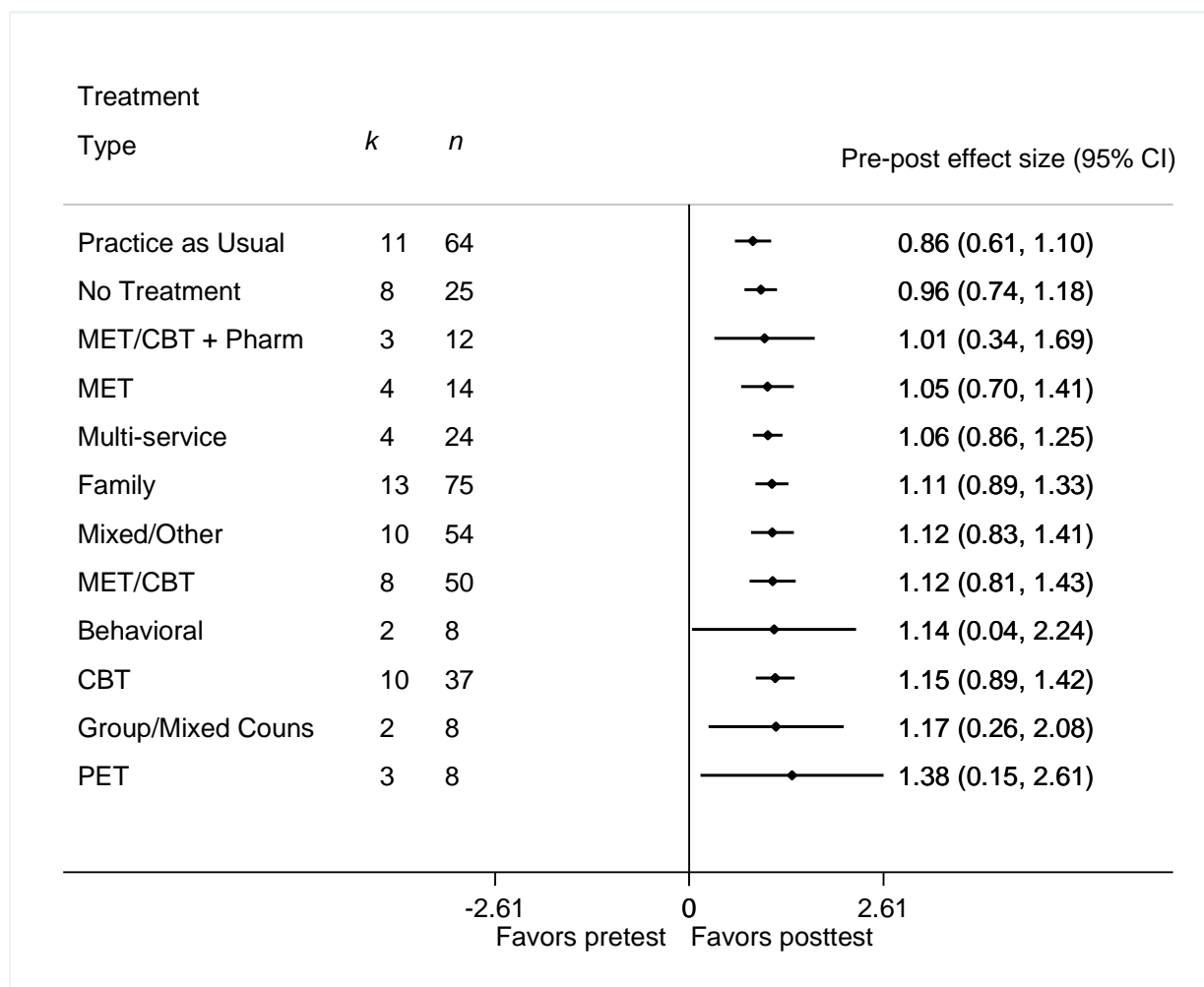
Exhibit 4. Coefficients and Robust Standard Errors From Nested Meta-Regression Models Predicting Pretest–Posttest Effect Sizes ($k = 37$; $n = 380$)

