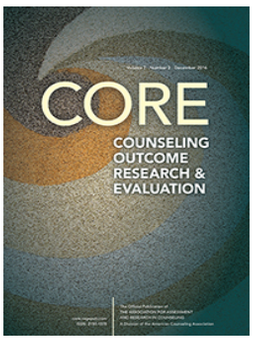

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Alcohol and Other Drug Abuse Counseling Outcomes for School-Aged Youth: A Meta-Analysis of Studies From 1990 to 2009

Danielle Rongione[1], Bradley T. Erford[1], and Caren Broglie[1]

Abstract

Clinical trials exploring the use of counseling and psychotherapy to treat alcohol and other drug use problems in school-aged youth were meta-analyzed using a random effects model. Of 374 possible studies identified, 20 studies were accepted into the analysis comprising 28 samples of participants ($n = 2{,}837$). Counseling and psychotherapy interventions for school-aged youth were inconsistently effective in lowering alcohol use at termination and not effective at follow-up. Effects of counseling and psychotherapy for drug abuse were consistently significant at termination, but follow-up effects yielded inconsistent results. With the exception of a sample size effect in the single group drug abuse treatment follow-up analysis, all tests of homogeneity (Cochran's Q and I^2) indicated no substantial effects of moderating variables.

Keywords

addictions, quantitative, children, clinical, treatment

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Substance abuse is a pattern of use (i.e., alcohol or other drugs) that causes impairment or distress (American Psychiatric Association, 2000). Estimates of drug use by adolescents averages about 79% and the prevalence of adolescent alcohol use is estimated to be around 86% (McGillicuddy, Rychtarik, Duquette, & Morsheimer, 2001). According to Burrow-Sanchez (2006), 11.6% of adolescents between ages 12 and 17 years were illicit drug users and 8.9% could be clinically diagnosed with substance abuse. Early use of drugs and alcohol leads to higher rates of addiction later in adolescence or young adulthood (Vaughn & Howard, 2000).

Winters, Stinchfield, Opland, Weller, and Latimer (2000) indicated that adolescents who abuse substances are different in many ways from adults who do because adolescents have shorter drug histories, less involvement with opiates, greater involvement with alcohol, and a higher

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probability of being a poly-abuser. In addition, Thush et al. (2007) found that alcohol abuse by adolescents increases the likelihood of unprotected sex, early drop-out rates in school, and unemployment, all of which can have serious long-term consequences. This seems to indicate that intervention approaches to the treatment of substance use must be developmentally appropriate and occur earlier in the life span.

Treatment of alcohol and drug abuse in youth ordinarily involves either counseling/psychotherapy or pharmacology, with the majority of the studies reporting psychotherapy. But there is disagreement about the efficacy of each treatment approach. For example, Wilens et al. (2005) concluded that pharmacology as a treatment for substance abuse has a moderate impact and did not result in any worsening of the symptoms of substance abuse. Alternatively, numerous studies promoted use of psychotherapy and counseling as a successful treatment for alcohol and other drug use problems (e.g., Naar-King et al., 2006; Sundell et al., 2008; Thush et al., 2007; Waldron, Slesnick, Brody, Turner, & Peterson, 2001; Winters et al., 2000). In addition, Cornelius, Clark, and Bukstein (2005) stated that a combination of both pharmacology and psychotherapy is the best form of treatment for alcohol or other drug abuse.

Regardless of whether the approach is drug therapy or counseling/psychotherapy, Sealock, Gottfredson, and Gallagher (1997) suggested that treatment length, modality, admission, and level of program implementation influence the success of treatment and therefore may serve as moderating variables. For a successful rate of treatment, Sealock et al. recommended providing a minimum of 3 months of treatment (i.e., at least 12 outpatient sessions), while a longer period of treatment (e.g., 6–12 months) will be even more successful in reducing future drug use.

Only one previous article (Vaughn & Howard, 2004) was dedicated exclusively to the synthesis of controlled studies of adolescent substance abuse treatment. However, Vaughn and Howard did not use systematic meta-analytic procedures, instead computing effect sizes for individual studies and comparing the results of the 15 controlled trials (published before April 2003) among the various therapeutic approaches used. Also, only a few of the studies in their synthesis treated adolescents for alcohol abuse and separate alcohol and drug results were not reported. They suggested that multidimensional family therapy (MDFT) and cognitive behavioral group therapy (CBGT) were recommended treatments that produced meaningful effect sizes (>.20) with staying power about 1 year after follow-up. Unfortunately, this conclusion was based upon only one and two studies for MDFT (Liddle et al., 2001) and CBGT (Kaminer, Burleson, Blitz, Sussman, & Rounsaville, 1998; Kaminer, Burleson, & Goldberger, 2002), respectively, so must be viewed cautiously and tentatively until additional clinical trials replicate these findings.

Stanton and Shadish (1997) conducted a second meta-analysis, but the focus was on the effectiveness of family–couples treatment of drug abuse, and only about half of the 15 studies included outcomes for adolescents. The major conclusion of Stanton and Shadish was that family–couples treatment approaches were superior to individual counseling or therapy, peer group therapy, and family psychoeducation approaches and equally effective for adults and adolescents. Effect sizes (Cohen's *d*) reportedly averaged close to .40, but the study did not specify whether standardized meta-analytic procedures, such as use of a fixed or random effects model was used, or the process used for averaging effect sizes across studies. As a result, the .40 effect size estimates may be inflated because of a failure to correct for sample size and weighting by inverse variance.

Counseling or psychotherapy is often the first line of defense in the treatment of substance abuse in school-age youth. Counselors intervening with school-age youth who abuse alcohol or drugs are interested in two main questions regarding the effectiveness of alcohol and other drug abuse treatments: (a) Is counseling/psychotherapy effective in reducing symptoms of alcohol and other drug abuse in school-age youth when compared with various comparison conditions? and (b) Do the effects of counseling and

psychotherapy last after treatment is terminated? These questions form the basis of this meta-analysis.

