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On the Learning Curve: The Emerging Evidence Supporting Cognitive-Behavioral Therapies for Adolescent Substance Abuse

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Abstract

Aims—Cognitive–behavioral therapy (CBT) approaches to intervention for adolescent substance use disorders has been limited and formal controlled clinical efficacy trials have been rare. Moreover, the early literature on the efficacy of CBT for adolescent substance abuse has been characterized by significant methodological limitations. Recent innovations in the treatment of adolescent substance abuse and the recent completion of several randomized clinical trials has brightened the picture with respect to establishing the empirical support for CBT. The aim of this review is to integrate the findings from controlled trials of CBT for adolescent substance abuse.

Method—Studies representing randomized clinical trials were reviewed using criteria provided by Lonigan et al. and Nathan & Gorman as a guide.

Findings and conclusions—Despite some prominent differences in design and methodology, the studies reviewed provide consistent empirical evidence that group and individual CBT are associated with significant and clinically meaningful reductions in adolescent substance use. The evidence for the efficacy of group therapy is particularly important, countering the assertion that aggregating problem youths into group treatment settings is associated with iatrogenic effects. The findings from the randomized trials reviewed represent significant developments in treatment outcome research and lay the foundation for validating CBT for adolescent substance use disorders. Future research directions include improving short- and long-term outcomes, enhancing treatment motivation and engagement, and identifying mechanisms and processes associated with positive change, especially for youths with comorbid conditions.

Keywords

Adolescent substance abuse; cognitive behavior therapy; treatment outcome

INTRODUCTION

Cognitive–behavioral interventions for adolescent alcohol and drug abuse, long neglected in treatment outcome research, have gained considerable empirical support in recent years. By contrast, research evaluating CBT for other behavioral problems and disorders associated with adolescent substance abuse, such as conduct problems (Kendall & Wilcox 1980; Kendall et al. 1990; Kazdin 1995), depression (Clarke et al. 1992; Rohde et al. 1994; Wood et al. 1996; Brent et al. 1997; Birmaher et al. 2000) and anxiety (Kendall 1994; Kendall et al. 1997; Spence et al. 2000; Barrett et al. 2001) for adult substance abuse and dependence (Kadden et al. 1989; Miller & Heather 1998), and behavioral approaches for preventing substance use in high-risk

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youths (Pentz 1985; Botvin & Botvin 1992) is well established. Given the success of CBT for other populations, especially for adolescents diagnosed with disorders known to co-occur with substance abuse, the newly emerging support for CBT with substance-abusing youths represents significant progress in the field.

The purpose of this paper is to examine the evidence for the efficacy of CBT for adolescent substance abuse. The theoretical underpinnings of the model are presented, followed by a descriptive review of the early research. The findings from recent controlled clinical trials evaluating out-patient adolescent substance abuse treatments are then reviewed. The evidence is used to argue for expanded efforts in the examination of behavioral treatments for adolescent substance abuse and to provide guidelines for future research.

LEARNING PERSPECTIVES

Cognitive–behavioral models conceptualize substance use and related problems as learned behaviors that are initiated and maintained in the context of environmental factors. Much research has examined the classically conditioned acquisition of preferences and aversions for alcohol and drugs, tolerance, and urges and cravings. For example, research with animals and humans has established that urges and cravings to drink or use drugs appear to be under stimulus control (Stewart & Grupp 1986; Sherman et al. 1988). Such studies have laid the foundation for the development of interventions that help clients anticipate and avoid high-risk situations as a means to facilitate sobriety (Dimeff & Marlatt 1995; Monti et al. 1995). These interventions often involve identifying the circumstances surrounding drug or alcohol use, such as the setting, time or place, which may serve as potential triggers or stimulus cues. Strategies to manage urges and cravings, once stimulus cues have been identified, may involve techniques from different learning perspectives, such as self-control, reinforcers for competing behaviors or other coping-skills training.

Other research has examined substance use from the operant perspective that alcohol and drug use behaviors develop and are maintained in the context of the antecedents and consequences surrounding the behavior. The physiological effects that alcohol and drugs have on the individual can serve as powerful reinforcement for continued use. Substance use may also, in the presence of stress, lead to tension reduction, allow for the regulation of negative affect or enhance social interaction, any of which may serve to reinforce use and thereby increase the likelihood that substance use will recur in the future. Both animal (Balster 1991; Carroll et al. 1991) and human studies (Hursh 1991; Bickel et al. 1992) amply demonstrate the responsiveness of drug-taking behavior to reinforcement contingencies. Moreover, therapeutic strategies derived from an operant model have already shown promise in treating drug problems for adults (Stitzer et al. 1979; Stitzer & Kirby 1991; Higgins et al. 1995) and for adolescents (Gilchrist & Schinke 1985; Corby et al. 2000).

