Evidence for Optimism: Behavior Therapies and Motivational Interviewing in Adolescent Substance Abuse Treatment

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Abstract

This article reviews behavior therapies ($n = 12$), motivational interviewing interventions ($n = 12$), and combined behavioral-psychosocial therapies ($n = 12$), across thirty-four peer-reviewed publications. Studies were included if they involved youth with alcohol and other drug (AOD) use, included measures of AOD outcomes, and utilized controlled research designs with a control or comparison condition. Across the studies, there were mild to very serious AOD problems including comorbidity. The level of empirical support of the interventions was evaluated using established guidelines to determine if the interventions could be considered "well-established," "probably efficacious," or "promising." The review determined that behavior therapies were "probably efficacious," and motivational interviewing interventions easily met the criteria for "promising." Due to small sample sizes, combined behavioral-psychosocial therapies marginally met the criteria for "promising." The findings from this review underscore the value of individual and group behavior therapies and motivational interviewing in helping reduce mild to serious AOD use among adolescents.

Keywords

Motivational Interviewing; Behavior Therapy; Cognitive Behavioral Therapy; Substance abuse; Adolescents

Behavior therapies and motivational interviewing approaches have been widely used in clinical and non-clinical, primary and secondary medical settings for the treatment of alcohol and other drug (AOD) problems among adolescents. Behavior therapy (BT), or more appropriately behavior therapies, is used here to include a wide range of cognate therapies, such as cognitive therapy, cognitive-behavior therapy, and social learning-based treatments, all of which have been widely used in the treatment of AOD problems. More recent, motivational interviewing (MI) has been developed and applied with adolescents and is

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similarly diverse, with a number of MI adaptations. This paper reviews BTs and MIs, including therapies that combine BT and MI, or use one or the other in conjunction with another psychosocial therapy. The focus of this review is on treatment studies involving clinical samples in which AODs are used. Thus, studies on prevention are excluded. Also not included are contingency management approaches, which are covered in another article in this journal.

The first section describes the methods used to find the studies, which is followed by separate critical reviews of BTs, MI, and combined approaches. We then offer an integrative discussion of relevant research and treatment issues emerging from the review with recommendations. The primary aim of this paper is to determine the state of the science of BT and MI therapies in the treatment of adolescent AOD use and make recommendations for clinical practice and research.

METHOD

This study reports findings from published, peer-reviewed journals, in the English language. Studies must have included adolescents (mean age 19 years or below) with AOD use but not tobacco, explicitly utilized BT, MI or adaptations either separately or together, and must have been controlled and compared two conditions within the same study (but not necessarily randomized). We conducted an extensive literature search in academic databases (Academic OneFile, and more specific databases, Psychinfo and Pubmed). We included any published study that met the criteria up to mid-2009. In addition to these sources, we also consulted recent reviews of controlled studies for potentially missing articles [1-9].

We report descriptive findings about each study and evaluate the efficacy of the approaches. The studies were evaluated according to the standards developed by American Psychological Association's Division 12 Task Force [10,11] that defined "well-established" and "probably efficacious" treatments. According to these criteria, well-established treatments:

1. Have at least two good between-group design experiments demonstrating efficacy in at least one of the following ways:

   a. Superior (statistically significantly so) to placebo or to another treatment, or

   b. equivalent to an already established treatment in experiments with adequate statistical power (about 30 per group),

2. Must be conducted with treatment manuals,

3. Must specify the characteristics of the client samples, and

4. Have effects that have been demonstrated by at least two different investigators or investigating teams

The criteria for probably efficacious treatments should include:

1. Two experiments showing the treatment is superior (statistically significant so) to a waiting-list control group, or

2. One or more experiments meeting the well-established treatment criteria 1a or 1b, 2, and 3, but not 4.

In addition, Chambless and Hollon [12] described methodological criteria that each study should have when determining efficacy. The criteria include:

1. Use of outcome assessment measures with demonstrated reliability and validity

2. Use of multiple methods of assessment (favored but not required)

3. Include follow-up results that demonstrate the enduring effects of different interventions, especially for disorders that have variable courses

4. Include all clients initially assigned to treatment in final analysis (especially when attrition is high)

5. Report on treatment adherence (favored but not required)

6. Report findings of between-group differences rather than draw conclusions based on pre-test to post-test differences within each condition.

Because the APA Task Force was focused mostly on treatments for adults, Division 12 appointed a second task force with an emphasis on treatments for children and adolescents. In addition to preserving the first two categories, the task force developed a third category called "promising interventions" [13]. In order to meet those criteria,

1. There must be positive support from one well-controlled study and at least one other less-well-controlled study;

OR

2. There must be positive support from a small number of single-case design experiments;

OR

3. There must be positive support from two or more well-controlled studies by the same investigator.

This study will identify treatments that meet the criteria for "well-established," "probably efficacious," and "promising." In addition, the findings from this review will be compared with two recent systematic reviews of adolescent AOD treatments [1,7]. This is advisable when there are conflicting results not only across studies but also within studies where there may be significant differences on some but not all measures [12].

RESULTS

Behavioral Therapies

Behavioral therapies (BTs) include, among others, behavior therapy, cognitive therapy, social learning, and cognitive-behavior therapy. These therapies tend to modify behaviors, cognitions, or environmental reinforcers related to adolescent AOD use. These therapies often borrow and blend from each other, so classifying behavior therapies into particular camps is often difficult. BTs for AOD use are often offered as a package of treatments combining different techniques from behavior theories. In the treatment of AOD problems among adolescents, the BTs reviewed in this paper incorporate a variety of techniques including self-monitoring, cravings management, mood regulation such as relaxation training, skills-building such as problem-solving and assertiveness training, relapse prevention, modeling, behavior rehearsal, feedback, and homework. This review includes studies that utilized BTs or their major components or techniques as a major part of treatment.