To answer both questions, published clinical trials of substance abuse interventions were identified. All selected studies assessed for substance abuse using pre- and post-test methodology and some assessed for short-term (i.e., less than 6 months) or long-term (i.e., 6 months or longer) follow-up effects. Study participants were school-age students 18 years or younger and each study used an outcome measure (e.g., drug test and rating scale). In keeping with procedures suggested by Erford, Savin-Murphy, and Butler (2010) effect sizes for mean gain scores were calculated using a control or comparison condition such as a waitlist (no treatment) or treatment-as-usual (TAU) condition. Homogeneity tests such as Cochran's Q and inconsistency (I^2) were calculated to determine the presence of moderator variables. This study is the first meta-analysis to separately analyze alcohol and drug outcomes of school-age youth, while synthesizing meta-analytic results of clinical trials using a random effects model.

Method

The definition of counseling or psychotherapy for substance abuse was any intervention or treatment used to reduce substance use and provided by a mental health professional or professional-in-training.

Inclusion and Exclusion Criteria

Inclusion in this meta-analysis required compliance with nine criteria:

- Use of an intervention or treatment directly used to reduce symptoms of substance use in participants identified with a substance use problem.
- Substance use was measured by at least one standardized procedure (e.g., drug test and rating scale).
- Provision of output data sufficient to calculate a mean difference effect size or mean gain effect size.
- Use of individual, family, and/or group counseling or psychotherapy.
- Participants were 18 years of age or younger.
- Minimum sample size of nine participants.
- Clinical trials using single group or a control procedure (i.e., waitlist and treatment as usual). Nonexperimental or preexperimental designs were excluded.
- In print between 1990 and 2009, inclusive.
- Published in the English language with no limitation on the cultural origin or nation.

Dissertations and unpublished manuscripts were not included in this meta-analysis. Therefore, publication bias is a possibility. If different studies with linked samples were discovered, only one of those studies was included to maintain independence of samples.

Search Strategies

Studies ultimately selected were discovered through three primary search methods: computerized searches, reviewing reference lists, and hand searches. Computerized searches were made of the PsychINFO and MEDLINE databases for the period of 1990–2009. Keywords were used that related to the intervention (i.e., counseling and psychotherapy) and the condition (e.g., substance abuse and alcohol use). Search limitations were set to select studies that included child and adolescent samples (i.e., ages 6–18 years), in the English language, from peer-reviewed sources, and yielding treatment outcomes or clinical trials. Next, reference lists of review, synthesis articles, and clinical trials were searched for additional candidate studies not identified through the electronic search. Lastly, several journals with a high frequency of candidate studies already selected were hand searched between the years 1990 and 2009 (i.e., *Journal of Consulting and Clinical Psychology*, *Journal of Family Psychology*, *Journal of Nervous and Mental Disorders*, and *Journal of Child & Adolescent Substance Abuse*) to locate additional candidate studies not yet identified.

Using the criteria for inclusion/exclusion specified above, the title, abstract, and full text

(when available) of each candidate study were analyzed. Two authors served as judges to make independent selection decisions and a third author mediated any disagreements in the selection or elimination of a study. The final sample of articles consisted of 20 studies, which included 28 independent samples. The characteristics of these 20 studies are reviewed in Table 1. The characteristics include summary of purpose, sample size, mean age, percentage of males in the sample, control/comparison group type, percentage of White participants in the sample, and substance use outcome measures used.

Coding Procedures

All studies were coded for various characteristics of participants, design, and methodological features. Two authors coded each study independently. Both coders were graduate students who had completed classes in research, statistics, and assessment and received specialized training and instruction in coding procedures under supervision. Participant characteristics included the sample size, age, sex, ethnicity, country, and completion rate of the participants. The design characteristics included randomization, recruitment method, diagnosis method, setting of treatment, type of treatment, and type of control group. Methodological characteristics described how well the therapists were trained in the treatment, use of blind assessment, supervision, treatment manual, individual or group method, homework, number of sessions, duration of sessions, duration of study, completion rate treatment/study, and therapist characteristics, such as degree, discipline, and vocation. Missing data were coded as "DK" (do not know).

Outcome Measures (Dependent Variables)

In empirical studies, substance abuse in adolescents was usually measured through self-reports of frequency of use and drug or alcohol testing (e.g., breathalyzer and urinalysis; Henggeler, Pickrel, & Brondino, 1999) which, like rating scales and self-report instruments, vary in accuracy. These outcome measures were used in the 20 selected studies of this meta-analysis and no specific standardized instrument was used in more than one study. Self-reported frequency of alcohol or drug use was the most frequently reported outcome measure (12 studies).

Statistical Methods

When computing average effect sizes, Erford et al. (2010) indicated that effect sizes can only be combined when they are computed using the same formula and for similar study designs (i.e., all waitlist, TAU, and single group designs, separately). In this study, effect sizes were independent. Posttreatment effect sizes were synthesized through the combination of effect sizes upon termination of treatment. Follow-up effect sizes were synthesized for the longest follow-up measure. For example, if a study provided a 3-month and 12-month follow-up measurement, the 12-month follow-up effect size was advanced into the analysis.

Lipsey and Wilson (2001) suggested use of Cohen's d to calculate standardized mean difference effect sizes for waitlist and TAU samples by computing the difference between the treatment and comparison group means and dividing this by the pooled standard deviation. Directional designations were fixed; a positive d means the treatment was effective and a negative d means the comparison condition outperformed the treatment condition. Standardized mean gain effect sizes for single group samples were calculated through the formula provided by Lipsey and Wilson. The reliability estimate of .65 was used if reliability data were not accessible to provide a conservative effect size estimate.