The social learning model incorporates classical and operant learning principles, acknowledging the influence of environmental events on the acquisition of behavior, but also recognizing the role of cognitive processes (e.g. how environmental influences are perceived and appraised) in determining behavior (Bandura 1977). From a social learning perspective alcohol and drug use, therefore, can be influenced by observation and imitation of models (e.g. parents, siblings, peers), social reinforcement, the anticipated effects of thesubstance or (i.e. expectancies), the direct experience of alcohol's effects as rewarding or punishing, self-efficacy beliefs about one's ability to refrain from use and physical dependence (Abrams & Niaura 1987). According to the stress–coping model, one example of a social learning conceptualization of substance use, individuals use alcohol or drugs as a maladaptive means of coping with stress. Such poor coping may stem from modeling drug use in response to stress and the lack of alternative appropriate coping models.

A number of intervention strategies have been derived from classical, operant and social learning perspectives, thus CBT is not a single unitary approach. Rather, a variety of approaches may be considered cognitive–behavioral treatment, but will vary depending on the treatment components and emphasis. Often, however, CBT for substance abuse will include such components as self-monitoring, avoidance of stimulus cues, altering reinforcement contingencies and coping-skills training to manage and resist urges to use. In addition, other skills-focused interventions (e.g. drug and alcohol refusal skills, communication, problem solving, assertiveness), mood regulation (e.g. relaxation training, anger management, modifying cognitive distortions) and relapse prevention are often incorporated to promote sobriety (Marlatt & Gordon 1985; Monti et al. 1989, 1993). The use of modeling, behavior rehearsal, feedback and homework assignments are characteristic during treatment sessions.

Although learning principles would be expected to operate in the same way for adults and adolescents, developmental issues must be addressed to tailor CBT for an adolescent population. School involvement and relationships with family and peers are clearly unique issues in adolescence. Other factors may not be unique to adolescents, such as lack of motivation to change, cooccurring problems and symptoms of physiological dependence, but the manifestation of these factors vary in adolescence and call for special consideration. For example, youths who have food and housing provided for them by their parents are often unmotivated to pursue sobriety, and the identification of effective reinforcers that compete with adolescent drug and alcohol use is particularly challenging.

Moreover, considerable variability exists even within the adolescent population. As youths move through adolescence, cognitive skills, emotional maturity and social functioning are changing, autonomy increases and parent–adolescent communication moves toward symmetry. Thus, behavioral targets of change (e.g. how privileges are negotiated, identification of contingencies) will vary widely depending on the age and developmental level of the adolescent. Some research findings also suggest that the use of substances during the teen years can interfere with crucial developmental tasks, such as prosocial identity formation, interpersonal and educational skill acquisition and assumption of family and work responsibilities (Bentler 1992). Youths who have used illicit substances heavily throughout adolescence, therefore, may not have had sufficient opportunity to acquire certain coping skills, because the alcohol or drug effects occurred during a critical developmental period. For such youths, CBT may need to be expanded to address basic skill deficits.

EFFICACY/EFFECTIVENESS OF PSYCHOSOCIAL TREATMENTS

Compared to the number and variety of treatment approaches implemented in clinical settings for adolescent substance abuse, remarkably little research has examined treatment effectiveness. Davidge & Forman (1988) reviewed eight case studies published between 1967 and 1985 that provided limited support for behavior therapy with adolescent substance abusers. These studies were limited by small sample sizes, lack of control or comparison conditions and, in many cases, only anecdotal reporting of substance-use behavior. Two of the cases, however, used urine analysis to validate self-report of substance use, lending more strength to study claims. These cases used contingency contracting with the adolescent and parents, focusing on school, work and relationships (Frederiksen et al. 1976; Cook & Petersen 1985). The adolescents in both cases had drastically reduced substance use or remained abstinent at posttreatment and at follow-up through 1 year in one case and 3 years in the other.

In other behavioral investigations, Duehn (1978) evaluated the effectiveness of aversive conditioning for adolescents with severe drug-use histories. At 6- and 18months follow-up, complete abstinence was reported for six of the seven youths who had participated in the 14week covert sensitization training program. DeJong & Henrich (1980) conducted a 2-year

follow-up study of 89 young addicts in a behavior-modification program who attended a rehabiltation center for at least 7 days. They reported that one-third of the total sample remained drug free. In a set of two studies using a pre–post design, Iverson and colleagues (Iverson et al. 1978; Iverson & Roberts 1980) conducted a community education-based program for parents and adolescents and found significant reductions in drug use at post-treatment and 6month follow-up.

Using a between-groups design, Smith (1983) compared an eight-session school-based group treatment, focusing on skills training in the areas of problem-solving, social skills and self-monitoring, with a no-treatment control condition for adolescent marijuana users. Self-reported use was reduced, and academic and peer functioning were enhanced for the youths in the treatment. Hawkins et al. (1992) found improved role-play performance involving avoidance of drug use and interpersonal problem solving in an applied behavioral social skills training intervention for adolescents in a residential treatment center.