Studies of BTs first began in any significant numbers with adults. With a few exceptions (e.g., relaxation training), reviews have reported that BTs have been generally effective for adults with alcohol problems [14]. The evidence for drug abuse treatment has lagged, but the evidence for adults is that BTs are effective [15,16]. With adolescents, reviews of the early outcome literature yielded some promising BT treatments [17,18]. However, the studies

included in these reviews were largely uncontrolled and there was insufficient evidence to support the differential effectiveness of any particular treatment. Only in the past ten to fifteen years have rigorous controlled studies of BTs involving adolescents been published.

The first controlled BT study was by Azrin and colleagues [19]. In that study 26 youths with illegal drug use were randomly assigned to either a behavioral-based individual intervention (BT-I, $n = 15$) or to a supportive group counseling comparison condition ($n = 11$), both of which were fifteen sessions. The BT-I treatment consisted of rehearsal, self-monitoring, with specific techniques that included stimulus and urge control, and contracting that include family involvement. There were both statistically and clinically significant differences between conditions in reductions in drug use. The behavioral treatment condition had a greater reduction in illegal drug use (across measures) compared to the supportive counseling program (large effects). Youth in BT had significantly better improvements in other areas such as school attendance, parent relationship satisfaction, conduct ratings, and depression ratings.

Building on his earlier study, Azrin and colleagues [20] undertook a second study, but this time compared family behavior therapy ($n = 29$) with an individual cognitive problem solving therapy (ICPS, $n = 27$). The problem-solving treatment used in the study differed from previous efforts in that this effort was more purely cognitive. The use of prob1em-so1ving steps was reinforced and there was no emphasis on behavioral features such as rehearsal, homework, behavioral recording charts. Both interventions included 15 sessions. This study included a sample of dually-diagnosed youth with conduct disorder and substance dependence. Both groups had significant decreases in their average number of days using drugs per month from pre-test to six months during treatment, and the results were maintained by the six-month follow-up. Both groups also experienced significant improvements in conduct through follow-ups. Within ICPS, there were significant reductions in AOD and other problems through 6-month follow-up. However, youth in both conditions demonstrated similar decreases in their drug use over time; there was no differential benefit of one treatment over the other.

Conrod and colleagues [21] examined the efficacy of a CBT-G intervention targeting youths with personality factors that placed them at high risk for drinking and drinking problems. The researchers characterized the intervention as selective, targeting not a clinical sample with AOD use disorders, but youth with reported alcohol use in the past four months, and a personality profile placing them at risk of subsequent alcohol problems and comorbid psychopathology. The personality profiles include anxiety sensitivity, hopelessness, and sensation seeking. Youth were randomly assigned to a two-session CBT-G intervention ($n = 166$) or to a no-treatment control condition ($n = 131$). The CBT-G consisted of psychoeducation, behavioral coping skills training, and cognitive coping skills training. By 4-month follow-up, youth in the CBT condition had significantly lower levels of alcohol consumption, number of problem drinking symptoms, and binge drinking, when compared to youth in the control condition. The brief CBT-G intervention had significant but small effects in reducing alcohol use and problems among selected high risk drinking youth.

Kaminer and colleagues undertook a series of studies that included youth with co-morbid disorders. The first study [22] compared a cognitive behavioral group therapy (CBT-G, $n = 13$) and interactional group treatment (IGT, $n = 10$) up to 3-month follow-up. The primary purpose of the study was to test whether youth could be matched to particular treatments based on diagnostic condition. The study's aim was to determine whether youth with externalizing disorders would have better outcomes when treated with (CBT-G) than with IGT, and youths with internalizing disorders would do better in IGT. The CBT approach viewed AOD abuse as a maladaptive way of coping with problems or meeting certain needs.

AOD use was related to a sequence of learned behaviors that can be changed through the application of behavior modification. Thus, treatment focused on the factors that precipitated and maintained episodes of AOD use, and involved didactic presentations, modeling, role-playing, and homework exercises. Thirty-two dually-diagnosed adolescents released from an outpatient aftercare treatment facility were randomly assigned to CBT or IT groups. Both groups consisted of 12 weekly, 90-minute sessions. At 3-month follow-up no matching effects were found, but an unexpected finding was noted; adolescents in the CBT-G condition demonstrated a significant reduction in severity of substance use compared with those assigned to IT. CBT-G demonstrated greater reduction in substance use compared to IT. In a 15-month follow-up study, Kaminer and Burleson [23] reported that youths maintained significant treatment gains on measures of AOD use and psychiatric status, but there were no significant differences between therapy types.

In a third and larger study, Kaminer and colleagues [24] examined the effects of a briefer version of the CBT group ($n = 51$) versus a psychoeducational group therapy (PET, $n = 37$), which included 3- and 9-month follow-ups. The sample consisted of 88 predominately dually-diagnosed youth referred to outpatient AOD treatment who were randomly assigned to 8 weeks of CBT or PET groups. Self-reported AOD use measures showed significant improvement through 3- and 9-month follow-up across conditions. A greater reduction in other drug use occurred among older youth and male youth in the CBT-G condition at 3-month follow-up, compared with the PET condition, but this was not maintained at 9-month follow-up.