	Model I				Model II				Model III				Model IV			
	<i>b</i>		<i>se</i>	β	<i>b</i>		<i>se</i>	β	<i>b</i>		<i>se</i>	β	<i>b</i>		<i>se</i>	β
Alcohol outcome	-0.45		0.24	-0.25	-0.44		0.22	-0.24	-0.44	*	0.22	-0.24	-0.50	*	0.25	-0.27
Marijuana outcome	-0.14		0.14	-0.07	-0.11		0.15	-0.05	-0.12		0.22	-0.06	-0.14		0.16	-0.07
Other substance outcome	0.29		0.56	0.03	0.51		0.84	0.05	0.50		0.88	0.05	0.26		0.79	0.03
Arm in non-focal position	0.17	*	0.06	0.15	0.17	*	0.06	0.14	0.17	*	0.06	0.14	0.02		0.12	0.02
Pretest-posttest interval	-0.00		0.00	-0.10	-0.00		0.00	-0.10	-0.00		0.01	-0.08	-0.00		0.00	-0.14
Randomized control design	-1.13	*	0.40	-0.60	-1.07		0.51	-0.57	-1.04		0.59	-0.55	-1.12		0.49	-0.59
Overall attrition	0.01		0.30	0.00	-0.00		0.34	-0.00	-0.01		0.39	-0.00	0.01		0.37	0.00
Implementation problems	-0.05		0.22	-0.03	-0.04		0.24	-0.02	-0.04		0.25	-0.03	-0.01		0.24	-0.00
Percent male					0.06		0.38	0.02	0.06		0.43	0.02	0.09		0.41	0.03
Percent White					-0.11		0.27	-0.05	-0.10		0.29	-0.05	-0.00		0.28	-0.00
Average age					0.04		0.10	0.09	0.04		0.11	0.08	0.09		0.11	0.17
Psychiatric comorbidity					0.06		0.12	0.04	0.05		0.14	0.04	0.10		0.12	0.08
Delinquency level					0.07		0.16	0.06	0.08		0.17	0.06	0.03		0.14	0.02
Frequency of treatment contact									-0.01		0.11	-0.01				
Treatment duration (days)									-0.00		0.00	-0.03				
Behavioral therapy													0.43		0.27	0.09
CBT													0.40		0.22	0.25
Family therapy													0.40		0.26	0.26
Group/mixed counseling													0.29		0.24	0.07
MET													0.35		0.23	0.13
MET/CBT													0.28		0.25	0.14
MET/CBT + pharmacological													0.18		0.19	0.06
Multiservice package													0.26		0.27	0.10
PET													0.55		0.34	0.17
Other/mixed													0.37		0.21	-0.02
Practice as usual													-0.04		0.20	-0.05

Note. β = standardized meta-regression coefficient; *b* = unstandardized meta-regression coefficient; CBT = cognitive-behavioral therapy; MET = motivational enhancement therapy; PET = psychoeducational therapy; *se* = standard error of unstandardized regression coefficient. No treatment conditions are the reference category for treatment modality dummy coefficients.

* $p < .05$.

Exhibit 5. Pretest–Posttest Changes in Substance Use After Intake, by Treatment Type



Appendix A. References to Studies Included in the Meta-Analysis

Aubrey, L. L. (1998). *Motivational interviewing with adolescents presenting for outpatient substance abuse treatment* (Unpublished doctoral dissertation, University of New Mexico, Albuquerque).

Azrin, N. H., Donohue, B., Besalel, V. A., Kogan, E. S., & Acierno, R. (1994). Youth drug abuse treatment: A controlled outcome study. *Journal of Child & Adolescent Substance Abuse*, 3(3), 1–16.

Supplementary Reports:

Azrin, N. H., Acierno, R., Kogan, E. S., Donohue, B., Besalel, V. A., & McMahon, P. T. (1996). Follow-up results of Supportive versus Behavioral therapy for illicit drug use. *Behaviour Research and Therapy*, 34(1), 41–46.

Azrin, N. H., McMahon, P. T., Donohue, B., Besalel, V. A., Lapinski, K. J., Kogan, E. S., ... Galloway, E. (1994). Behavior therapy for drug abuse: A controlled treatment outcome study. *Behaviour Research and Therapy*, 32(8), 857–866.

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Appendix B. Description of Included Studies

Aubrey (1998)	A randomized trial that examined the effectiveness of motivational interview (MI) with feedback compared with treatment as usual. MI consisted of one session implemented with adolescents before entering outpatient therapy. This session included personalized feedback regarding substance use behavior, norm referencing, risks for and consequences of substance use, and advice regarding behavior change. The treatment as usual group completed usual outpatient therapy without a preceding MI session.
Azrin et al. (1994)	A randomized trial that examined the effectiveness of behavioral counseling compared with supportive counseling. Behavioral counseling consisted of one-hour individual sessions that were initially conducted twice weekly and tapered when progress was apparent. Procedures of behavioral counseling included stimulus control, urge control, and contracting. Supportive counseling consisted of weekly two-hour group sessions promoting expressions of feelings/insights and discussions of substance use experiences with minimal direction from the counselor. Parents of adolescents in the behavioral counseling group attended all sessions and parents in the supportive counseling group attended one session per month.
Azrin et al. (2001)	A randomized trial that examined the effectiveness of family behavior therapy (FBT) compared with individual cognitive problem-solving (ICPS). FBT addressed cognitive, verbal, social, and familial factors associated with substance use and consisted of the following treatments: behavioral contracting, stimulus control, urge control, and communications training. ICPS focused on cognitive processes and emphasized problem solving. Both treatments consisted of 15 sessions completed over a period of 6 months.
Braukmann et al. (1985)	A quasi-experimental trial that examined the effectiveness of a teaching family group home compared with a nonteaching family group home. Adolescents assigned to a teaching family group home lived with a married couple who were instructed in procedures of youth advocacy and trained to teach skill building, self-government, motivation, and relationship development; adolescents participated in counseling sessions throughout the day. Adolescents assigned to a nonteaching family group home lived with staff who were not trained in a standardized model of care and conducted counseling sessions periodically.
Burleson et al. (2012)	A randomized trial that examined the effectiveness of three forms of cognitive-behavioral therapy (CBT): CBT plus in-person aftercare, CBT plus telephone aftercare, and CBT plus no-active aftercare. All participants completed a maximum of 9 weekly manually guided CBT group sessions focusing on substance refusal skills, problem solving and coping, anger management, management of negative thoughts and criticism, and building social support. The contents of in-person aftercare and telephone aftercare were identical, consisting of a functional analysis of factors that may contribute to relapse and four integrated motivational enhancement therapy and CBT sessions. In-person sessions were 50 minutes and telephone sessions were 12–15 minutes.