To correct for sample size bias, effect sizes were adjusted through the formula $d' = d[1 - (3/(4N - 9))]$. As suggested by Erford et al. (2010) and Lipsey and Wilson (2001), an inverse weighting procedure was used to correct the unbiased effect sizes (d'). A corrected effect size $d+$ was calculated prior to being combined and averaged for hypothesis testing and evaluation for homogeneity using a random effects model. The random effects model was used because it assumes the current set of studies is part of a

Table 1. Characteristics of Individual Studies Used in the Meta-Analysis

Study	Summary	*n*	Age (*M* years)	% Male	Control Group Type	% White	Outcome Measures
Azrin et al. (1994)	Behavioral drug abuse treatment program	26	16	77	TAU	81	Urinalysis drug use
Azrin et al. (2001)	Individual cognitive problem solving (ICPS) and family behavior therapies (FAM) in dually diagnosed conduct disordered and substance dependent youth	112	15.4	82	Single group	79	Days/month of drug use, Parent Happiness with Youth (PHYS) Drug Use scale, Youth Happiness with Parents (YHPS) Drug Use scale, Life Satisfaction Scale (LSS-A) Drug Use scale
Baer et al. (2007)	Brief motivational intervention with homeless adolescents	127	17.9	56	TAU	58	Other drug use; marijuana use; Alcohol use
Burleson, Kaminer, and Dennis (2006)	Group therapy for youth with substance use disorder	400	15.7	83	Single group	67	Substance Frequency Scale (SFS)
Cornwall and Blood (1998)	Inpatient vs. day treatment for youth substance abuse	145	16.5	65	Single group	DK	Adolescent Alcohol Involvement Scale (AAIS), Drug Abuse Screening Test (DAST)
Friedman et al. (2002)	Multimodel substance use intervention program for male delinquents	110	15.5	100	Single group	15	Drug use severity; alcohol use severity; drug selling severity
Henggeler et al. (1999)	Multisystemic family treatment of substance-abusing and dependent delinquents	118	15.7	79	TAU	47	Alcohol use; other drug use
Kaminer et al. (1998)	CBT group vs. interactional group treatments for adolescent substance abuse	32	DK	DK	Single group	DK	Teen Addiction Severity Index (T-ASI)
Kaminer et al. (2002)	CBT vs. psychoeducational therapies for adolescent substance abuse	88	15.4	70	TAU	90	Alcohol problems
Liddle et al. (2001)	Multidimensional family therapy (MFT), adolescent group therapy (AGT), and multifamily educational intervention (MEI) treatments for adolescent drug abuse	102	15.9	80	Single groups	51	Drug use

(continued)

Table 1 (continued)

Study	Summary	*n*	Age (*M* years)	% Male	Control Group Type	% White	Outcome Measures
Liddle et al. (2008)	MDFT and CBT	224	15.4	81	Single group	18	Dug use problem severity; cannabis use; alcohol use; other drug use
McGillicuddy et al. (2001)	Skill training program for parents of substance abusing adolescents	22	16.3	73	Waitlist	91	Alcohol use; marijuana use
Naar-King et al. (2006)	Motivational enhancement therapy for health risk behaviors	51	DK	51	Waitlist	3	Alcohol use; Marijuana use
Najavits et al. (2006)	Safety seeking therapy for adolescent girls with posttraumatic stress disorder (PTSD) and substance use disorder	33	16.1	0	TAU	79	Personal Experiences Inventory; Adolescent Psychopathology Scales
Santisteban et al. (2003)	Brief strategic family therapy Hispanic substance use	126	15.6	75	TAU	0	Alcohol use; marijuana use
Sealock et al. (1997)	Drug treatment for juvenile offenders	393	DK	DK	TAU	DK	Drug use
Sundell et al. (2008)	Multisystemic therapy for conduct disorder	156	15	61	TAU	DK	Alcohol consumption, alcohol dependence Drug dependence
Thush et al. (2007)	Targeted intervention to moderate use and alcohol-related problems in at-risk adolescents	107	15.5	57	TAU	DK	Perception of risk factor for alcohol use
Waldron et al. (2001)	CBT, family therapy, and combined treatment vs. group intervention for adolescent marijuana use	120	DK	80	TAU	38	Percentage of days of marijuana use
Winters et al. (2000)	Effectiveness of Minnesota model in treatment of adolescent drug abusers	245	~15	56	Waitlist	85	Drug use frequency

Note: *d* = Cohen's *d* (effect size); DK = do not know; *n* = sample size; TAU = treatment as usual. Ages reported in years.

larger set of potential studies, thus allowing for greater generalizability (Hedges & Olkin, 1985).

Effect size standard errors and 95% confidence intervals (CI95; $\alpha < .05$) were calculated using the formula provided by Erford et al. (2010) and Lipsey and Wilson (2001). To determine if an average effect size was greater than zero, the CI95 was used. As an example, if a CI95 for $d+ = .50$ is $\pm .10$, a CI95 range of .40–.60 is constructed, and as the entire range for $d+$ is >0, we can reject the null hypothesis of $d+ = 0$. Likewise, if $d+ = .20$ and the CI95 is $\pm .25$, the resulting range would be -0.05 to $+0.45$, a portion of which is less than zero. As a result, the $d+$ is not significantly greater than zero and the null hypothesis cannot be rejected.

Heterogeneity in effect sizes was assessed through computation of Cochran's Q statistic, which conforms to a chi-square distribution. To reject the null hypothesis of homogeneity, $p < .05$ was set for the Q statistic. Q determines the possibility of heterogeneity for effect sizes across various studies and suggests the possibility of mediator or moderator variables (Hedges & Olkin, 1985; Lipsey & Wilson, 2001). Degree of inconsistency (I^2) was also computed (Higgins, Thompson, Deeks, & Altman, 2003). If Q was less than the *df*, a negative I^2 resulted and was subsequently set to zero. Higgins et al. recommended the following rule of interpretations: 0% mean no inconsistency (homogeneity); 25% is low; 50% is moderate; 75% is high, and 100% means total inconsistency (total heterogeneity). Therefore, if $I^2 > 50\%$, heterogeneity may exist and the presence of mediator or moderator variables could be explored.