Liddle and colleagues included a CBT intervention as an active comparison group for the development and testing of Multidimensional Family Therapy (MDFT) in three studies. In the first clinical trial [25], 152 multiethnic adolescents were assigned to MDFT ($n = 47$), Adolescent Group Therapy (AGT, $n = 53$), or Multifamily Educational Intervention (MEI, $n = 52$). AGT was based on CBT and emphasized social skills training, such as communication, self-control, self-acceptance, and problem solving. Statistically significant reductions were achieved in all three conditions, although the biggest reductions and across more domains (e.g., family functioning, school performance) were in the MDFT condition. However, the findings also provided support for the AGT intervention. At the 12-month follow-up, youth's drug use in the AGT condition gradually declined from pre-test and was as low as for those who were in the MDFT condition, demonstrating a "sleeper effect." In addition, the AGT at 12-month follow-up had significantly lower rates of drug use than the MEI condition.

A second study compared MDFT ($n = 39$) with peer group treatment (PGT, $n = 41$), which was based on social learning and behavior therapy [26]. This study was focused on including younger (mean age 13.7 years) diverse youth and reported findings through discharge from treatment. Both conditions demonstrated significant improvements in youth's alcohol and marijuana use over the course of treatment until discharge from treatment. MDFT had more rapid decreases in cannabis use over treatment than AGT, and for adolescents who reported using alcohol during treatment, those in the MDFT condition demonstrated significantly better changes in alcohol use than youth in AGT.

In a follow-up study, Liddle and colleagues [27] reported 12-month outcomes for MDFT and PGT (now called adolescent group therapy, AGT). Both treatments showed significant reductions in the number of youths reporting any AOD problems during the 12-month follow-up and the proportion of youth abstaining from AOD use significantly increased over time. There were also clinically significant reductions in AOD problems over time, but the frequency of their use by the end of treatment was not clinically significant, in contrast to MDFT which had more clinically meaningful reductions in AOD frequency. MDFT had

more rapid decreases in reported problems over time than AGT, and youths in the MDFT condition reported fewer days of AOD use and increased abstinence from AOD. MDFT also had greater improvements in reducing delinquency, internalized distress, and risk in the areas of family, peer, and school functioning.

Najavits and colleagues [28] examined the efficacy of Seeking Safety (SS), a coping skills program adapted for youth, which targeted both PTSD and AOD disorders among female adolescents. All participants had AOD and PTSD diagnoses, with most experiencing trauma in the form of sexual or physical abuse. In the small study, youth were randomly assigned to either SS combined with usual treatment (SS+TAU, $n = 18$), or to usual treatment (TAU, $n = 15$). According to the researchers, the SS manual included 25 topics representing cognitive, behavioral, and interpersonal domains, and each topic included a "safe coping skill" relevant for both AOD and PTSD, such as Asking for Help. The researchers utilized full intent-to-treat analyses, including all data available at each time point (Pre-test, post-test, 3-month follow-up). The results were that youth in the SS+TAU condition had significantly better outcomes on seven of ten subscales of the AOD measure than those in TAU. In addition, youth in the treatment condition had significantly fewer substance use disorders (SUDs) than TAU by follow-up. The SS+TAU condition experiences significantly better outcomes on trauma related symptoms (sexual, physical abuse), cognitions related to SUD and PTSD (but not PTSD), and all differences favored treatment over TAU.

In a randomized clinical trial, Smith and colleagues [29] evaluated the efficacy of strengths oriented family therapy (SOFT, $n = 58$) and The Seven Challenges program (7C, $n = 40$). The 7C program was a combination of group (10 sessions) and individual (5 sessions) CBT treatment that incorporated cognitive-emotional, decision-making process, which included decision-making exercises, skills training, and interactive journaling with clinicians, with motivational interviewing concepts. Both groups experiences significant reductions in AOD use at 3- and 6-month follow-ups. Specifically, youth in both groups were significantly more likely to abstain or in full remission at follow-ups compared with baseline. Within the 7C condition, the odds of AOD use at the 3- and 6-month follow-ups were reduced by 93% and 95% respectively, and the odds of AOD problems were reduced by 52% and 69%, respectively. Neither treatment was superior to the other in reducing the odds of continued use or continued AOD symptoms.

Stice and colleagues [30] tested the efficacy of a brief CBT-G intervention in reducing depression symptoms and AOD use. In a RCT, the CBT-G intervention ($n = 89$) was compared with three other conditions, a group supportive-expressive intervention (GS-EI, $n = 88$), bibliotherapy ($n = 80$), and an assessment-only control condition ($n = 84$). The study's primary area of interest was depression and AOD use. CBT-G focused on increasing participant involvement in pleasant activities, replacing negative cognitions with positive cognitions, and involved homework to reinforce the skills taught in the sessions, and behavioral techniques to reinforce the use of new skills. Motivational enhancement exercises were also included to maximize willingness to use the new skills. Youth in the CBT-G condition had significantly greater reductions in depressive symptoms than those in GS-EI, bibliotherapy, and assessment-only conditions at post-test. The CBT-G intervention yielded significantly greater reductions in depressive symptoms than in assessment-only at 6-month follow-up and the changes were clinically significant. Youth in the CBT-G condition demonstrated significantly greater reductions in AOD use at post-test for all conditions but GS-EI, and by 6-month follow-up than youth in all three other conditions.