	Participants assigned to the CBT plus no-active aftercare group received no active treatment beyond the nine CBT sessions.
Burrow-Sanchez et al. (2015)	<p>A randomized trial that examined the effectiveness of culturally accommodated CBT (A-CBT) compared with standard CBT (S-CBT). Adolescents in both groups completed 12 weekly 90-minute CBT sessions. Therapy sessions for adolescents in the S-CBT group followed standard CBT techniques, which were not described by the study authors. For adolescents in the A-CBT group, CBT was modified to be culturally relevant to Latino adolescents; this included developing ways participants could address negative appraisals of their ethnic identities, integrating Spanish names into examples, and promoting parental involvement.</p>
Burrow-Sanchez et al. (2012)	A randomized trial that examined the effectiveness of A-CBT compared with S-CBT. S-CBT consisted of weekly 90-minute group sessions completed over a 12-week period; the sessions focused on problem solving, decision-making, and coping skills. A-CBT followed a similar format as S-CBT but included culturally relevant themes for Latino adolescents and emphasized parental involvement through regular mailings and phone calls to parents.
Cornelius et al. (2009)	A randomized, double-blind trial that examined the effectiveness of fluoxetine compared with a placebo control in a sample of comorbid youth. Adolescents were initially given 10 mg fluoxetine or placebo daily, which was increased to a target dose of 20 mg fluoxetine or placebo after 2 weeks. Adolescents in both the fluoxetine and placebo groups received CBT and motivational enhancement therapy (CBT + MET) during the trial. Treatment duration was 12 weeks for participants in both groups.
Cornelius et al. (2011)	A quasi-experimental trial that examined the effectiveness of CBT+MET with naturalistic care. CBT included a functional analysis to identify antecedents and consequences surrounding adolescents' substance use; MET was employed to promote adolescents' engagement in therapy. As part of another substudy, adolescents in the CBT+MET group were randomly assigned to receive either fluoxetine or a placebo. Adolescents who did not meet inclusion criteria for the trial were assigned to the naturalistic care group and were referred to alternate care near their homes. Treatment duration was 12 weeks.
Dakof et al. (2015)	A randomized trial comparing the effectiveness of multidimensional family therapy (MDFT) with adolescent group therapy (AGT) in a juvenile drug court. MDFT was evenly divided into clinical sessions and in-home sessions and targeted three domains: adolescent, parent, family, and community. AGT was conducted in a clinical setting and combined cognitive behavioral therapy with motivational interviewing. MDFT consisted of two sessions per week for 4 to 6 months; AGT consisted of three sessions per week for 4 to 6 months.
D'Amico et al. (2013)	A randomized trial that examined the effectiveness of free talk compared with treatment as usual. Free talk consisted of six 55-minute group sessions and used an MI approach. Session content included personalized feedback about substance use and discussions of pros and cons of substance use, willingness to change, myths about substance use, paths to addiction, and effective communication. Treatment as usual consisted of six 55-minute group sessions following an Alcoholics Anonymous approach.

- Dennis et al. (2004) A randomized trial that examined the effectiveness of a five-session regimen of MET plus CBT (MET+CBT5, a 12-session regimen of MET plus CBT (MET+CBT12), and a family support network intervention (FSN). MET+CBT5 included two individual MET sessions and three group CBT sessions delivered over a period of 6 to 7 weeks. MET+CBT12 consisted of two individual MET sessions and 10 CBT sessions delivered over a period of 12 to 14 weeks. FSN used MET+CBT12 as its foundation and added six parent education group meetings, four therapeutic home visits, referral to self-help groups, and case management services.
- Esposito-Smythers et al. (2011) A randomized trial that examined the effectiveness of Integrated CBT (I-CBT) for an alcohol/drug use disorder with co-occurring suicidality compared with enhanced treatment as usual (E-TAU). I-CBT targeted common maladaptive behaviors and beliefs that underlie both substance use and suicidality. I-CBT consisted of 6 months of acute adolescent and adolescent-parent treatment; sessions were tapered during 3 months of continuation treatment and again during 3 months of treatment maintenance. The treatment approach and schedule for adolescents assigned to the E-TAU group were determined independently by community providers. Participants in both groups were offered free medication management, if needed.
- Findling et al. (2009) A randomized trial that examined the effectiveness of fluoxetine to a placebo control. Participants received an initial 10-mg daily dose of fluoxetine or matching placebo for 4 weeks, which was then increased to a daily dose of up to 20 mg.
- Godley et al. (2014) A randomized trial that evaluated the effectiveness of contingency management (CM), assertive continuing care (ACC), and CM+ACC compared with usual continuing care (UCC). Upon discharge from a residential program, adolescents in the UCC group were referred to continuing care programs that offered a diverse range of services. Adolescents in the CM group were referred to usual continuing care and completed 12 weekly home visits with a clinician who offered incentives for negative drug/alcohol tests and/or prosocial activities. Adolescents in the ACC group were referred to continuing care and completed 10 sessions over 12 weeks designed to encourage participation in continuing care and in prosocial activities. Adolescents in the CM+ACC group were referred to continuing care and received CM and ACC services.
- Godley et al. (2010) A randomized trial that examined the effectiveness of Chestnut Bloomington outpatient therapy (CBOP), CBOP+ACC, MET+CBT7, and MET+CBT7+ACC. CBOP consisted of group, family, and individual sessions fostering desire, skills, and environmental support for change; the duration of CBOP services was individualized. MET+CBT7 consisted of two family sessions designed to encourage parental involvement, two individual sessions to assist the adolescent in developing goals for change, and three 90-minute group sessions promoting refusal skills, social support, management of high-risk situations, and coping with relapse. Adolescents assigned to an ACC group received 12 to 14 post-treatment weekly home visits.
- Godley et al. (2007) A randomized trial that examined the effectiveness of ACC compared with UCC. Upon discharge from a residential treatment facility, adolescents in the