Azrin et al. (1994a, b) conducted two studies comparing a behavioral intervention to a process-oriented, non-directive (supportive) adolescent group therapy intervention. The first study involved a mixed sample of adults and 14 adolescent substance abusers whose average age was 16 years. The behavioral-therapy condition utilized role-playing, response rehearsal, home assignments and diary keeping. The supportive counseling comparison condition involved a process-oriented, nondirective group intervention. Treatment for each group was delivered for 1 hour per week for 12 months. The behavioral treatment was shown to be superior to supportive counseling in terms of reducing drug use and drug-related problems at treatment completion. Azrin and colleagues followed with a replication study involving adolescents only (n = 26). Analysis of the differential efficacy of these interventions revealed that adolescents in the behavioral therapy condition reported less frequent substance use than those in supportive counseling and had fewer positive urine screens.

A few studies have also focused on the hypothesized mechanisms of change underlying CBT. Most notably, Brown and colleagues have found that among adolescents treated for substance-use disorders, abstainers and minor relapsers were more likely to utilize problem-solving coping strategies than were major relapsers (Myers & Brown 1990a,b). Moreover, coping factors have been identified as significant predictors of treatment outcome (Myers et al. 1993).

Unfortunately, the early literature on efficacy studies for adolescent substance abusers has been characterized by significant methodological limitations. The major limitations of these studies include small sample sizes, lack of appropriate control or comparison conditions, non-random assignment to treatment, inadequate measurement of psychosocial and comorbid psychiatric conditions, failure to indicate compliance and attrition rates, limited descriptions of treatments implemented, failure to measure treatment fidelity, lack of treatment manuals (making replication difficult), absence of biological measures (e.g. drug urinalysis) to validate self-report and inadequate reporting on treatment completers and dropouts (Catalano et al. 1990–91; Waldron 1997; Kaminer 2000). Moreover, the studies varied widely with respect to selection criteria, measures of substance use outcome and number and latency of follow-up assessments. Different patterns of findings may result from these methodological variations and the mixed findings in the literature have probably resulted from the considerable methodological variability across studies.

Within the last decade, innovations in the treatment of adolescent substance abuse and the recent completion of several randomized clinical trials examining CBT as one of the intervention conditions has brightened the picture with respect to evaluating treatment efficacy for adolescent substance abuse (Wagner & Waldron 2001; Waldron & Kern-Jones 2004). This

new wave of research has involved rigorous clinical trials involving larger samples of youths, random assignment to treatment conditions, the direct comparison of active treatment conditions, careful measurement of substance abuse, manual-guided interventions and longer-term follow-up of treatment effects. The outcomes from these trials are remarkably similar, despite several prominent differences in design and methodology. Taken together, the findings represent significant developments in treatment– outcome research and lay the foundation of support for CBT with adolescent substance-use disorders.

The findings from randomized prospective clinical trials were included for review according to criteria for empirically supported treatments outlined by Lonigan, Elbert & Johnson (1998) and by Nathan & Gorman (2002). For each of the studies described below: (1) at least one form of CBT was compared to one or more other comparison conditions; (2) substance use was measured through self-report and/or biological assay as a primary outcome variable; (3) participants were assigned randomly to treatment; (4) treatments were manual-guided; and (5) samples were clearly specified.

ADOLESCENT SUBSTANCE ABUSE TREATMENT OUTCOMES

The first clinical trials comparing two active treatment conditions, family therapy and CBT, for adolescents presenting for out-patient treatment of substance abuse or dependence were conducted in the mid-1990s (Liddle et al. 2001; Waldron et al. 2001b). Liddle et al. (2001) randomly assigned 182 adolescent substance abusers between the ages of 13 and 18 years in the San Francisco area to one of three treatment conditions: multi-dimensional family therapy, an adolescent skills-based group therapy and a family education group intervention. The group intervention included an integration of cognitive and behavioral features and focused heavily on social-skills training (e.g. communication, self control and problem solving). The first group session was preceded by two individual family sessions to enhance cooperation and participation. The substance use measure involved a composite severity of drug use rating that was based on self- and parent collateral report of frequency of different drugs used and urinalysis results. Scores ranged from 1, indicating no drug use, to 15, indicating daily marijuana use with other illicit drugs used three or more times per week.

All three conditions were associated with reduced substance use over time ($F_{1,92} = 53.15$, $P = 0.0001$) and youths showed improvements in otherareas of functioning, including externalizing behaviors and school and family competence. Post-treatment outcomes revealed that family therapy had significantly greater reductions in drug use severity ratings than the cognitive behavioral group. Ratings for youths in the family condition decreased from means of 9.89 (standard deviation [SD] = 3.77) to 4.54 (SD = 3.10), compared to means of 8.90 (SD = 2.82) and 7.28 (SD = 3.30) for the cognitive-behavioral group intervention. At the 6- and 12-month follow-up youths in the family condition had maintained their reductions, with average ratings of 5.04 and 4.25, respectively, while youths in the group condition continued to reduce their use to ratings of 6.21 and 5.08, respectively. Differences between the family and cognitive behavioral intervention at the two follow-up assessments were not significant. Thus, the family intervention produced more immediate change, but by 6 and 12 months after intake, youths who had received the cognitive–behavioral intervention had achieved the same low levels of drug use as those in family therapy. The outcomes for the group condition, albeit delayed, provide empirical support for this cognitive–behavioral intervention.

