Adolescent Substance Abuse Treatment: A Review of Evidence-Based Research

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Introduction

Use of alcohol and other drugs (hereafter referred to as *drugs*) by American teenagers continues to present a significant public health concern. Whereas substance use among adolescents has leveled-off, and in some instances declined, in recent years (Miech, Johnston, O'Malley, Bachman, & Schulenberg, 2016)

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the rates of use are still a public health concern (National Institute on Drug Abuse, 2014). Adolescence represents a critical period for the onset of drug use; onset of use during these years increases the likelihood of negative impacts on a range of developmental factors, including cognitive, physical, and psychosocial. Also, early onset use also increases the likelihood for developing a substance use disorder (SUD), and for some youth, it contributes to the progression of a long-term SUD (Volkow, Baler, Compton, & Weiss, 2014). There are concerns that recent trends in the USA to legalize marijuana for recreational or medical purposes may contribute to a rise in adolescent marijuana use. Marijuana is the most commonly used illicit drug among adolescents in the USA and is now used at higher rates than tobacco (Miech et al., 2016). Nearly one-quarter (23.4%) of high school students report use at least one or more times per month (Kann et al., 2014).

For youth who meet criteria for a SUD, treatment may be indicated. According to the National Survey on Drug Use and Health, approximately 1.3 million adolescents had a past year SUD (Center for Behavioral Health Statistics and Quality, 2015). Yet it is estimated that about 90% of youth with a SUD do not receive drug treatment (Substance Abuse and Mental Health Services Administration, 2013). There are several reasons for the large gap between SUDs and treatment utilization by youth: little if any local treatment options, poor health coverage, low motivation by the youth, and unsupportive parents.

Developmental Issues

The adolescent drug abuse treatment field continues to make significant strides in the expanding the field of evidence-based approaches. A common theme across contemporary approaches is their developmental relevance. Adolescents seeking treatment differ from their adult counterparts in many ways: the length and severity of substance use is usually less; typical patterns and context of use differ; the type of substance-related problems most often experienced also differ; and in most instances there is not a self-referral to treatment (National Institute on Drug Abuse, 2014). Moreover, developmental neuroscience research, which supports the view that brain develops during adolescence in a way that contributes to risky judgments, including the tendency to make choices based on heavily on emotion, (Spear, 2002; Volkow et al., 2014), have led to various speculations that youth may be less motivated to change drug use behaviors than adult clients, that advice alone may be ineffective for promoting change for a teenager, and that positive peer influences and interactions during treatment may be particularly important to treatment outcome (Riggs et al., 2007). Furthermore, because youth typically enter treatment because of a referral by a concerned parent, mental health clinician, or school staff) (Battjes, Gordon, O'Grady, & Kinlock, 2004), a negative attitude about drug treatment may be a prevalent among adolescents.

Intensity of Treatment

Based on several client characteristics (e.g., severity of drug involvement; mental health condition; current and past medical condition; environment support for recovery; readiness to change), it is advisable to initially place an adolescent into one of the following five treatment levels (American Society of Addiction Medicine, 2013): (1) brief intervention; (2) outpatient; (3) intensive outpatient; (4) residential/inpatient; or (5) medically managed inpatient treatment.

Treatment Approaches

Most adolescent drug treatment programs use an eclectic treatment approach, integrating multiple therapeutic strategies within their treatment service framework. Common themes among them are that they teach skills to resist the triggers associated with the individual's drug use pattern, address life functioning issues that likely contributed to the onset and maintenance of the drug use (e.g., mental health, family issues), and identify and build upon a youth's strengths.

Research has established that several types of therapeutic practices and approaches, regardless of intensity of treatment or therapeutic approach, are vital to providing effective treatment for adolescents with a drug problem. Recently the National Institute of Drug Abuse (2014) identified 13 practice principles that are elements of quality care spanning assessment, treatment and aftercare (see Table 1).

Treatment Outcome Research

Overview

Despite this issue of low treatment utilization, significant advances have been made since 1990 in the development and scientific evaluation of treatments for adolescent drug abuse (e.g., Winters, Tanner-Smith, Bresani, & Meyers, 2014). Perhaps the most significant sign of these advances is that the field is now characterized by rigorous controlled studies on the effectiveness of treatment approaches and strategies. Many treatments for adolescents with a SUD that are now considered evidenced based.

We focused our literature search on controlled evaluations of drug abuse treatment approaches for adolescent clients since 1990, owing to the principle that drug treatment for adolescents prior to that time may not be comparable to more contemporary and rigorous standards. The criteria for study inclusion were as follows: (1) adolescents had to be the primary target of the intervention or treatment; (2) drug use outcomes had to be measured; and (3) the study consisted of essential components of a controlled evaluation, including favorable sample sizes, com-