Power is another concern because meta-analyses with $k < 20$ studies are probably underpowered, leading to Type II errors (Cornwell, 1993; Cornwell & Ladd, 1993). In the current meta-analysis, there were three waitlist samples, 12 TAU samples, and 13 single group samples, meaning that the ultimate results are probably underpowered.

Publication Bias

To detect publication bias, funnel plot analyses were conducted for each group of effect sizes in the single group, waitlist, and TAU conditions. Funnel plots are graphical representations of data with effect sizes plotted on the *x*-axis and sample sizes plotted on the *y*-axis. Effect size distributions taking the characteristic shape of an inverted funnel indicate the likely absence of publication bias. Any observed outliers were low or negative effect size estimates, so the resulting distributions are likely conservative estimates. Furthermore, publication bias estimates for file drawer effects are noted in the results section and were computed using Rosenthal's (1979) fail-safe *N* procedure. Additional sources of bias should be minimal as no data were censored or effect size estimates eliminated.

Results

Figure 1 provides the decision-making flow chart representing the article selection process. We identified 374 relevant articles through computerized search procedures and hand searches. Initial review eliminated 350 articles for violation of at least one of the inclusion criteria. Of the 24 studies moved to the final selection stage and retrieved in full text, 4 were eliminated for the various reasons presented in Figure 1, resulting in a final set of 20 articles selected for coding and meta-analysis. In the reference list, a double asterisk indicates removal of these four studies, while a single asterisk indicates those studies that were included in this meta-analysis. A selection agreement rate of 98.7% ($\kappa = .96$) was noted between the two judges and disagreements in judging decisions were adjudicated by the second author.

Study Characteristics

Of the final 20 articles moved to the coding phase, 17 (85%) used randomization procedures and 3 (15%) did not. Summary characteristics of these 20 studies are provided in Table 1. The total number of participants was 2,837, and 12 (60%) of the studies were conducted in the United States. Of the 20 studies, 3 (15%) were conducted in an inpatient setting, 15 (75%) were conducted in an outpatient setting, and 2 (10%) were conducted in a day treatment setting. Four of the studies (20%) used an individual treatment approach, 11 (55%) used a group approach, and 5 (25%) studies used family or combination approaches. The number of counselor or psychotherapy sessions held per study was a median of 12, with a range of 6–26. The median length of sessions was 77 min, with a range of 25–120 min.

Intercoder agreement across the 25 coded variables ranged from 75% to 100%, with a median percentage agreement of 97.5%. Kappas ranged from .50 to 1.00 with a median kappa of .95. Kappas in the range of .41–.60 were noted as moderate for research purposes, kappas of .61–.80 were considered substantial, and kappas of .81–1.00 were almost perfect (Landis & Koch, 1977).

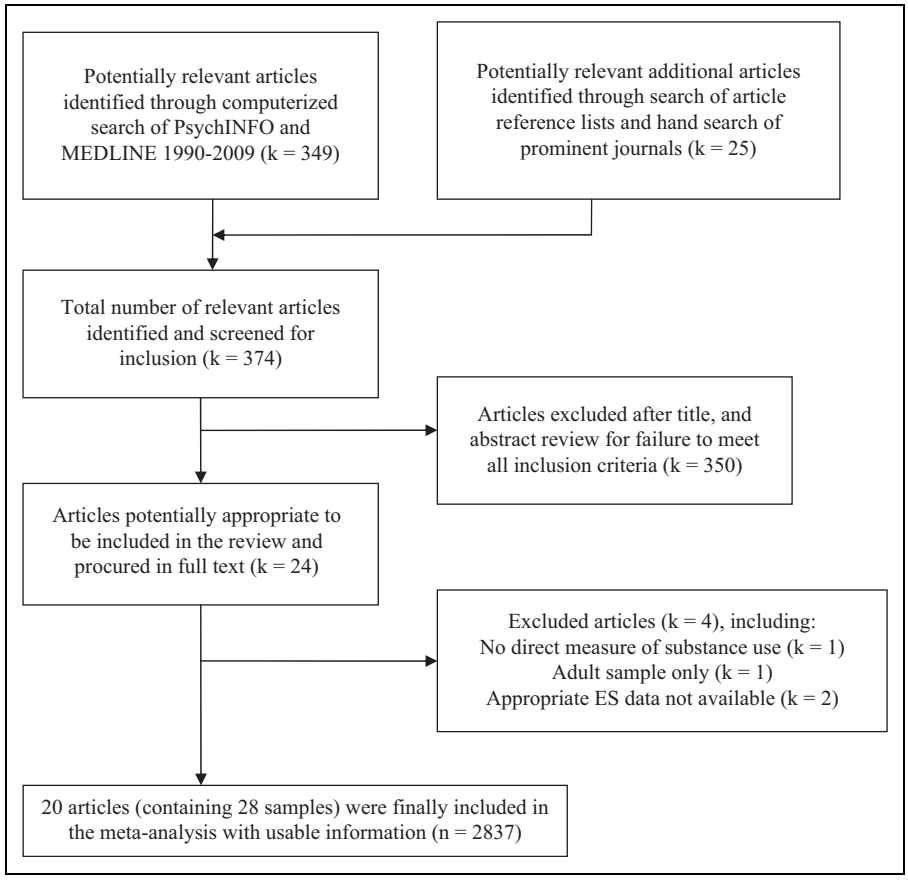

Figure 1. Flow chart of included studies.

Different experimental and comparison conditions affect the effect size magnitude. Single group mean gain studies usually yield larger effect size estimates than controlled studies because they lack a comparison group. Between waitlist and TAU conditions, ordinarily, waitlist studies are the least conservative and yield higher mean effect sizes than TAU studies, while TAU studies are more conservative and yield lower average effect sizes. This is because waitlist participants receive no alternative activities that might affect the outcome variable (e.g., substance abuse), while the TAU participants received an active treatment that is supposed to affect the outcome variable. It is crucial that all effect size averages among different conditions (i.e., single group, waitlist, and TAU) not be combined, because they represent distinct methodologies (Thompson, 2002, 2006). To simplify the results presentation to follow, results related to the two main research questions will be categorized according to the three study conditions: single group, waitlist, and TAU.