- ACC group received 90 days of case management services. These services included weekly meetings with adolescents and their families to actively link them with continuing care in their communities and encourage daily prosocial activities. Adolescents in the UCC group were referred to continuing care, but did not receive case management services.
- Harris (2012) A randomized trial that examined the effectiveness of mindfulness training compared with a waitlist control group. After completing a standard drug and alcohol treatment program, participants in the mindfulness training group were assigned to complete 1-hour weekly sessions for 4 weeks. Goals of sessions were to acknowledge and manage urges to use substances, called urge surfing. Participants assigned to the waitlist control group were invited to participate in mindfulness training 12 weeks after completing a standard drug and alcohol treatment program.
- Heinzerling et al. (2013) A randomized trial that examined the effectiveness of bupropion plus outpatient treatment compared with a placebo plus outpatient treatment. Adolescents received either 150 mg bupropion SR twice daily or a matching placebo. Adolescents in both groups completed group therapy sessions twice a week. Treatment duration was 8 weeks.
- Henggeler et al. (2012) A randomized trial that examined the effectiveness of CM in combination with family engagement strategies (CM+FAM) compared with usual juvenile drug court services. CM+FAM involved developing a contingency contract outlining incentives for negative drug and alcohol tests and disincentives for positive drug and alcohol tests; treatment included strategies to promote family engagement in defining problems, setting goals, and implementing interventions. Usual juvenile drug court services combined cognitive-behavioral and system theory orientations and were delivered in a combination of group and family therapy sessions. Treatment duration was 120 days for both groups.
- Henggeler et al. (1999) A randomized trial that examined the effectiveness of multisystemic therapy (MST) compared with a control group that received usual community services. MST focused on factors that contribute to substance use at the individual, family, peer, and community levels and was integrated with psychopharmacological treatment for those adolescents who were deemed in need. MST service delivery averaged 40 direct contact hours over 130 days. Usual community services typically included weekly group meetings following a 12-step program.
- Henggeler et al. (1992) A randomized trial that examined the effectiveness of MST compared with usual juvenile justice services. MST focused on interactions within the adolescent's family, peer groups, school, and other social systems. MST sessions were conducted as needed in the adolescent's home or in a community setting and lasted 15–90 minutes; the average treatment duration was 13.4 weeks. Adolescents receiving usual juvenile justice services followed court-ordered stipulations that typically pertained to curfew, school attendance, and/or community agency services.
- Joanning et al. (1992) A randomized trial that examined the effectiveness of family systems therapy (FST), adolescent group therapy (AGT), and family drug education (FDE).

	<p>FST combined structural and strategic family therapies; families in the FST group completed a maximum of 15 weekly sessions of 60–90 minutes. AGT combined cognitive development and role theory with social skills training and primarily focused on group process; adolescents in the AGT group completed a maximum of 12 weekly sessions of 90 minutes. FLE served as a comparison group to control for the influence of attention and expectant improvement; families in the FLE group received information about substances and their effects on the human body across 6 biweekly presentations of 2.5 hours.</p>
Kaminer et al. (2014)	<p>A randomized trial that examined the effectiveness of CBT plus voucher-based reinforcement therapy (CBT+VBRT) compared with CBT plus an attendance-based reward program. Adolescents in the CBT+VBRT group were assigned to complete 10 weekly CBT group sessions combined with a contingency management program that provided rewards for negative drug tests, with greater rewards for longer periods of drug abstinence. Adolescents in the CBT plus attendance-based rewards program received rewards for attending weekly CBT sessions and completing drug testing, regardless of their drug test results.</p>
Kaminer et al. (2002)	<p>A randomized trial that examined the effectiveness of CBT compared with psychoeducational therapy (PET). The study authors did not report details of each treatment. Participants in both groups received manualized treatment throughout 8 weekly sessions of 75–90 minutes each.</p>
Kaminer et al. (1998)	<p>A randomized trial that examined effectiveness of CBT compared with interactional therapy (IT). CBT focused on identifying and managing situations that may place adolescents at risk for relapse. IT focused on adolescents’ issues with relationships, self-care, affect, and self-esteem that could contribute to their risk for relapse. Each treatment was delivered in weekly sessions over a 12-week period.</p>
Killeen et al. (2012)	<p>A randomized trial that examined the effectiveness of CM and standard community treatment compared with standard community treatment only. Standard community treatment typically lasted 10–12 weeks and consisted of group therapy, 12-step treatment, in-home services, family counseling, relapse prevention, education, and case management. In addition to these services, adolescents assigned to receive CM were given incentives for negative drug and alcohol tests.</p>
Latimer et al. (2003)	<p>A randomized trial that examined the effectiveness of an integrated family and CBT (IFCBT) compared with a drugs harm psychoeducation curriculum (DHPE). IFCBT was composed of weekly family therapy sessions and biweekly peer-group cognitive-behavioral sessions delivered over a 16-week period. DHPE was composed of weekly group sessions focused on the psychological consequences of drug use. These sessions were delivered over a 16-week period.</p>
Lewis et al. (1990)	<p>A randomized trial that examined the effectiveness of Purdue brief family therapy (PBFT) with the Training in Parenting Skills (TIPS) program. PBFT combined structural, strategic, functional, and behavioral family therapies to target family dynamics that may contribute to substance use. TIPS adopted an educational model and provided information to adolescents and their families</p>