In a second study, 224 adolescents referred for adolescent substance abuse in Philadelphia were randomly assigned to either multi-dimensional family therapy or individual CBT (Liddle 2002). The CBT and family interventions both included individual and conjoint family sessions. However, the cognitive–behavioral condition emphasized self-monitoring, communication and problem-solving skills training, contingency contracting, and substance-

refusal skills. Substance use was measured using the time-line follow-back (TLFB) method, a calendar-based interview involving a daily reconstruction of drug use (Sobell & Sobell 1995). Both interventions produced significant decreases in the percentage of reported substance use days during the past month from pretreatment to 6- and 12-month follow-up assessments, although there appeared to be continued improvement over time in the family therapy condition, compared to some leveling off in substance-use reductions in the CBT condition after the 6-month follow-up. Again, Liddle and colleagues concluded that support for family therapy was relatively stronger, although the significant within-condition pre- to post-treatment reductions in drug use for CBT provide some empirical support for this intervention as well.

Our own efforts to evaluate family-based and CBT interventions have involved a series of randomized controlled trials, several of which are still under way. In our first completed trial (Waldron et al. 2001b), adolescents were assigned randomly to one of four interventions: an individual CBT intervention, a behavioral skills-based group intervention, family therapy and a combined intervention including both individual CBT and family therapy. Adolescents (n = 129) ranged in age from 13 to 18 years (X = 15.54), and 23% of the sample were female. They identified themselves as Hispanic (35%), Anglo (41%), Native American (6%) or mixed (15%). Substance use was measured at pretreatment and again 4, 7 and 19 months after the initiation of treatment, using the TLFB method (Sobell & Sobell 1995) and validated using urine drug screens and parent collateral reports of adolescent substance use (see Waldron et al. 2001b). At pretreatment, adolescents reported using alcohol or drugs (excluding tobacco) on an average of 61.11% of the days in the 6 months prior to treatment. Substance use varied little with age and between single versus two-parent families, and for the previous 180 days, average percentage of days of substance use was 67.78 for girls and 57.78 for boys. On average, adolescents completed 85% of their available treatment sessions with no significant differences between groups.

Youths who were assigned to family therapy, individual CBT or the skills group received 12 hours of therapy, while adolescents assigned to the combined condition received 12 hours of family therapy plus 12 hours of individual cognitive–behavior therapy. The individually oriented, CBT skills-training program was patterned after coping-skills training programs developed by Monti et al. (1989) and Project MATCH (Kadden et al. 1992). The underlying model was designed to teach the individual adolescent self-regulation and coping skills for avoiding substance use (Wilkinson & LeBreton 1986; Hester & Miller 1989). The CBT intervention included a two-session motivational-enhancement intervention (MET; Miller & Rollnick 2002) and 10 skills modules focusing on such topics as communication training, problem solving, peer refusal, negative-mood management, social support, work and school-related skills and relapse prevention. The group intervention was a behavioral skills-based approach that provided some psycho-educational material, focusing on drug/alcohol effects and expectancies/consequences of substance use, which also provided skills training on communication, assertiveness and substance-refusal skills. Although there was some content overlap between the individual and group conditions, individual CBT involved a flexible treatment plan based on each adolescent's needs. The group was more structured and emphasized group interaction and feedback more than individual skill acquisition.

The 30 adolescents who received the behavioral skills-based group intervention showed significant reductions in their percentage of days of marijuana use from a pretreatment mean of 64.60 (SD = 27.98) to 40.67 (SD = 39.33) at the 7-month and 45.08 (SD = 36.35) at the 19-month assessments [$t(29) = 2.80$, $P < 0.009$, $d = 1.04$; $t(29) = 2.51$, $P < 0.018$, $d = 0.93$, respectively]. Youths had an average of 54.83 (SD = 34.16) days of use at the 4-month assessments (i.e. post-treatment), a non-significant reduction [$t(29) = 1.63$, $P < 0.114$, $d =$

0.60]. Thus, the positive outcomes for the behavioral group treatment, as in the study by Liddle et al. (2001), were delayed but substantial.

The effect size for the group intervention from pretreatment to 19-month follow-up was 0.93, compared to 0.67 for the family-based intervention for the same time points. Effect sizes are standardized scores for comparing differences between means, calculated by subtracting the mean of the second group from the mean of the first group and divided by the pooled standard deviation. The effect size represents a proportion of a standard deviation (Cohen 1988). Thus, the group intervention showed a reduction in substance use nearly 1 SD lower at 19 months, compared to baseline, while the family intervention was associated with a reduction of about two-thirds of 1 SD lower. The percentage of days of use for the individual CBT condition ($n = 30$) was not significantly different from baseline at any of the three follow-up measurement conditions ($t < 1.0$).