Is Counseling/Psychotherapy Effective for School-Age Youth With Substance Abuse?

The effectiveness of counseling or psychotherapy at termination (posttest) was evaluated using 13 single group samples, 3 waitlist samples, and 12 TAU comparison group samples from the 20 selected studies. All samples were independent. Mean difference and mean gain effect sizes are interpreted through the following rule-of-thumb designations: 0 means no effect; $\leq$.30 is a small effect; .50 is a medium effect; and $\geq$.67 is a large effect (Lipsey &

Wilson, 1993). Transformation of the effect size, which is basically a *z* score, to a percentile rank is another way of interpreting effect sizes. A percentile rank of 50 indicates no effect of treatment. Percentile ranks greater than 50 indicate an effect of treatment. Percentile ranks lower than 50 indicate ineffective/harmful effects of treatment. For example, an effect size of .30, a small effect, means the average participant in the treatment group outperformed 62% of comparison group participants. Likewise, an effect size of .67, a large effect, indicates the average treatment group participant outperformed 75% of the participants in the comparison group.

Single group studies. Thirteen samples (n = 1,999) presented single group study results. Out of the 13 samples, 5 included alcohol posttest results for an average $d+ = .255$ (CI95 = .068–.442) and percentile rank of 60. Therefore, the mean effect size is higher than 0 and the null hypothesis can be rejected. The fail-safe N was computed to be 127.5, meaning that 127 unpublished and unlocated studies having an effect size of zero would need to be located to mitigate the mean effect of this five-sample result to a nonsignificant effect size of just .01. Cochran's Q-statistic was $Q(4) = 4.76$ ($p > .05$), and $I^2 = 0$, meaning that the distribution of 5 effect sizes was homogeneous. Therefore, no search for moderator variables was necessary.

Thirteen of the samples included drug posttest results and were combined for an average $d+ = .337$ (CI95 = .233–.441) or the 63rd percentile, meaning the average effect size is significantly higher than 0. The computed fail-safe N was 438.1, a rather robust result. In testing for homogeneity of the effect size distribution, $Q(12) = 13.1$ ($p > .05$) and $I^2 = .01$, again indicating a homogeneous set of effect sizes for the drug outcome posttest distribution.

Waitlist comparison groups. Three studies ($n = 318$) reported using waitlist group studies. Out of the three studies, two of the studies included alcohol posttest results for an average $d+ = .019$ (CI95 = −.391–.429), which is at the 50th percentile. Therefore, this mean effect size estimate was not significantly higher than 0 and the null hypothesis of no difference is retained. The fail-safe N for this effect was only 3.8. Analysis for homogeneity yielded a $Q(1) = 0.62$ ($p > .05$) and $I^2 = 0$, a quite homogeneous result.

All three of the studies included drug posttest results, combining for an average $d+ = .291$ (CI95 = .057–.525), a result which was significantly higher than 0 and falling in the 62nd percentile. The fail-safe N was 229.1, a very robust result for a three-study effect size result. Cochran's Q-statistic was $Q(2) = 1.51$ ($p > .05$) and $I^2 = 0$, indicating substantial homogeneity and no effect of moderating variables.

TAU comparison groups. Twelve studies (n = 1,344) reported use of TAU comparison groups. Out of the 12 samples, 6 presented with alcohol posttest results for a $d+ = .078$ (CI95 = −.236–392), a nonsignificant average effect size falling at a percentile rank of 53. The fail-safe N was computed to be 46.8. When analyzing for homogeneity, $Q(5) = 8.26$ ($p > .05$) and $I^2 = .39$, a homogeneous result.

Ten samples included drug posttest results combining for a $d+$ of .346 (CI95 = .102–.590), a small effect but still significantly higher than zero and falling at the 64th percentile. The fail-safe N for this analysis was a very robust 346; that is, it is unlikely that 346 posttest drug intervention studies of school-age youth with an effect size of zero exist to negate this small but significant effect. Regarding analysis of effect size homogeneity, $Q(9) = 14.62$ ($p > .05$) and $I^2 = .38$, leading to a conclusion of homogeneity and no subsequent search for moderator variables.

Do the Effects of Counseling/ Psychotherapy Last for School-Age Youth With Substance Abuse?

The effectiveness of counseling and psychotherapy at the most distant point of follow-up assessment was evaluated using 13 single

group samples and 12 TAU comparison group studies. None of the three waitlist samples provided follow-up data. Again, each of these effect size groupings will be analyzed separately to determine the likely staying power of therapeutic treatment effects on alcohol and drug use outcome measures in the months or years after termination.

Single group studies. Thirteen studies ($n = 1{,}999$) reported single group samples. Three samples included alcohol follow-up results, yielding a $d+$ of .102 (CI95 = −.151–.355), which was not higher than zero, but did fall at the 54th percentile. The fail-safe N for this analysis was only 30.6. The analysis for homogeneity resulted in $Q(2) = 1.83$ ($p > .05$) and $I^2 = 0$.

Five single group samples reported drug intervention follow-up results, yielding a $d+ = .209$ (CI95 = .048–.370), which fell at the 58th percentile, and was a small effect, but a significant result. The fail-safe N for this analysis was 104.5. Cochran's Q was reported to be $Q(4) = 9.28$ ($p > .05$) and $I^2 = .57$. This means that the Q-statistic indicates homogeneity while the I^2 statistic indicates heterogeneity. Formal inspection of the coded variables lead to a hypothesis that sample size may be a moderating variable. The two larger effect sizes were from smaller samples (Azrin et al., 2001; $n = 56$ each; $d = .42$ and .41) than the other three effect sizes (Liddle et al., 2001, CBT $n = 112$ and MFT, $n = 112$; Friedman, Terras, & Glassman, 2002, $n = 110$; $d = .14$, .20, and −.04, respectively), which were derived from larger samples. Analysis of sample size as a moderator variable using the ANOVA analog yielded a $Q_B(1) = 8.28$, $p < .05$. Therefore, confirming sample size as the moderator variable in operation. Of course, the number of samples in the analysis was very small (5), thus lacking power and reliability.