Waldron and colleagues [31] randomly assigned 114 multiethnic adolescents to four treatment conditions; functional family therapy (FFT, $n = 30$), CBT-I with motivational enhancement therapy (CBT-I/MET, $n = 31$), combined FFT with CBT-I/MET (joint, $n = $

29), and a psychoeducation group intervention that included drug and alcohol education and skills training (*n* = 30). The CBT-I intervention included a two-session MET followed by ten skills modules, which included communication training, problem-solving, refusal skills, negative mood management, and relapse prevention. The group intervention included behavioral elements such as exploration of expectancies and consequences of AOD use and assertiveness and refusal skills training. The intervention has been classified as CBT in the researcher's subsequent studies [7], and is thus classified as CBT-G in this paper. Thus, three of the interventions included elements of BTs, but only the group condition was exclusively CBT. Two outcomes were used in the study, percentage days of marijuana use and changes from heavy to minimal marijuana use. Youth in FFT and joint condition had significantly fewer days of marijuana use from pre-treatment to the 4-month follow-up. However, only youths in the joint and CBT-G conditions maintained significant reduction in percentage of days of marijuana use through to the 7-month follow-up. Thus, there seemed to be a delay effect in the CBT-G condition in that gains were not observed at 4- but rather 7-month follow-up. Youths in the CBT-I/MET did not have significant reductions in marijuana use at either 4- or 7-month follow-up. With respect to changes from heavy to minimal marijuana use, significant more youths achieved minimal use in the FFT, joint, and CBT-I/MET conditions at the 4-month follow-up. At seven months, significant changes from heavy to minimal use were seen in the FFT, joint, and CBT-G conditions, but not in the CBT-I/MET condition. When comparing treatments, the FFT condition had a significantly lower rate of marijuana use than did the CBT-I/MET and CBT-G treatments at four months, but there were no differences between conditions by the 7-month post-test.

Summary of Behavior Therapies—Thirteen articles tested twelve different BTs interventions in group or individual modalities, either as the primary or comparison condition. Most were delivered in outpatient settings but two were school-based [21,30]. Treatment lengths ranged from 2 to 25 sessions, with a median of 12 sessions. Most (8 of 12) were group interventions.

With respect to problem severity, most of the treatments tended to target youth with at least moderate AOD use. Several targeted youth with co-morbidity that included PTSD [28], elevated depression [30], and both internalizing and externalizing disorders including conduct disorder [20,22-24]. With respect to effectiveness, most had significant changes from pre-test through follow-ups. The BT condition had superior outcomes than at least one comparison condition on an AOD variable in half of the interventions [19,21,22,25,28,30]. One study noted a superior outcome versus the comparison condition among older youths and male at short-term follow-up [24]. The studies involving youth with comorbidity demonstrated that in most cases, CBT-based interventions reduced AOD use over time, and in some cases, over comparison conditions. When examining the criteria from Chambless and colleagues, only two studies - both group-based - had sufficient sample sizes and a treatment that performed better than the comparison condition on many if not all indicators of AOD use [21,30]. The other four studies that demonstrated significant differences compared to comparison conditions [19,22,25,28] suffered from small sample sizes or had only one measure or outcome point that was significantly different than the comparison condition. Thus, although the body of research did not meet the criteria for "well-established" the BTs interventions met the criteria for "probably efficacious," given they were better than comparison groups on some or all AOD measures.

Motivational Interviewing

Motivational interviewing (MI) includes a number of different approaches that employ motivational processes. MI was originally developed by William Miller [32] for adult alcohol drinkers. It has theoretical roots in social learning and CBT [33] but is humanistic at

its core. MI is defined as a "collaborative, person-centered form of guiding to elicit and strengthen motivation for change" [34, p. 137]. This "form of guiding" is characterized by the therapist's emphasis on collaborating with the client, supporting client autonomy, and evoking the client's own views of behavior change [35]. In addition, MI consists of techniques, which are often described with the acronym: Open questions, affirmations, reflections, summaries (OARS). These techniques are used to increase motivation and strengthen commitment to behavior change. Because it values client autonomy, MI does not require than an individual "admit" to an AOD problem before considering behavior change. Thus, it is thought that adolescents may respond more favorably to MI approaches than to "confrontation of denial" approaches.

MI principles have been incorporated into a number of different versions. Adapted motivational interviewing (AMI) has been used to describe interventions based partially but not solely on MI. Motivational enhancement therapy (MET) is based on MI but typically incorporates client feedback regarding the targeted behavior. Although MI tends to be a brief intervention, brief motivational interventions (BMI) are explicitly so. Finally, most brief interventions (BI) are also MI-based.

With adults, MI and its adaptations have good strong empirical support for treating AOD disorders [36,37], although other reviews have noted that the effects for reducing other drugs is mixed and that stronger effects are seen for interventions that combine MI with other approaches [15]. The literature on MI with adolescents is much more recent. The first published report of MI in the literature with adolescents with non-tobacco AOD use was by Monti and colleagues in 1999 [38]. Since then, there have been a number of controlled studies.

Twelve different controlled studies that draw upon MI principles and techniques are presented below according to treatment setting. The first set of five studies were in schools, followed by four in community settings that serve either heavy AOD users or homeless youth, and three in primary health care settings (i.e., health care clinic, emergency departments).

School-Based Studies—The first two studies were in high schools in the United States. The other three were in "further education colleges" in the United Kingdom, which enroll older adolescents. In the first study, Walker and colleagues [39] examined the feasibility and efficacy of a school-based MET with an ethnically diverse sample of adolescents. Youth were randomly assigned either to MET ($n = 47$) or to delayed treatment control ($n = 50$). MET did not significantly reduce marijuana use compared to a 3-month delayed control condition, but both conditions significantly reduced use from baseline. A nonstatistical difference in number of participants exhibiting a meaningful change (i.e., having reduced baseline marijuana use by at least 50% or no longer reporting symptoms of abuse and/or dependence at 3-month follow-up) was also noted for the MET condition. This study provided some support for the usefulness and appropriateness of the school setting to intervene in heavy adolescent AOD use and suggested that assessment alone may reduce use, but provided no conclusive evidence for the efficacy of MET.