	about the effects of substances as well as methods families can use to eliminate substance use. Both programs were implemented across 12 sessions.
Liddle et al. (2011)	A randomized trial that examined the effectiveness of MDFT with enhanced services as usual (ESAU). MDFT focused on four interdependent domains: adolescent, parent, family, and extrafamilial. MDFT services were initially delivered to adolescents and their families in short-term juvenile detention settings and continued for 4 months after the adolescent returned home. Adolescents in both the MDFT and ESAU groups had access to the following detention center services: education, crisis management, and health care.
Liddle et al. (2009)	A randomized trial that examined the effectiveness of MDFT compared with a peer group intervention. MDFT employed a multiple systems treatment approach and focused on four domains: adolescent, parent, family interaction, and extrafamilial. The peer-group intervention integrated social learning principles with CBT and combined relationship skills training with drug education. Both treatments consisted of 90-minute sessions twice weekly for 12 to 16 weeks.
Liddle et al. (2008)	A randomized trial that examined the effectiveness of individual CBT compared with MDFT. CBT combined CBT with dialectical behavior therapy; it employed a harm-reduction approach, emphasized coping skills, and focused on reducing behaviors that threaten health, safety, and quality of life. MDFT consisted of four interrelated treatment domains: adolescent, parent, interactional, and extrafamilial. CBT and MDFT were both delivered in 60–90 minute weekly sessions over a 16- to 24-week period.
Liddle et al. (2001)	A randomized trial that examined the effectiveness of MDFT, a multifamily education intervention (MEI), and AGT. MDFT consisted of individual and family sessions with treatment addressing individual characteristics of adolescents/parents and interactional patterns correlated with drug use. MEI was delivered to groups of three or four families and integrated components of psychoeducational and family therapies. AGT was conducted with groups of six to eight adolescents and focused on developing individual social skills and building support among peer-group members. Each of these three treatments consisted of weekly sessions delivered over a period of 5 to 6 months.
Lindeman (2009)	A quasi-experimental trial that examined the effectiveness of Seven Challenges compared with CBT. Seven Challenges was designed to motivate adolescents to make a decision and a commitment to change; treatment included journaling integrated with weekly individual and group counseling. The purpose of CBT was to change adolescents' thought processes surrounding substance use as a means of changing substance-use behavior; treatment included journaling, homework assignments, and weekly and individual counseling. The treatment duration for both groups was 6 weeks.
Lotts (2013)	A randomized trial that examined the effectiveness of the adolescent-community reinforcement approach (A-CRA) with ACC compared with services as usual. Adolescents in the A-CRA/ACC group were assigned to complete approximately 3 months of weekly sessions designed to increase prosocial behaviors that compete with substance use behaviors; treatment was

- followed by 3 months of ACC. Adolescents in the services as usual group received probation with or without treatment.
- Lowe et al. (2012) A randomized trial that examined the effectiveness of manually guided Cherokee Talking Circle Intervention (CTC) compared with standard substance abuse education. Adolescents in the CTC group were assigned to complete ten 45-minute group talking sessions designed for Keetoowah-Cherokee youth. Adolescents in the standard substance abuse education group were assigned to complete ten 45-minute sessions of a drug education program known as “Be a Winner.” This program was revised from the Drug Abuse Resistance Education program and implemented by police officers in schools.
- Marsch et al. (2005) A randomized, double-blind trial that examined the effectiveness of buprenorphine detoxification to clonidine detoxification. Adolescents assigned to the buprenorphine detoxification group were given a starting daily dose of 6 mg to 8 mg tablets (depending on weight and reported opiate use), which was decreased by 2 mg every 7 days. Adolescents assigned to the clonidine detoxification group were initially given a single 0.1-mg clonidine patch, which was increased to two patches on day 2 and could optionally be increased to three patches on day 4; all patches were replaced on day 7 with a 0.2-mg dose, replaced on day 14 with a 0.1-mg dose, and replaced on day 21 with a 0-mg placebo patch. Along with their active drug treatment, participants in the buprenorphine detoxification group received placebo doses of clonidine and participants in the clonidine detoxification group received placebo doses of buprenorphine. The treatment duration for both groups was 28 days and included three sessions of individual behavior therapy per week along with incentives for negative opioid tests.
- Miranda et al. (2014) A randomized, double-blind trial that examined the effectiveness of naltrexone compared with a placebo control. Participants received either up to 50 mg daily of naltrexone compounded into 25-mg capsules or placebo capsules identical to Naltrexone capsules. The treatment lasted 8–10 days, and was followed by a 4–11 day washout period.
- Morrall et al. (2004) A quasi-experimental trial that examined the effectiveness of the Phoenix Academy compared with treatment as usual. Adolescents in the Phoenix Academy group received 9 to 12 months of residential treatment for substance abuse; key components of the treatment model included honesty, personal responsibility, community involvement, and mutual self-help. Adolescents in the treatment as usual group were referred to residential programs that were comparable to Phoenix Academy in size, treatment duration, and staffing, but did not specialize in substance abuse treatment.
- Najavits et al. (2006) A randomized trial that examined the effectiveness of Seeking Safety (SS) compared with a treatment as usual control group. SS was a coping skills therapy that consisted of four treatment content areas: cognitive, behavioral, interpersonal, and case management. SS implementation consisted of 25 sessions of 50 minutes delivered over 3 months. Participants in the treatment as usual group did not receive SS; participants in both groups were permitted to attend any additional treatments they sought.