A somewhat different pattern of findings emerged when examining clinically meaningful change, with the proportion of youths achieving abstinence or minimal levels of use (i.e. reported use on fewer than 10% of the days) as the outcome measure. Pretreatment to 4-, 7- and 19-month change in clinically-significant marijuana use was assessed using a Wilcoxon signed test procedure within each treatment condition. As with the measure of percentage of days of use overall, a significantly greater number of youths in the behavioral group intervention had achieved abstinence or minimal use at the 7-month (3.3% versus 31.0%, $Z = 2.53$, $P < 0.011$) and 19-month follow-up assessments, but not at the 4-month assessment (3.3% versus 12.2%, $Z = 1.63$, $P < 0.102$). For individual CBT, however, a significant proportion of youths had become abstinent by 4 months (3.2% versus 27.6%, $Z = 2.65$, $P < 0.008$). This pattern was only a trend by 7 months (3.2% versus 17.2%, $Z = 1.63$, $P < 0.10$) and did not persist at 19 months. However, the findings reveal that some youths did benefit from individual CBT, and understanding who may benefit has critical implications for client–treatment-matching.

A second randomized clinical trial, currently under way, is examining the individual and group CBT interventions and family-based treatments for youths referred for problem drinking. Of the 160 adolescents to be enrolled in the trial, 45 have completed treatment and 5and 8-month follow-up assessments. The demographic characteristics of the participating youths are similar to those in the earlier trial, and the ethnic/cultural distribution roughly reflects the population of the region, with 44% of the sample identified as Hispanic, 43% as non-Hispanic white, 6% as Native American, 7% as other. Again, substance use was measured using TLFB, with corroboration provided by collateral reports and urine drug screening (Waldron et al. 2001b).

The group and individual CBT intervention conditions in this study are essentially identical to those in the previous trial, with a total of 14 sessions for each condition. The two CBT interventions both included modules focusing on drug-use consequences, substance refusal skills, sobriety sampling, relapse prevention, communication and problem-solving skills, and negative-mood management. Preliminary analyses for the 22 youths who received group or individual CBT revealed reductions in percentage of days of alcohol use from pretreatment ($X = 23.14$) to the 5-month follow-up ($X = 13.87$) and in percentage of days of any substance use from pretreatment ($X = 54.68$) to the 8-month follow-up ($X = 36.11$). These reductions were statistically significant ($F1,21 = 5.44$, $P < 0.03$ and $F1,21 = 7.62$, $P < 0.01$ for 5- and 8 months, respectively). Post-hoc analyses, however, indicated that the youths who received individual CBT were primarily responsible for the decreases at 5 months, and those who received group CBT were primarily responsible for the decreases at 8 months. Although these findings are preliminary and can be confirmed only when the data collection is complete, the pattern of findings is consistent with the findings of the earlier trial and provides additional support for CBT.

A third study evaluated the efficacy of individual CBT for unmotivated youths (n = 31) who initially refused to participate in treatment, but who were subsequently engaged into therapy through an intervention offered to parents. The CBT intervention was the same as in the previous trials. Adolescents in this study completed an average of five therapy sessions, half the number of sessions completed by youths in the earlier studies. Accordingly, their substance use, assessed using TLFB, a measure that has been corroborated using parent collateral reports and urine drug screens (Waldron et al. 2001b), decreased from an average of 87.47% days of use (SD = 20.62) at pretreatment to an average of 70.19% days of use (SD = 33.59) at post-treatment. While this reduction was statistically significant ($F1,26 = 7.93$, $P < 0.009$), their extremely high level of use at baseline and their continued heavy use at post-treatment suggests that more intensive engagement and intervention strategies may be needed to increase the dose of treatment received and enhance the impact of the intervention for this difficult treatment-resistant population.

Kaminer and colleagues have also conducted several studies evaluating CBT. In one study the feasibility, utility and safety of manual-guided group CBT, developed in the context of a patient–treatment-matching study for adults (Kadden et al. 1989; Cooney et al. 1991), was evaluated for out-patient adolescent substance abusers (Kaminer et al. 1998a). This randomized, adolescent patient–treatment-matching study compared 12 sessions of CBT to a similar number of interactional group therapy sessions for adolescents between the ages of 13 and 18 years. Thirty-two consecutively referred, dually-diagnosed adolescents were assigned randomly to 12-weekly sessions of one of the two conditions in an out-patient setting. The primary substance use outcome variable was derived using a combination of self-report measures (i.e. TLFB interview, Sobell & Sobell 1995; Teen Addiction Severity Index, or T-ASI, Kaminer et al. 1991) and urinalysis data. No patient–treatment-matching effects between psychopathologies (i.e. externalizing, internalizing disorders) and treatment modalities (i.e. CBT, interactional therapy) were found (Kaminer et al. 1998a). However, CBT short-term efficacy was significant. Adolescents assigned to CBT showed a short-term post-treatment differential gain compared to those assigned to interactional therapy. As in other adolescent treatment–outcome studies, however, relapse was a problem for many youths, and the differential gains for CBT were not sustained 1 year later (Kaminer & Burleson 1999).