TAU comparison group studies. Two samples included alcohol follow-up results, yielding a $d+$ of .190 (CI95 = −.063 to +.443), which was not higher than zero and fell at the 58th percentile. The fail-safe N for this analysis was only 19. The analysis for homogeneity resulted in $Q(1) = 0.86$ ($p > .05$) and $I^2 = 0$, meaning the distribution of two effect sizes was homogeneous.

The effect of psychotherapy or counseling at longest follow-up for the seven TAU studies located ($Mdn = 6$ months; range 1–12 months follow-up) resulted in a $d+ = -.018$; CI95 = −.150 to +.114, meaning no difference was observed between the treatment and "usual care" conditions. Given the negative $d+$, the percentile rank for this effect was actually 49. The fail-safe N was 0, and $Q(6) = 5.29$ ($p > .05$) and $I^2 = 0$. Thus, the distribution of seven effect sizes was homogeneous.

Discussion

Using a random effects model on studies published from 1990 to 2009, the findings of this meta-analysis of 20 clinical trials and 28 independent samples suggest that counseling and psychotherapy are effective in the treatment of drug use problems in school-age youth at termination and inconsistently at follow-up. Inconsistent results were noted for the treatment of alcohol use problems at termination and treatment was consistently not effective upon follow-up. For all comparisons, the average $d+$ estimates were small (<.35) and homogeneous, meaning no moderator variables of import were operating.

This differential effectiveness has important implications for treatment of both drug and alcohol use problems in youth. Treatment of alcohol use disorders yielded small and insignificant effect sizes at termination for both waitlist and TAU conditions. A combined effect of $d+ = .019$ was derived from the McGillicudy et al. (2001), a skill training program for parents, and Naar-King et al. (2006) studies, which used motivational enhancement therapy. Neither produced an effect size greater than .20. A combined effect of $d+ = .078$ was observed from the six TAU samples: Baer et al. (2007) used a brief motivational interview procedure; Henggeler et al. (1999) used multisystemic family treatment; Kaminer et al. (2002) used CBT; Santisteban et al. (2003) used brief strategic family therapy; Sundell

et al. (2008) used multisystemic therapy; and Thush et al. (2007) used targeted interventions. Kaminer et al. produced a medium effect size of .59 using a group CBT approach compared to a psychoeducational approach, and Thush et al.'s targeted interventions produced a large effect size of .74. However, because the types of approaches used were so varied and no more than one or two studies used a similar approach, these results must be viewed as tentative pending completion of additional studies.

A small but significant effect ($d+ = .255$) was observed for alcohol treatment among the five single group studies, but these designs measure progress from pretest to posttest without benefit of a comparison group and are the least conservative effect size estimates; that is, single group studies tend to inflate effect sizes. The five samples included Cornwall and Blood's (1998) inpatient and day treatment samples, Friedman et al.'s (2002) multimodel substance use intervention program, and Liddle, Dakof, Turner, Henderson, and Greenbaum's (2008) MDFT and CBT samples. Not surprisingly, Cornwall and Blood's inpatient sample produced an effect size of .63, and day treatment sample .38, while the final three outpatient samples produced effect sizes of .22, .08, and .04, respectively. This finding is supported by Sealock et al. (1997) who insisted that treatment length, intensity, and level of program implementation were essential in producing substantial treatment outcomes.

Not surprisingly, because the treatments were not particularly effective in the first place, the question of whether treatments for alcohol use have staying power over follow-up time intervals is a consistent "no." None of the waitlist studies provided follow-up measurements, two of the TAU studies, Baer, Garrett, Beadnell, Wells, and Peterson (2007) and Henggeler et al. (1999) combined for a mean $d+$ of .190, and three single group samples (Friedman et al., 2002; Liddle et al., 2008, MDFT and CBT samples) combined for a $d+$ of only .102. Of course, little meaningful meta-analytic interpretation can be garnered from just five results across two different design considerations. What can be concluded at this point is that there is a critical need for studies of more effective alcohol use intervention approaches and more follow-up studies to determine the long-term effects of treatment. As of this time, the usefulness and cost effectiveness of outpatient treatment of adolescents with alcohol use disorders is quite suspect, both in the short term and in the long term.

Treatment of drug use disorders yielded consistently significant, albeit small, effect sizes at termination for all three conditions. The average $d+$ for the 13 single group samples was .337, with the highest effect sizes again reported by Liddle et al.'s (2008) MDFT treatment ($d = .70$), Cornwall and Blood's (1998) inpatient ($d = .58$) and day treatment ($d = .59$) conditions, and Azrin et al.'s (2001) family behavior therapy ($d = .45$) and individual cognitive problem-solving (ICPS) conditions ($d = .38$). The $d+$ for the three waitlist control studies was .291 with only McGillicuddy et al.'s (2001) skill training program demonstrating a medium effect size ($d = .63$). The mean $d+$ for the 10 samples using a TAU condition was .346, and several of these treatments were noteworthy, producing the greatest effect sizes in the entire meta-analysis, including Najavits, Gallop, and Weiss (2006) safety seeking approach ($d = 1.76$), Waldron et al.'s (2001) family therapy approach ($d = 1.00$), Azrin, Donahue, Besalel, Kogan, and Acierno's (1994) behavior therapy approach ($d = .98$).