Winters and Leitten [40] tested two BIs, a brief intervention adolescent only (BI-A, $n = 26$) and a brief intervention with adolescents and a parental component (BI-AP, $n = 26$). A delayed treatment group served as a control condition ($n = 27$). Both BI conditions were associated with reduced drug use and related consequences, and these improvements exceeded the changes in the assessment-only control group. BI-AP exhibited greater and more consistent intervention effects compared to the BI-A condition. This study provided additional support for intervening in adolescent AOD use in the school setting. It also found

clear empirical support for the efficacy of BI with mild to moderate AOD using adolescents particularly when a parental component was added.

In the first of three RCTs in schools in the United Kingdom, McCambridge and Strang [41] tested the effects of a single one hour MI ($n = 105$) against an "education as usual" condition ($n = 95$). At the 3-month follow-up, those in the MI condition had significantly reductions of AOD use compared with the control group (Cohen's *d* effect sizes = 0.34 and 0.75 for alcohol and cannabis, respectively). A follow-up study noted that after twelve months these differential effects diminished to non-significant levels [42]. However, both groups achieved a small but statistically significant reduction in marijuana use frequency at twelve months.

A second study by McCambridge and colleagues [43] trained youth workers with the intervention model used in the first study [41,42]. In this quasi-experimental study, the MI group ($n = 59$) exhibited a statistically significant reduction in alcohol use compared to an assessment only condition ($n = 103$), but there was no evidence of impact on cannabis use.

A third study [44] focused on reducing marijuana use and for a comparison condition, the researchers developed a standardized protocol called drug information and advice-giving (DIA). The MI intervention ($n = 94$) did not reduce marijuana use outcomes more than the DIA intervention ($n = 104$). In this study, MI fidelity was assessed using the Motivational Interviewing Treatment Integrity instrument. Scores fell below proficiency and competency thresholds [45]. There were also practitioner-interaction effects such that clients seen by certain practitioners in the MI condition were significantly more likely to decrease their marijuana use. Thus, this study suffered from methodological limitations.

The five MI studies in schools produced mixed results. Three studies reported beneficial effects, but in one study, the initial positive effects [41] diminished at the 12-month follow-up [42].

Community Settings for Homeless and other "Hard to Reach" Youth—Two randomized studies targeted youth with hard AOD use in the United Kingdom and in Thailand. The first [46] evaluated an AMI intervention targeted for youth with moderate to heavy substance use. AMI included a self-assessment questionnaire, a single-session intervention and standard printed information about the health risks of stimulant drugs and hazardous alcohol consumption. Both the intervention ($n = 166$) and control group consisting of health risk information only ($n = 176$) reported significant reductions in their stimulant use. However, there were no significant between-subjects effects for abstinence or changes in frequency and amount used.

The second study [47] examined the effects of BI ($n = 24$) compared to a psychoeducation control ($n = 24$) with methamphetamine abusing or dependent youth in Thailand. Results were mixed with some indication of superior effects of the BI group, including a statistically significant difference in the number of days per week of use compared at the 8-week follow-up assessment. Differences between conditions on other outcomes, such as amount used per occasion, were not significant but reductions from baseline were. This study supported the effectiveness of BI in reducing methamphetamine use relative to an assessment control. Moreover, this difference was found despite a significant reduction achieved by both conditions from baseline to the follow-up assessment.

Peterson, Baer and colleagues conducted two clinical trials with homeless adolescents. The first randomized trial [48] studied the effects of a single session ME ($n = 92$) compared to two control conditions, assessment only (AO, $n = 99$) and assessment at 1-month follow-up only (AFO, $n = 94$). ME was informed by the Transtheoretical Model of behavior change,

the theory of reasoned action, and norm confrontation models [49]. An AFO was offered in addition to AO condition to address potential assessment reactivity or Hawthorne effects. ME participants reduced use of hard substances significantly more than the AO control condition at the 1-month (but not 3-month) follow-up, and no differences were found for marijuana or alcohol. Post hoc analyses within the ME group suggested that those who were rated as more engaged and more likely to benefit showed greater drug use reduction than did those rated as less engaged.

Baer, Peterson and colleagues [50] made several modifications to their previous protocol to increase engagement. For example, instead of a single-session, the BMI included up to four sessions ($n = 66$), which was compared to treatment as usual ($n = 61$). Youth experienced significant reductions in AOD use over time. However, there were no significant differences between conditions in AOD use.

These studies involving homeless and other "hard to reach" youth highlight the challenges associated with intervening with this high-risk population. It is likely that BMIs alone are not enough to cause lasting change in AOD use with these youth with many unmet needs. Thus, a more comprehensive intervention that also targets more needs may be needed.

Primary Medical Care Settings—Three studies involving MI have been done in primary medical care settings. The first randomized study [51] tested a BMI intervention (Project CHAT, $n = 38$), against a standard care (SC, $n = 26$) control condition with a mostly Hispanic adolescent sample. Participants in the MI condition versus the SC condition exhibited statistically significant reductions in marijuana use as well as intentions to use marijuana, and prevalence estimates of marijuana use, with large reported effect sizes. Although trends for reductions in alcohol use were found, these effects were not statistically significant.

Two studies by the same research group were done in emergency department in hospitals. The first randomized study [38] tested a BMI ($n = 52$) against standard care (SC, $n = 42$) with adolescents who had been drinking prior to the event that precipitated emergency medical attention. Both conditions resulted in reduced alcohol use, but BMI significantly outperformed SC in reducing drinking and driving and alcohol-related injuries, alcohol-related problems, and moving violations than SC at 6-month follow-up.