In another study, Kaminer, Burleson & Goldberger (2002) compared the efficacy of CBT versus psycho-educational therapies (PET) for adolescent substance abusers. This study was designed to replicate the findings from the earlier investigation, establishing the efficacy of the CBT intervention in a larger-scale, controlled, randomized trial. The study hypotheses were that participants in both conditions would show treatment gains from pretreatment to 3 and 9 months' post-treatment follow-up, and that youths assigned to the CBT condition would have better retention rates in treatment and follow-up, and superior short-and long-term outcomes, compared to those assigned to the PET condition. The 88 predominantly dually-diagnosed adolescents were randomized to one of the two 8-week group interventions. Participants included 62 males, 26 females, age 13–18 years ($X = 15.4$, $SD = 1.3$ years), of whom 79 were white. Drug urinalysis and the T-ASI (Kaminer et al. 1991) were used as outcome measures. Treatment completion rate was 86%, follow-up location rate was 95% and rates of post-treatment 3- and 9-month follow-ups were 80% and 65%, respectively.

Youth in the CBT group exhibited significantly lower rates of positive urinalysis than did PET subjects for older youths at 3-month follow-up. Moreover, T-ASI subscales indicated sound improvement from baseline to 3- and 9months follow-up across conditions. At 3-months follow-up there was a trend toward improvement for adolescents who received CBT on T-ASI drug subscale, and this improvement was significant for males. No similar changes were found for PET. Thus, greater support was found for CBT, but only for older youths and for males. Contrary to hypotheses, however, CBT did not produce any long-term differential relapse rates

compared to PET, due to increased relapse among CBT participants at the 9month follow-up. It is important to note, however, that most of the participants achieved substantial improvement in functional status. The majority of the substance-use related problems in life domains assessed by the T-ASI had improved at the 3-month post-treatment follow-up and continued to improve at the 9-month follow-up compared to baseline, regardless of assigned treatment condition.

Through an initiative funded by the Center for Substance Abuse Treatment, a set of two linked clinical trials implemented across four sites was conducted to evaluate five short-term cognitive-behavioral and family-based out-patient interventions for adolescent marijuana abuse and dependence (Dennis et al. 2002). In one trial, a brief, five-session group intervention involving two individual motivational enhancement sessions, followed by three CBT sessions (MET/CBT5), was compared to a full group CBT condition, comprised of the two motivational sessions and 10 CBT sessions (MET/CBT12), and to a third condition in which a 6-week psycho-education family support intervention was added to MET/CBT-12. In the other trial, the MET/CBT5 intervention was compared to a 12-session individual cognitive–behavioral intervention and a 12-week family therapy condition was included. The inclusion of the MET/CBT5 intervention across both trials and all four sites made it possible to study site differences and conduct quasi-experimental comparisons of the interventions across study arms.

Overall, a total of 600 adolescents were assigned randomly to one of three interventions. The average age of the adolescents was 16 years, with 83% male and 61% Caucasian non-Hispanic. Substance use was measured using data from the Global Appraisal of Individual Needs (GAIN; Dennis 1998), a self-report instrument that compares well with the TLFB interview (see Dennis et al. 2004), collateral interviews, urinalysis and other clinical materials. Dennis et al. (2004) reported that all five interventions across both trials produced significant reductions in cannabis use and negative consequences of use from pretreatment to the 3-month follow-up, and that these reductions were sustained through the 12-month follow-up. In addition, changes in marijuana use were accompanied by reductions in behavioral problems, family problems, school problems, school absences, argumentativeness, violence and illegal activity. The costs of the interventions were also examined in order to evaluate the potential for differential cost-effectiveness across the five diverse interventions. The most cost-effective interventions were MET/CBT5 and MET/CBT12 in the first trial and the individual CBT condition and MET/CBT5 in the second trial.

Taken together, the substance use outcomes and cost-effectiveness findings provide striking support for both group and individual cognitive–behavioral interventions for adolescents in out-patient substance abuse treatment. Moreover, the findings are inconsistent with a simple dose–response relationship, as the efficacy of the 5-, 12- and 18-session interventions in trial 1 were all supported. Also, despite considerable support for family interventions in the literature (Stanton & Shadish 1997; Waldron 1997), the family intervention in the second trial did not produce better outcomes than the individual cognitive–behavioral intervention and the group-based MET/CBT5 intervention.