Nissen (2005)	A randomized trial that examined the effectiveness of adolescent portable therapy (APT) compared with a control group. APT was an outpatient, strengths-based, family-based treatment for youth who were arrested for substance use. Services were provided in three phases, beginning when youth enter detention and continuing throughout institutionalization and their reunification with their families and communities. APT combined CBT with family-centered therapy. Participants in the APT group completed an average of 16 sessions across an average of 9 months. The study authors provided no information describing the control group treatment.
Riggs et al. (2011)	A randomized trial that examined the effectiveness of osmotic-release methylphenidate plus cognitive behavioral therapy (OROS-MPH+CBT) compared with a placebo drug plus CBT (Placebo + CBT). Adolescents received an 18-mg dose of OROS or an identical placebo, which was titrated to 72 mg or the highest dose tolerated during the first 2 weeks of this 16-week study. Adolescents in both groups were assigned to complete individual CBT, which used a motivational enhancement approach.
Riggs et al. (2007)	A randomized trial that examined the effectiveness of fluoxetine hydrochloride plus CBT (fluoxetine + CBT) compared with a placebo plus CBT (placebo + CBT). Adolescents in the fluoxetine + CBT group received 20 mg fluoxetine daily for 16 weeks, whereas participants in the placebo + CBT group received a matching placebo daily for 16 weeks. CBT sessions were offered to all participants but not required. CBT consisted of weekly, individual sessions combining CBT and MET with the goals of reducing substance use and building coping and decision-making skills to reduce the risk of substance use and relapse.
Riggs et al. (2004)	A randomized trial that examined the effectiveness of pemoline compared with a placebo. Adolescents in the treatment and control groups were given blinded packets containing either pemoline or the placebo, respectively, and they were instructed to take one 37.5-mg capsule daily during week 1, two 37.5 mg capsules daily during week 2, and three 37.5-mg capsules daily during week 3. The total treatment duration was 12 weeks.
Robbins et al. (2011)	A randomized trial that examined the effectiveness of brief strategic family therapy (BSFT) compared with community-based outpatient treatment as usual. The manually guided BSFT intervention combined structural and strategic family therapy techniques to address family interactions, and was delivered in 12–16 sessions over a 4-month period. The treatment as usual comparison group received standard agency services, which might include individual or group therapy, parent training groups, nonmanualized family therapy, and/or case management; these services were provided at least once per week.
Robbins et al. (2008)	A randomized trial that examined the effectiveness of structural ecosystems therapy (SET), a family-process intervention (FAM), or community services. Adolescents in the manually guided SET group were assigned to complete 12–16 family sessions targeting family relationships and 12 ecosystemic sessions targeting relationships with peer groups, school, and the juvenile justice system. Participants in the manualized FAM group were assigned to complete