The second study [52] examined the effects of BMI ($n = 78$) compared to SC ($n = 74$) on alcohol-related consequences and use. Both conditions resulted in reduced quantity of drinking during the 12-month follow-up. However, alcohol-related negative consequences, which were already relatively low, stayed low at follow-up. Adolescents who screened positive for problematic alcohol use at baseline and who received MI, reported significantly reduced average number of drinking days per month and frequency of high-volume drinking, compared with SC.

These studies highlighted the utility of health care settings for adolescent AOD use intervention. Intervening in AOD and other risk behaviors in these settings has unique potential to impact adolescents, capitalizing on a potentially significant life event or "teachable moment."

Summary of Motivation Interviewing Treatments—Twelve different MI interventions were reviewed. All were individualized interventions and the quality of the studies was generally strong. Most ($n = 5$) of the studies were in school settings, followed by three in primary medical care settings, and four for homeless and other "hard to reach" youth. Most of the MI interventions were single session ($n = 8$), followed by two sessions (n

= 3), and one of four sessions. Most of the studies involved youth with moderate to heavy use, and no studies targeted dually-diagnosed individuals, although some studies clearly involved a majority with an AOD disorder [47,48].

Given the brevity of the interventions and the relatively serious AOD problems, it is significant that there were effects. All of the studies reported reductions in at least one AOD through follow-up. MI had superior outcomes than comparison conditions on all indicators through follow-ups in two studies [38,40]. Five studies [43,47,48,51,52] reported significantly better outcomes than comparison conditions on some but not all outcome measures at follow-ups. When examining the criteria from Chambless and colleagues, two studies demonstrated significant differences with a comparison condition, had adequate sample sizes, and had a treatment that performed better on many if not all indicators of AOD than the comparison condition [38,41]. However one of the studies subsequently completed a 12-month follow-up [42], and failed to find sustained effects. Two additional studies [40,47] reported significant differences between the treatment and comparison conditions, but were insufficiently powered [1]. Thus, the body of research did not meet the criteria for "well-established" or "probably efficacious" treatments, but the MI interventions met the criteria as a "promising" intervention. Thus, MI is a promising treatment choice, particularly in circumstances in which youth with significant AOD problems are not likely to seek treatment on their own, and a brief treatment is offered opportunistically, such as in a primary medical care setting when other services are sought, or in school during class time.

Behavior Therapies Combined with Other Approaches

Some studies have combined BTs and/or MIs with other psychosocial treatments. Sometimes the purpose of such combinations is to have treatment elements target different problem or risk areas. Twelve interventions have been combined.

One of the studies reviewed earlier in this paper included two combined treatments. Waldron and colleagues [31] included two combined conditions, one that paired CBT-I with MET (CBT-I/MET, *n* = 31) and a second that paired CBT-I/MET with functional family treatment (joint, *n* = 29). Recall that youths in the CBT-I/MET did not have significant reductions in percentage of days marijuana use at either 4- or 7-month follow-ups, but did experience changes from heavy to minimal marijuana use at 4-month follow-up. Youths in the joint condition had significant reductions in both indicators of marijuana use at 4- and 7-month follow-ups, but there were no significant differences between conditions.

Bailey and colleagues implemented a pilot study in Australia [53] involving youth at risk for alcohol problems. Youth were randomly assigned to either four sessions of a group that combined MI with CBT (MI/CBT-G, *n* = 17) or to a no treatment condition (*n* = 17). Youth in the MI/CBT-G condition significantly increased their readiness to reduce or quit drinking by the second follow-up. Youths reduced the frequency of their drinking at post-treatment and at 1-month follow-up, while the control group reported increases at 2-month follow-up. As a result, youth in the MI/CBT-G condition experienced significant reductions in their frequency of drinking at post-treatment through the 2-month follow-up relative to the control group (largely due to the control group increasing its frequency of drinking at 2-month follow-up). Both groups had significantly reduced number of drinks consumed per drinking occasion. There was a significant difference between groups in pre-test to 2-month follow-up in frequency of binge drinking and in hazardous drinking (largely due to the control group increasing their drinking in both areas compared to the treatment group).

Battjes and colleagues [54] examined the effectiveness of a CBT-G intervention that incorporated elements of both social learning theory, which explained how adult and peer role models began and continued AOD use, and operant conditioning theory, which

explained how AOD use progressed and was maintained. CBT-G was the foundation on which two conditions were created; namely, nineteen sessions of CBT-G with one-session of MI (*n* = 95), and CBT-G with a one-session counseling overview (CO, *n* = 99). In this quasi-experimental study, low to moderate AOD-using youth were assigned to either condition. Main outcomes were AOD use and criminal behaviors at 6- and 12-month follow-ups. Youths in both conditions experienced significant reductions in their marijuana use at 6-month follow-up, with reductions largely sustained at 12-month follow-up. However, there were no changes in alcohol use or criminal involvement. Type of treatment preparation (MI or CO) was not associated with marijuana use outcomes. In this study, the addition of MI to CBT-G did not have an additive effect.