SUMMARY OF FINDINGS ACROSS RANDOMIZED CONTROLLED TRIALS

Taken together, the clinical trials for adolescent substance abuse treatment that were reviewed provide support for the benefits of cognitive–behavioral interventions. Consistent with literature reviews (Catalano et al. 1990–91; Weinberg et al. 1998), these results show that out-patient CBT treatment can be effective in reducing adolescent substance use and related problems. However, some variation in outcomes was observed. For example, while Liddle et al. (2001) and Waldron et al. (2001b) both found greater evidence for the immediate benefits of family therapy, they also found marked substance use reductions, although delayed, for the cognitive behavioral group interventions. However, Dennis et al. (2004) did not find evidence

that family-based treatments had superior outcomes. Both group and individual CBT outcomes were as favorable as those of the family interventions and were significantly more cost-effective. Similarly, Kaminer and colleagues (Kaminer et al. 1998a; Kaminer & Burleson 1999) found consistent evidence for the efficacy of group CBT interventions. Overall, the outcomes appear better that those achieved in national evaluations of existing practice (Simpson et al. 1978; Sells & Simpson 1979; Hubbard et al. 1985; Gerstein & Johnson 1999; National Institute of Justice 2001). The empirical support for the efficacy of CBT with adolescents is also similar to evidence found for treatment studies for adult drinking and drug use (Woody et al. 1983; Kadden et al. 1989; Graham et al. 1996; Marques & Formigoni 2001; Babor & Del Boca 2003). The results of these recent clinical trials for adolescents are particularly important because of their enhanced design and methodological features that represent significant improvements over previous studies: (a) comparing interventions with other well-implemented interventions; (b) evaluating interventions with a clearly defined target population that mirrors the population found in regular practice settings; (c) assessment of subsequent treatment and symptom status during follow-up; and (d) the use of treatment manuals and therapist training and monitoring procedures. Although the absence of untreated control groups represents a limitation in the recent clinical trials, the differential efficacy of treatments across multiple studies provides compelling evidence that the reductions in substance use were a direct function of the treatments clients received, rather than an artifact of the passage of time or involvement in a clinical trial.

It is important to note, however, that despite the advances of recent clinical trials over previous studies, none of these interventions sufficiently addressed all of the adolescents' problems. Relapse was a consistent problem for many youths across studies. In the CYT study, for example, roughly half the adolescents experienced periods of recovery followed by relapse during the follow-up period and two-thirds were still reporting substance use or other problems 12 months after intake (Dennis et al. 2004). Treatment development efforts, including further refinement of cognitive behavioral and other promising interventions, remain a high priority in the field.

GROUP VERSUS INDIVIDUAL CBT

An important finding across each of the controlled trials was the significant reductions in substance use from pretreatment to follow-up for group CBT. This consistent empirical support of group CBT for substance-abusing adolescents refutes assertions concerning the iatrogenic effects reported for aggregating youth in group interventions (Dishion et al. 1999, 2002; Poulin et al. 2001). However, Dishion and colleagues focused their research efforts on preventive interventions for youths who were at risk for substance use, not for those who had already developed a substance use disorder as in each of the samples of the treatment outcome studies reviewed. The negative consequences experienced by adolescents diagnosed with substance abuse or dependence would be expected to influence treatment motivation. A number of features associated with group approaches to treatment may also facilitate cognitive, affective and behavioral changes. These factors include the realization that others share similar problems, the development of socializing techniques, modeling, rehearsal and peer/therapist feedback. The opportunity to try out new behaviors in a social environment and the development and enhancement of interpersonal learning and trust may also be influential.

In studies of group versus individual CBT conducted with adults, both conditions were similarly successful in reducing drinking and drug use at 12-months follow-up (Graham et al. 1996; Marques & Formigoni 2001). Furthermore, Graham and colleagues reported that the group condition demonstrated its superiority in improving social skills deemed important for relapse prevention in many patients, including adolescents. Because teens typically use alcohol or drugs when in the company of other users, and they are easily influenced in group settings

(Myers & Brown 1996), group treatment has the benefit of mirroring their daily experience. Role-playing, an effective component employed in CBT, takes advantage of the group setting by allowing the participants to practice scenes of high-risk experience.

FUTURE DIRECTIONS FOR IMPROVING RESEARCH AND TREATMENT

Treatment development research CBT does not appear to be equally efficacious for all youths. Therefore the need for research focused on understanding who might benefit from CBT is urgent. The finding of Kaminer et al (1998a) that older male adolescents had better outcomes are intriguing, butdifficult to explain. Perhaps boys respond more positively to the structured context of CBT interventions compared to girls. Older youths may be in a more advanced stage of cognitive development. To understand better individual differences in response to treatment, Waldron, Ozechowski & Turner (2004) examined adolescents' marijuana use change trajectories from intake to 19months assessment. Based on k-means cluster analysis, four distinct change profiles in marijuana use were identified, including continuous heavy use, rapid improvement followed by relapse, gradual improvement, and continuous low use. Youths with co-occurring delinquent behavior and depression, more severe drug use, negative attitudes toward school and deviant peers were more likely to continue their problem use or experience relapse. These predictors of change trajectories may offer some direction for treatment refinement for subgroups of adolescents. Co-occurring psychological problems and client anger were also identified as significant client– treatment-matching variables for adults in Project MATCH and could be useful in understanding adolescent treatment outcome (Waldron, Miller & Tonigan 2001).