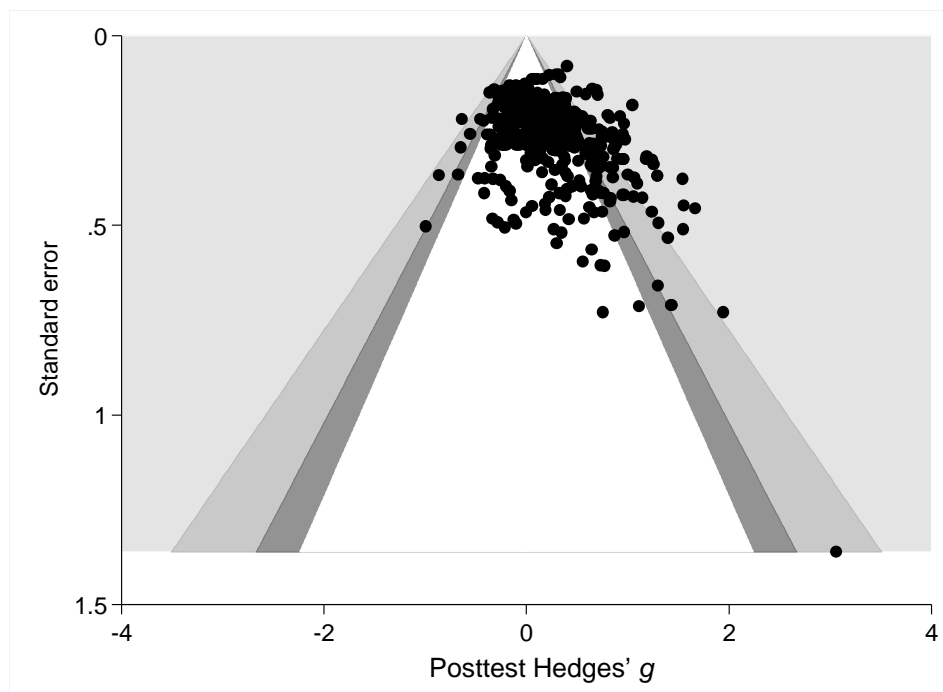
- 12–16 family sessions identical to those included in SET. Participants receiving community services were referred to community agencies.
- Rohde et al. (2014) A randomized trial that examined the effectiveness of functional family therapy (FFT) followed by an adolescent coping with depression course (FFT+CWD), CWD followed by FFT (CWD+FFT), and coordinated FFT and CWD (CT). FFT employed a systems-oriented, behavioral model of family therapy to address addictive behaviors; CWD was a group treatment for depression that employed cognitive and behavioral strategies. Treatment duration was 20 weeks for all groups. All included effect sizes that were coded after the first 10 weeks of treatment only, to isolate the effects of CWD, FFT, and CWD+FFT.
- Santisteban et al. (2015) A randomized trial that examined the effectiveness of integrative borderline personality disorder-oriented adolescent family therapy (I-BAFT) compared with individual drug counseling (IDC). I-BAFT is a manualized treatment combining dialectical behavior therapy with structural family therapy and targeted factors that contribute to both substance use and self-harm. Adolescents in the I-BAFT group completed one weekly family session paired with either a weekly skills training or individual session for 7 months. IDC was manually guided, individually oriented, and employed a 12-step approach to address addiction. Adolescents in the IDC group completed two individual sessions per week and their parents participated in monthly meetings for 7 months.
- Santisteban et al. (2011) A randomized trial that evaluated the effectiveness of culturally informed and flexible family-based treatment for adolescents (CIFFTA) compared with traditional family therapy (TFT). CIFFTA integrated themes that are relevant to Hispanic families into structural family therapy; treatment also included individual therapies such as motivational interviewing, skills training, and psycho-educational interventions. Adolescents in the CIFFTA group completed biweekly sessions over a 16-week period. TFT consisted of weekly sessions of structural family therapy delivered over a 16-week period.
- Schaeffer et al. (2014) A randomized trial that examined the effectiveness of community restitution apprenticeship-focused training (CRAFT) compared with education as usual. Adolescents assigned to the CRAFT group completed a 6-month employment program with curricula focusing on requisite skills for the home building industry. Specific areas of focus included classroom-based construction skill learning, academic skill development, employability skill development, job placement assistance, and job retention/follow-up. Adolescents assigned to the education as usual group had access to vocational training through public schools and community agencies; however, these services were scarce and few adolescents accessed them.
- Sealock et al. (1997) A quasi-experimental trial that examined the effectiveness of residential treatment compared with usual services. Adolescents assigned to residential treatment completed a 6- to 8-week program that included signing a treatment contract, completing the Alcoholics Anonymous program (Steps 1-9), and attending group sessions. Adolescents receiving residential treatment were also offered academic, recreational, and vocational programs as well as work

	assignments, therapeutic recreation, and social activities. There was an additional aftercare component offered to support reentry. Adolescents receiving usual services were supervised by a probation officer.
Slesnick et al. (2013)	A randomized trial that examined the effectiveness of ecologically based family therapy (EBFT), the community reinforcement approach (CRA), and MI. EBFT focused on multisystem interactional patterns that correspond with substance use; adolescents in the EBFT group completed an average of 6.8 sessions. CRA was based on operant behavioral principles and employed functional analysis to identify triggers, consequences, and alternative behaviors pertinent to adolescents' substance use; adolescents in the CRA group completed an average of 5.3 sessions. MI focused on enhancing adolescents' willingness to change substance use behavior; adolescents in the MI group completed an average of 1.6 sessions. All groups received manualized treatment.
Slesnick et al. (2009)	A randomized trial that examined the effectiveness of FFT, EBFT, and a treatment as usual control. Both EBFT and FFT are manually guided, multisystemic approaches. FFT was delivered in the office and focused on altering family patterns that contribute to problematic behavior. EBFT was similar to FFT except it was delivered in the home. FFT and EBFT were both conducted across 16 sessions of 50 minutes. Treatment as usual typically consisted of case management and individual therapy.
Slesnick et al. (2005)	A randomized trial that examined the effectiveness of EBFT compared with services as usual. EBFT was a multisystemic intervention that encouraged immediate and extended family members to participate in family sessions targeting dysfunctional interaction patterns that may contribute to adolescent substance use. Adolescents in the EBFT group were assigned to complete 15 sessions within a 90-day period. Adolescents in the services as usual group received typical shelter services (i.e., food, clothing, crisis intervention, placement).
Smith (1983)	A randomized trial that examined the effectiveness of a three-component intervention (information, cognitive-processing, and behavioral) compared with a delayed treatment control group. The intervention included information about marijuana use/abuse, focused on interpersonal skills and problem solving, used role-play to explore problematic situations, and was delivered to groups of 10 adolescents over eight sessions. Adolescents assigned to the delayed treatment group received treatment after adolescents in the treatment group completed their eighth session.
Smith et al. (2006)	A randomized trial that examined the effectiveness of strengths-oriented family therapy (SOFT) compared with The Seven Challenges. SOFT was a solution-focused model that combined a pre-treatment motivational family session, family therapy, multifamily treatment, and case management. SOFT consisted of approximately 30 hours of treatment across 10 weekly multifamily group sessions and five conjoint family therapy sessions of approximately two hours each. The Seven Challenges program included decision-making tasks, skills training, journaling, and motivational interviewing and was implemented in both individual and peer-group sessions;