The Cannabis Youth Treatment Study was a major effort to compare the efficacy of a number of short (3 months) interventions for adolescents with cannabis use [55,56]. Five short-term manualized treatments were tested in two separate RCTs [57]. In the first, three treatments were compared; two sessions of individual motivational enhancement therapy plus three sessions of group cognitive behavioral therapy (MET/CBT5, *n* = 102); two sessions of MET plus 10 sessions of group CBT (MET/CBT12, *n* = 96); and MET/CBT12 plus the family support network (FSN, *n* = 102). In the second trial, three treatments were compared: MET/CBT-5 (*n* = 100); 12-weeks of adolescent community reinforcement approach (ACRA, *n* = 100); and multidimensional family therapy (MDFT, *n* = 100). Across both trials, all treatments demonstrated significant pre-post reductions in AOD use and there were no significant differences between groups. Across conditions, half relapsed at least once through 12-month follow-up and two thirds were using AOD or had related problems, pointing to the need for continued ongoing treatment. The economic analysis indicated that the MET/CBT5 condition across both trials was the most cost effective (better than all in the first trial, second to ACRA in the second trial). Thus, of the two MET/CBT interventions, MET/CBT5 was superior.

Guided Self-Change (GSC) was developed as a brief outpatient CBT-MI that incorporated self-management to help participants formulate and implement their own treatment plans [58-60]. GSC was developed for problem drinkers, not dependent on alcohol but still demonstrating alcohol problems. Breslin and colleagues [61] evaluated the First Contact program (FC), a GSC intervention that combined an assessment-feedback session plus four group sessions in a quasi-experimental design. The study examined both the effectiveness of FC (*n* = 22) and also whether further community treatment after the intervention increased the effectiveness of FC (FC+, *n* = 28). The study reported that youth in FC, with or without extra treatment, experienced significant reductions in substance use and number of consequences, and significantly increased confidence in high-risk situations, up to six months after program entry.

Latimer and colleagues [62] evaluated an intervention consisting of family and group CBT, called integrated family and cognitive therapy (IFCBT, *n* = 21), which was compared with psychoeducation (*n* = 22) in a randomized trial. IFCBT was informed by ecological theory, social learning, and family systems theory and consisted of four modules; three CBT modules offered in a group format delivered over 32 sessions, and one module offered in a family format delivered over 16 sessions. Both the groups and family sessions were delivered concurrently. The comparison condition was called drug harm psychoeducation group (DHPE), and emphasized the physiological consequences of drug use. IFCBT had substantial reductions in Alcohol and marijuana use from pre-test through 6-month follow-ups. IFCBT was significantly better than DHPE in reducing alcohol and marijuana use, and in improving problem-solving and school learning skills, during the 6-month follow-up, with medium to strong effect sizes. Thus, the IFCBT appeared to be successful in targeting putative cognitive mechanisms related to AOD use.

Liddle and colleagues [63] compared MDFT (*n* = 112) with CBT-I plus family (*n* = 112). CBT-I incorporated elements of dialectical behavior therapy, along with social learning, classical and operant principles, and cognitive elements. Clinicians within the CBT-I condition used a modular approach in selecting treatment strategies. Examples of modules included providing information, contingency contracting, self-monitoring, problem-solving training, communication skills training, identifying cognitive distortions; and homework. The CBT-I also included a family-involved component in that parents attended the first two sessions. This study is notable because it included a large sample of African Americans (72%). Both treatments demonstrated statistically significant reductions in AOD problem severity and frequency of cannabis use at 12-month follow-up. There were no significant differences between conditions with respect to frequency of cannabis use or with alcohol use through 12-month follow-up. However, those in the MDFT condition reported significantly less AOD problem severity, other drug use, and a significantly higher proportion of youth reported minimal AOD use or abstinence at 6- and 12-month follow-ups. Thus, this study demonstrated that CBT-I was effective in reducing AOD use and problems, and on some AOD variables was as effective as MDFT, but that MDFT had superior effects across more AOD outcomes.

Martin and Copeland [64] compared a two-session motivational and CBT intervention called the adolescent cannabis check-up (ACCU, *n* = 20) to a 3-month delayed-treatment control condition (DTC, *n* = 20). After an initial detailed assessment session, a feedback and skills intervention session was provided. An optional component of the second session included practical strategies for quitting and reducing use including a discussion of triggers, managing craving, goal setting, and relapse prevention. ACCU had significant and substantial reductions in cannabis use from baseline to 3-month follow-up, and when compared with DTC (medium to strong effect sizes).

A study in the Netherlands [65] compared the efficacy of a combined CBT-G and MI intervention (*n* = 53), compared to an information-only control (*n* = 54). The treatment consisted of seven sessions that combined six sessions of group-based CBT followed by one session of an adapted form of MI based on the BASICS program [66]. The intervention was effective in changing several of the targeted cognitive determinants, such as a significant increase in the perception of risk factors for developing alcohol problems and a significant decrease in positive alcohol expectancies in the experimental versus control group. However, despite these changes in cognitive determinants of drinking, the treatment group failed to show a significant difference in decrease of drinking at post-test compared with the control group through follow-ups. Thus, the putative mechanisms for explaining alcohol use failed to suggest that targeting cognitive domain is sufficient.

Summary of Combined Treatments—Twelve combined interventions were reviewed. CBT was combined with MI in all but three cases, which combined family treatment with CBT [31,62,63]. Many of the combined approaches were done in groups. Not counting the replication of MET/CBT-5, half of the interventions involved some form of group treatment. The duration of treatments ranged from as low as 2 sessions (ACCU)[64] to 24 sessions (joint)[31], with a median of 10 sessions. In terms of outcomes, most of the studies had significant changes in AOD use from pre-test through follow-ups, but only three had most or all outcomes significantly better than the other condition [53,62,64], and only one with some differences in favor of a joint condition [31]. In terms of overall efficacy of the approaches using the criteria from Chambless and colleagues, none of the studies could be considered "well-established" or "probably efficacious," largely because there was no replication of the same intervention by a different investigating team and/or because the intervention was not superior to the comparison or control condition. However, they met the criteria as "promising" interventions, but marginally so, given the very low sample sizes in each

condition. In all studies involving group treatment, there were positive changes in AOD use and not one report of iatrogenic effects.