CBT and comorbid conditions

Substance use disorders in adolescents have a high prevalence of comorbidity with other psychological disorders. For example, Bukstein, Glancy & Kaminer (1992) found that 62% of adolescents receiving in-patient treatment were dually diagnosed. DeMilio (1989) found that 42% of adolescents presenting for treatment of substance abuse also met criteria for conduct disorder, the most common disorder co-occurring with substance abuse, and 35% also had a major depressive disorder. The comorbidity issue adds a level of complexity to understanding substance abuse (Kaminer & Waldron 2004). Whether substance abuse is primary or occurs secondary to another disorder and how the interaction of coexisting disorders influence the onset, identification, course and treatment of substance abuse problems remain in question.

Kaminer and others have shown that conduct-disordered, substance-abusing youths are at increased risk of not completing treatment (Kaminer et al. 1992a, b; Myers et al. 1998; Kaminer & Waldron 2004). This is particularly true for those who do not also have comorbid diagnoses of depression or anxiety disorders (Kaminer et al. 1992a). Given that treatment completion has been associated with favorable treatment outcome, more research is needed to examine treatments that would improve treatment retention for youths dually-diagnosed with conduct and substance-use disorders. However, efficacy studies for depression in adolescents have shown that CBT produces more rapid short-term improvements than other psychosocial interventions (Birmaher et al. 2000). The co-occurrence of substance use disorders and depression suggest that CBT is likely to be particularly beneficial for these dually-diagnosed youths.

Treatment motivation, engagement and retention

Treatment retention in alcohol and drug abuse populations is a widely recognized problem. Adolescents are at even greater risk for dropping out of treatment compared with adults, because they are less motivated to change, do not perceive treatment as suitable for themselves and are more likely to be in treatment because of external pressures (Jainchill et al. 1995).

Kaminer & Frances (1991) compared treatment non-completers with completers prospectively between the ages of 13–18 years, in an in-patient dual disorder substance abuse treatment program designed specifically for adolescents, hypothesizing that treatments which simultaneously address psychiatric issues would improve treatment outcome. Fifty adolescents completed treatment, 14 did not. Involuntary admission, past treatment and parental psychopathology had no impact on dropout. A trend towards a higher prevalence of mood disorder rand adjustment disorder was found in treatment completers. By contrast, the treatment-dropout group had a higher prevalence of conduct disorder. Kaminer et al. (1998b) also reported that adolescents who endorsed CBT as helpful in their recovery process had a significantly higher rate of treatment completion than those who did not subscribe to this opinion. In addition, Jainchill et al. (1995) found that older clients felt more motivated and ready for treatment and perceived treatment to be more suitable for them. These studies suggest that motivational issues and their role in retention and recovery should continue as a focus of study.

Mechanisms and therapeutic processes associated with change

The studies reviewed in this article have found support for CBT as an efficacious intervention for youths with substance-use disorders and related problem behaviors. However, CBT interventions represent a heterogeneous mix, ranging from those involving minimal components of CBT to a variety of distinctly different stand-alone programs, all represented as a cognitive–behavioral therapy. Whereas researchers have begun to wrestle with the mechanisms and therapeutic processes of CBT associated with change in adults with substance-use disorders (Maisto et al. 2000; Morgenstern & Longabaugh 2000; Waldron et al. 2001a), studies examining the efficacy of various components of CBT to elucidate mechanisms of change or therapy-process variables associated with change are virtually nonexistent in youths.

Myers & Brown (1990a, b), for example, found that following cognitive–behavioral treatment, adolescent alcohol abstainers and minor relapsers were more likely to utilize problem-solving coping strategies than were major relapsers. Furthermore, coping factors have been identified as significant predictors of treatment outcome (Myers et al. 1993). However, a limitation of adolescent treatment studies employing CBT is a lack of empirical measurement of deficits in coping skills and changes in coping skills, compared to self-efficacy ratings and treatment outcome. No studies of adolescent substance abuse treatment have examined critically the assumption that coping skills are actually acquired or enhanced in treatment. For example, one or more mediators, or an interaction of mediators, such as readiness to change, expectancy, therapeutic alliance and engagement in treatment could account for change in self-efficacy and subsequent behavioral change. Further complicating the issue is that change processes associated with CBT are also found in other therapies (Finney et al. 1998). Understanding the unique mechanisms of change of CBT remains a major challenge for adolescent substance abuse treatment researchers.

CONCLUSIONS

The recent controlled clinical trials evaluating treatments for adolescent substance-use disorders have contributed substantial new empirical evidence supporting the efficacy of CBT for substance-use disorders. Research focusing on improving short- and long-term outcomes, improving engagement techniques, especially for conduct-disordered and other severely disturbed individuals and identifying youths for whom CBT is likely to be a beneficial treatment modality is essential. Moreover, the problem of relapse and lack of maintenance of treatment gains make research on continuing care following CBT, as a single modality or part of an integrated approach, an important focus of investigation.

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