- it consisted of approximately 25 hours of treatment across 10 weekly group sessions of two hours and 5 biweekly individual sessions of one hour.
- Stanger et al. (2015) A randomized trial that examined the effectiveness of MotivMET+CBT, MET plus CBT and abstinence-based contingency management (MET+CBT+CM), and MET plus CBT, CM, and Parent Training (MET+CBT+CM+PT). Adolescents in all three groups completed weekly individual MET+CBT sessions and biweekly drug testing over a 14-week period. In addition to MET+CBT, participants in the MET+CBT+CM group were provided incentives for adolescents' negative drug tests and parents' implementation of a substance monitoring contract. Parents in the MET+CBT+CM+PT group attended weekly sessions with therapists for behavioral training.
- Szapocznik et al. (1983) A randomized trial that examined the effectiveness of conjoint family therapy (CFT) compared with one-person family therapy (OPFT). CFT was implemented in a manner that reflected usual practice for family therapy; sessions were conducted with the whole family or with a major family subsystem and entailed restructuring family interaction patterns. OPFT was implemented with only the adolescent and was designed under the premise that, if one family member changes his or her behavior the remaining family members will change their behavior as well. Both therapies were completed within a maximum of 12 sessions.
- Thurstone et al. (2010) A randomized trial that examined the effectiveness of atomoxetine combined with MI and CBT (atomoxetine + MI/CBT) compared with a placebo combined with MI/CBT (placebo + MI/CBT). Depending on weight, participants received an initial atomoxetine or matching placebo dose ranging from 5 mg per kg to 50 mg daily, which was increased to a daily dose ranging from 1.5 mg per kg to 100 mg daily. Participants in both groups completed weekly individual MI/CBT sessions that included a functional analysis of substance use behaviors, goal setting, and strategies for coping with cravings; family sessions were also available to participants.
- Waldron et al. (2001) A randomized trial that examined the effectiveness of individual CBT, FFT, combined individual CBT and FFT (CBT+FFT), and PET group therapy. CBT combined MET with 10 skill modules to teach adolescents self-control and coping skills to avoid substance use. FFT employed structured family therapy to change family patterns that may contribute to substance use. CBT+FFT combined CBT for adolescents with FFT for adolescents and their families. PET group therapy educated adolescents about substances, included skill-building training, and explored substance use expectancies, consequences, and alternatives. Adolescents in the CBT, FFT, and PET group therapy conditions completed 12 hours of therapy; adolescents in the CBT+FFT condition completed 24 hours of therapy (one hour of CBT and one hour of FFT each week).
- Walker et al. (2006) A randomized trial that examined the effectiveness of MET compared with a delayed treatment control. MET consisted of two 30- to 60-minute weekly sessions and included personalized feedback addressing substance use behavior, substance use norms, positive and negative consequences of substance use, personal goals, and self-efficacy for resisting substance use.

- MET was delivered immediately for the treatment group and after a 3-month delay for the control group.
- Woody et al. (2008) A randomized trial that examined the effectiveness of buprenorphine-naloxone compared with detoxification. Adolescents in the buprenorphine-naloxone group received a daily dose of up to 24 mg, which was tapered from week 9 to week 12. Adolescents in the detoxification comparison group received a daily buprenorphine dose of up to 14 mg, which was tapered by day 14. Adolescents in both groups were scheduled to complete one individual and one group drug counseling session per week.
- Zhang (2001) A quasi-experimental trial that examined the effectiveness of drug treatment boot camp compared with traditional camp. Adolescents in drug treatment boot camp completed a drug education program and participated in counseling, parental involvement activities, educational activities, drilling and marching, and physical training. Boot camp was originally intended to be 24 weeks, but it was shortened to 8 weeks followed by intensive aftercare. Adolescents in the traditional camp participated in counseling, parental involvement activities, and educational activities; traditional camp was followed by regular probation services.

Appendix C. Contour Enhanced Funnel Plot for Posttest Group Difference Effect Sizes



Peabody Research Institute at Vanderbilt University

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Our mission is to conduct research aimed at improving the effectiveness of programs for children, youth, and families. Using field research, program evaluation, and research synthesis (meta-analysis), our faculty and staff help determine which programs are actually making a difference in the lives of the people they serve. PRI research addresses many aspects of child and family programs, such as their implementation, costs, dissemination, and social or political support. But the main focus for all of our work is the effects of programs on children and families.

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