DISCUSSION

This article reviewed thirty-six different interventions across thirty-four peer-reviewed publications; twelve each of BTs, MIs, and BT plus psychosocial approaches. Across interventions, most demonstrated significant changes from pre-test to follow-ups. For the BTs, twelve different BTs interventions were tested in group or individual modalities. Most of the BTs demonstrated significant changes from pre-test through follow-ups. Although half of the BT interventions [19,21,22,25,28,30] had superior outcomes on at least one comparison condition on an AOD variable, only two had sufficient sample sizes and a treatment that performed better than the comparison conditions on many if not all indicators of AOD use [21,30]. Thus, the BTs interventions met the criteria for "probably efficacious." This finding can be compared with the conclusions of two other recent reviews that examined the BT evidence. One that included a rigorous quality-of-study analysis [1] concluded that BTs have evidence of treatment superiority in at least two methodologically strong studies. Waldron and Turner [7] evaluated whether treatments included in their meta-analysis were significantly better than a minimally-treated condition, which was derived from pooled findings from the studies included in their meta-analysis. Using such methodology, they reported that CBT-G was considered a "well-established" treatment and that CBT-I was considered "promising." Thus, the findings from this and the other two reviews support the efficacy of BTs in the treatment of adolescent AOD use. When considering both within and across treatment changes over time, most of the CBT interventions were helpful in significantly - and in many cases substantially - reducing AOD use over time, which makes individual and group-based BTs clear clinical choices.

For the twelve different MI interventions, all had significant reductions in at least one AOD indicator through follow-up. Except for four studies that demonstrated no significant differences between conditions on AOD outcomes [39,42,44,46], most of the studies had superior outcomes than comparison conditions on some or all indicators through follow-ups. The body of MI research met the criteria as a "promising" intervention. Becker and Curry's review [1] noted that MIs had superior evidentiary support in two or more methodologically strong studies. Thus, MI approaches may be viewed as a good treatment option. Many of the MI studies indicated that both non-treatment seeking but AOD-involved adolescents, and youth with SUDs can be recruited into treatment. As a stepped approach, this could be valuable. In addition, there is good evidence for the efficacy of MI treatments in health care settings.

There were twelve combined BT plus other psychosocial interventions. Most of these demonstrated significant changes in AOD use from pre-test through follow-ups, but only three had most or all outcomes significantly better than the other condition, although the samples sizes were only about twenty in each condition [53,62,64]. Two of these were combined MI and CBT interventions, but given their very low sample sizes (mean of 18.5), combined approaches may only be classified marginally as a "promising" intervention.

Table 1 offers a summary of the level of evidence for the treatments reviewed, along with the support from the two recent systematic reviews. BTs are recommended and MI interventions are also a viable treatment choice. There is less evidence for combined psychosocial approaches. The most effective therapy for serious and comorbid disorders are BTs. For youth with mild AOD use, or for a treatment that is suitable for locations that are not primary AOD treatment settings, such as schools of medical settings, MI is perhaps the first choice. However, the two brief, group-based CBTs are also good options [21,30]. Most

of the BT interventions and a few of the combined interventions were group-based. The evidence clearly supports the efficacy of group-based interventions in reducing alcohol and in some cases, related problems.

The findings should be interpreted in light of methodological issues that attenuated the findings, and which should inform future research. Overall, the studies utilized designs that were methodologically rigorous and utilized control (routine or standard treatment) and comparison conditions. In the case of BTs, clear methodological improvements have been made when compared to the studies before the 1990s. However, improvements in methodology are sorely needed, such as increasing the sample sizes in the conditions. Many of the BT and MI studies that demonstrated superior effects over the comparison condition did not have adequate sample sizes, many below twenty. Adequately powered studies are important to detect differences and in order to meet the criteria of "well-established." In particular, studies continue to have insufficient sample sizes in the group condition. There is a critical need to sufficiently power group-based studies, to account not only for group-level phenomenon, such as cohesion or compositional variables, but also to manage the problem of non-independence of observations, which can lead to spurious "significant" results [67,68]. Other methodological needs include strengthening the randomization process (e.g., computerized generation, assignment concealment from investigators), more clear and complete reporting of study objectives and primary outcomes, wider use of intent-to-treat analyses, and outcome assessment by independent evaluators [1].

Acknowledgments

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Table 1

Efficacy of Behavior Therapies, Motivational Interviewing, and Combined Psychosocial Approaches

Treatment	Level of Evidence [a]	Settings	Problem Severity	Reports from Recent Systematic Reviews [b]
Behavior Therapies [c]	Probably Efficacious	Outpatient	Mild to heavy use; SUDs; DD	BTs: "Evidence of treatment superiority" [1]; BT-G: "Well-established" [7]; BT-I: "Promising" [7]
Motivational Interviewing	Promising	Schools; Community clinics; Hospitals	Mild to heavy use, SUDs	"Evidence of treatment superiority" [1]
Behavior Therapies + Psychosocial	Promising [d]	Mostly outpatient	Mild to heavy use; SUDs	---

BTs = Behavior therapies; BT-G = Group-based behavior therapy; BT-I = Behavior therapy with individuals; DD = Dual-diagnosis; SUD = Substance use disorder.

[a]Levels of evidence: Well-established, probably efficacious [10]; Promising [13].

[b]Systematic reviews since 2004.

[c]Excludes contingency management approaches.

[d]Marginally classified as "promising" due to low sample sizes.