Unfortunately, the gains made in drug treatment as demonstrated at termination disappeared in the TAU condition upon follow-up ($d+ = -.018$) across the seven reporting samples. The Najavits et al. (2006) result, which was so promising at termination, plummeted to $d = .49$ just 3 months after the treatment was completed, and Waldron et al. (2001) was reduced to a nonsignificant d of just .05. On the other hand, single group follow-up results appear to have been maintained through the longest follow-up phase in the five samples located ($d+ = .209$). Both of Azrin et al.'s (2001) treatments maintained respectable gains of .43 for the ICPS condition and .42 for the family behavior therapy treatment over 6 additional months. In addition, Liddle et al. (2008)

reported a 12-month follow-up for the MDFT condition of $d = .27$. There were no follow-up results for any of the waitlist studies.

The results from this study provide lower estimates of average effect sizes than Vaughn and Howard (2004) or Stanton and Shadish (1997) reported because of use of random effects model and more sophisticated meta-analytic procedures, which offer a more conservative estimate of the average effect size across studies. The results reported by Stanton and Shadish of the effectiveness of family therapy approaches treating substance use disorders in adults appear warranted, but a generalization to adolescents should be viewed as tentative until more clinical trials emerge, which confirm their contention. It is also premature to conclude, as Vaughn and Howard did, that MDFT and CBGT are effective treatments for youth over the short term and long term, as their conclusions were based on two or fewer studies for each approach. Clinicians should think carefully when choosing an approach for treatment of alcohol or drug abuse in school-age youth as the overall effects, generally, appear small and short lived.

Another important result from this meta-analysis was that all effect size distributions were homogeneous, except for the sample size effect for the single group drug abuse follow-up studies. This means there were no substantial effects of moderator variables in operation. By extension, this means that no treatment approach was documented as superior to any other and that no moderator variable (client demographics, settings, and treatment characteristics) category appeared to influence the results more than any other. For example, treatment appeared equally effective for children and adolescents, boys and girls, and White participants and participants of color, and group and individual approaches were equally effective. In addition, most of the 20 studies included in this review used cognitive or family approaches in the treatment of substance abuse, but these approaches were spread across design conditions (e.g., TAU and single group), reducing the power of the analyses. As a result, there were no significant differences among the various treatment approaches.

Limitations

The authors of this meta-analysis used rigorous methodology and a random effects model, extensively searched the extant literature, used a nine-criteria selection process, weighted effect sizes for inverse variance prior to combining them, assessed for publication bias, and tested for homogeneity using both Cochran's Q-statistic and I^2. While using rigorous criteria is a positive thing, sometimes it leads to the elimination of lower quality studies that could yield meaningful results. Also, because only published studies were used there may be limitations to the generalizeabilty of findings.

Currently, there are so few high-quality clinical trials on drug and alcohol treatment in school-age youth that it is essential to reiterate that any conclusions must be viewed as tentative. In addition, the small number of studies included in this meta-analysis is a major source of concern. Cornwell (1993) and Cornwell and Ladd (1993) recommended a minimum of 20 studies be used in analyses to provide adequate power. While there are more than 300 controlled studies of substance use treatments focused on adults (Miller & Wilbourne, 2002), there are relatively few dedicated to adolescents and these are spread among several designs (e.g., TAU, waitlist, and single group). None of the analyses in this meta-analysis included more than 13 sample results, so it is safe to assume that all analyses were underpowered.

An important limitation is that only a few studies provide any follow-up data on the usefulness of alcohol or drug treatment. Only 11 of the 20 (55%) studies or 11 of the 28 (39%) samples provided any follow-up data at all. None of the three waitlist samples provided follow-up data; six of the 12 TAU samples did; only five of the 13 single group samples did. It is essential that more long-term outcome research be conducted.

Several methodological issues in the individual clinical trials were problematic, generally because authors failed to provide sufficient information to replicate or allow generalization of findings. Only 6 of the 20 (30%) studies used a standardized treatment manual, the most comprehensive way to guarantee replicability of treatment. No studies were conducted in a school setting, which is a treatment venue for many school-age children. In 7 of the 20 (35%) studies at least a portion of the participants were court referred, so generalizeability of results to the general youth population may be reduced. Only 2 of the 20 studies (10%) conducted assessment of outcomes by individuals blind to the treatment condition, a potentially biasing reactance effect. Coupling this reactance issue with the use of self-report and parent report dependent variables increases the potential for problematic bias. Interestingly, Stanton and Shadish (1997) indicated that effect sizes for urinalysis were actually higher than self-report measures for drug use. While this could be due to the sensitivity and lower magnitudes of the urinalysis standard deviations, it also could mean that the more unreliable self-reported frequency estimates of drug or alcohol use underestimates actual usage rates.

Some evidence of potential publication bias in this meta-analysis exists, which is not unusual, given the small number of studies in each condition. However, with only one exception, all outliers were low or negative effect size estimates. The highest reported effect size in the study was 1.72 and the next highest was 1.00. Interestingly, both of these were in the TAU condition. Thus, inflation due to sample size or inclusion of single group designs does not appear to be in evidence. We retained outliers rather than trimming or Winsorizing the distribution to stay close to actual observed results.

Implications for Practice

A consistent conclusion was that drug use treatments with school-age youth are effective at termination but inconsistently effective in follow-up studies. Alcohol use treatments were inconsistently effective at termination and ineffective at follow-up measurement points, as fewer than half of the samples in this meta-analysis contained a follow-up phase. Of course, each of these analyses was underpowered so more clinical trials over the next decade are needed to provide a more complete picture of the effectiveness of drug and alcohol interventions at both the termination point and throughout the long-term follow-ups. It will also be interesting to see if the synergistic effects of a combination of medication and counseling shown to be effective in adult samples will have similar efficacy in the adolescent population (Cornelius et al., 2005). Some drugs, such as methadone medications, can have serious, even dangerous, side effects. In the end, of course, counselors and therapists want clients to be completely drug free (Stanton & Shadish, 1997).

It is evident that clinicians and researchers need to create more viable or powerful approaches to drug and alcohol intervention with school-age youth. Effective treatments with longer staying power must be identified or developed and then studied intensely to yield clinical outcomes with higher effect sizes over the short term and long term. One potential application would be use of post-intervention booster sessions to help clients maintain treatment effects for longer periods of time. Stanton and Shadish (1997) and Baer et al. (2007) believed that treatment benefits could be extended for greater lengths of time through booster sessions or treatment continuation, but few researchers have followed up to determine the long-term efficacy of this application.

A mixed blessing is that no difference appears to exist among current treatment approaches, although some individual studies did yield higher effect sizes than others. This means that at this point in the history of youth drug and alcohol counseling, no treatment approach has garnered widespread support for its effectiveness. This is because so few clinical trials with youth have been conducted. Some approaches (e.g., Azrin et al., 2001; Cornwall & Blood, 1998; Liddle et al., 2008; Najavits et al., 2006) show promise, but caution is needed regarding generalizing results from just one or two studies.

It is important to note that the results of this meta-analysis confirm McGillicuddy et al.'s (2001) and Sealock et al.'s (1997) contention that no difference exists between the effectiveness of individual and group approaches, and group work has the cost-effectiveness advantage. It is also interesting to note that Stanton and Shadish (1997) concluded that family therapy plus methadone produced a more effective long-term effect than family therapy alone in adults. Interestingly, when long-term effects of medication and psychotherapy were tested separately, it was concluded that family therapy treatment led to higher retention rate in treatment as opposed to other treatment modalities, like medication alone. And Henggeler et al. (1999) concluded that the most effective treatments for alcohol or drug problems required youth to focus on measureable goals and that "effective treatment services must have the capacity to comprehensively address coexisting psychiatric disorders, family difficulties, negative peer influences, and other pertinent factors in the youth's broader social network" (p. 181).

It is important to note that most approaches present in the extant literature were short term. In this meta-analysis, the studies' treatments ranged in intensity from 6 to 26 sessions with a median of 12 sessions. The optimal length of treatment is multifaceted and client specific, and symptom severity is just one factor in the complicated dynamic. Stanton and Shadish (1997) suggested that new approaches should be explored to find more effective approaches with long-term effects but questioned the efficacy of short-term approaches when treating substance abuse. The lack of significant long-term effects of treatment for both alcohol and drug problems discerned through this meta-analysis supports their contention.

Finally, it is important to stress the importance of prevention and early intervention in the ongoing battle against drugs and alcohol among school-age youth. Importantly, prevention and early intervention programs can often be implemented in schools and school counselors are in a prime position to address these issues. But we first need to develop or identify evidence-based, effective approaches. And this means more outcome research on drug and alcohol prevention and early intervention programs. If effective, school-age children would benefit from screening and early intervention for substance abuse, which could be an efficient use of resources, given the effect that substance abuse has on children and adolescents in terms of academic, emotional, and social costs for the child, not to mention the financial costs to treat cases that advance to moderate and severe statuses.

Implications for Future Research

The critical need at this point is for more clinical trials using TAU and single group methodologies, as well as waitlist and placebo trials. These trials should also include short-term and long-term follow-up components to determine the staying power of interventions. It is also important that follow-up booster sessions and continued monitoring programs be implemented to counteract the problematic recidivism noted in numerous studies. Substance use is difficult to treat and clients need a continuing support model to maintain gains made in sessions and prevent backsliding into continuing use that was so prevalent in the follow-up results. It is critical that counselors and policy makers discern and advocate for the most efficacious and long-lasting evidence-based approaches to the treatment of drug and alcohol abuse.

If there is no consistent long-term treatment effect for alcohol or drug use in adolescents, it is reasonable for a health care system to ask, "Is counseling or psychotherapy a cost-effective approach?" When considering the cost of not treating youths with substance use disorders, it is easy to answer yes to this question. But additionally, one could conclude in the affirmative because interventions with a treatment effect of .25 applied over the approximately one million youth with drug and alcohol problems are definitely worthwhile from a societal perspective and cost-effective standpoint. The problem is that results often do not last for even a few months, let alone a few

years. The critical question is how do we help adolescents who abuse substances respond to treatment over the long term? It is also reasonable to point out that more in-depth study of the treatment of heavy users is needed.

A meta-analysis is only as good as the studies included within. Some authors did not adequately describe sample and study characteristics making subsequent analyses of mediator variables difficult or less accurate. At the very least, adequate description of the treatments used should be included or available so that results can be replicated. This means that researchers undertaking clinical trials should make better use of treatment manuals or standardized treatment protocols. In addition, published studies should be of adequate quality and describe sample characteristics such as sex, age, and race.

An important research implication in clinical trials, and a substantial limitation in some, is the problem of attrition: successful participants tend to stay in the study, complete treatment (and therefore the posttest assessment), and remain available for follow-up (and therefore the follow-up assessment). Unsuccessful participants frequently drop out, and their data are lost from the analyses. As a result, attrition often causes inflated effect size estimates.

A noticeable omission was the lack of clinical trials in the counseling literature and related research by counselors. Given the importance of substance abuse counseling to the counseling profession and the increasing numbers of alcohol and drug counselors licensed by professional counseling licensure boards, more scholarly activity related to outcomes research would be expected. However, nearly all of the studies contained in this meta-analysis were from the psychological and psychiatric literature. As a result, counselor researchers must contribute more substantially to the extant literature on the treatment of alcohol or other drug abuse. On a related note, there were no school-based clinical trials. Given that all youth present at school for an education, one would expect that school-based studies would be more commonplace. At any rate, it is useful to consider what approaches may be efficacious for use in schools by counselors and other school personnel, for prevention, early intervention, and when clinical intervention is required.

Counseling and psychotherapy are seen as effective choices for the treatment of substance abuse in adults, but the results of this meta-analysis indicate that the same conclusion about treatment effectiveness with school-age youth is premature and unwarranted at this time. More high-quality research studies with more effective treatment approaches and long-term follow-up studies are critically needed to provide conclusive evidence.

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