Table 1 Principles of adolescent substance use treatment

Principle	Description
1. Identify and address substance use as soon as possible	Identifying and addressing adolescent substance use as soon as possible is important due to the negative effects early use can have on the brain. Additionally, adults with substance use disorders often report using drugs as adolescents or young adults.
2. Adolescents do not have to be addicted to benefit from a substance use intervention	Interventions can successfully treat a range of substance use disorders from problematic use to severe addiction. Youth in particular can benefit from intervention at early stages. Even use that does not seem problematic can lead to heavier use and other risky behaviors.
3. Medical visits are an opportunity to ask about drug use	Medical doctors (e.g., pediatricians, emergency room doctors, dentists) can use standardized screenings to determine if an adolescent is using substances and if an intervention is warranted. In some instances, it is possible to provide a brief intervention in the physician's office and in other cases referral to treatment is more appropriate.
4. Legal or family pressure may be an important influence on adolescent's involvement in treatment	Most adolescents with a substance use disorder do not think they need treatment and rarely look for treatment. Treatment can be successful even if the adolescent is legally mandated to treatment or goes due to family pressures.
5. Treatment should be tailored to the adolescent's needs	Many factors need to be considered when developing a treatment plan for an adolescent including sex, family, and peer relationships, and community environment. Therefore, it is necessary to begin with a comprehensive assessment.
6. Treatment should not focus on just substance use	Treatment is most successful when it focuses on the whole person. Treatment should address housing, medical, social, and legal needs.
7. Behavioral therapies can effectively treat substance use disorders	Behavioral therapies have been shown to be an effective treatment. These therapies help build motivation to change by providing incentives for abstinence, teaching skills to deal with cravings, and finding positive and rewarding activities.
8. Family and community support are important features of treatment	There are several evidence-based interventions for adolescent substance use that involve family members and individuals in the community. These interventions try to improve family communication and provide the adolescent with support.
9. Mental health conditions need to be addressed in order to effectively treat substance use	Adolescents with a substance use disorder often have co-occurring mental health conditions. It is important that adolescents are screened and treated for these other conditions in order for substance abuse treatment to be successful.
10. Sensitive issues should be addressed and confidentiality maintained when possible	It is common for adolescents with substance use disorders to have a history of abuse or other trauma.69 whereas maintaining confidentiality with respect to sensitive issues is important in the therapeutic setting, appropriate authorities need to be informed if abuse is suspected.
11. Drug use should be monitored during treatment	It is important to monitor an adolescent's drug use while in treatment and identify a relapse early on. The relapse could indicate that treatment should be intensified or needs to be altered to better meet the adolescent's needs.

(continued)

Table 1 (continued)

Principle	Description
12. Completing treatment and having a continuing care plan are important	The length of treatment will vary based on the severity of the adolescent's substance use disorder; however, studies have shown outcomes are best when an individual is in treatment 3 months or longer. The adolescent can also benefit from continuing care.
13. Adolescents should be tested and treated for sexually transmitted diseases and hepatitis	Drug using adolescents are at an increased risk for sexually transmitted and blood borne diseases (e.g., human immunodeficiency virus, hepatitis B and C) due to the increase in high-risk behaviors that result from drug use. Addressing this in treatment can help decrease high-risk behaviors thereby reducing the likelihood of infection.

Note. From the National Institute on Drug Abuse. *Principles of Adolescent Substance Use Disorder Treatment: A Research-Based Guide*. Bethesda, MD: National institute on Drug Abuse, 2014. Available from http://www.drugabuse.gov/publications/principles-adolescent-substance-use-disorder-treatment-research-based-guide/principles-adolescent-substance-use-disorder-treatment

parison group (i.e., control group, waiting list control, or contrasting treatment group), use of standardized assessment instruments, treatment interventions that are well-described, and outcome evaluation ratings by individuals who did not conduct the therapy.

Treatment outcome studies were identified from a computerized literature search of standard journal databases (e.g., MEDLINE, PsychINFO, Social Sciences Abstracts), as well as from drug treatment websites and the sites of well-known treatment research organizations. Close reviews of the reference sections of relevant books, identified studies, and the handful of literature summaries and reviews were also conducted. We benefited from recent reviews of the literature (Deas & Thomas, 2001; Tanner-Smith, Wilson, & Lipsey, 2013; Vaughn & Howard, 2004).

The review is organized around these strategies or approaches: 12-step-based treatment, therapeutic community (TC), family-based interventions, behavioral therapy, cognitive behavioral therapy (CBT), motivational-based therapy (motivational enhancement and motivational interviewing), electronic and web-based therapy, and pharmacotherapy approaches (*see* Table 2 for an overview description of each). As noted above, multiple approaches are commonly integrated in clinical interventions, and thus, some overlap of approaches exists within the review presented here. Additionally we discuss these approaches aimed at maximizing outcome: recovery high schools, use of reinforcements, and adaptive strategies.

In addition to providing an overview of the prominent types of treatment approaches noted in Table 2, we also summarize a major multisite study (Cannabis Youth Treatment project) and highlight a recent meta-analysis on outpatient treatment (a meta-analysis refers to statistical techniques used to synthesize quantitative findings across multiple studies included in a review). Regardless of therapeutic modality, one underlying goal of adolescent treatment for drug abuse involves promoting recovery by preventing or minimizing relapse. The definition of relapse varies, but in most instances it refers to a return to drug use. Some definitions of relapse include categories for the level of problems resulting from the return to drug use or

Table 2 Descriptions of seven primary treatment approaches

Approach	Description
1. 12-step-based	The goal of 12-step therapy is to encourage the adolescent to become involved in a 12-step program. These programs incorporate a self-help approach centered within the context of reciprocal support. They are organized around the basic tenets of alcoholics anonymous (AA), and are a commonly applied strategy in inpatient and outpatient treatment programs, as well as a standalone approach (i.e., attending AA, narcotics anonymous, or cocaine anonymous meetings). Approximately 2.3% of AA members in the USA and Canada are under the age of 21.
2. Therapeutic community	The therapeutic community is typically rooted in self-help principles and experiential knowledge of the recovery community. This treatment option views the community as the key agent of change and emphasizes mutual self-help, behavioral consequences, and shared values for a healthy lifestyle. For adolescents, therapeutic communities use various therapeutic techniques which may include individual counseling sessions, family therapy, 12-step techniques, life skills techniques, and recreational techniques, and are usually long-term residential treatment programs.
3. Family-based	Family-based approaches seek to reduce an adolescent's use of drugs and correct the problem behaviors that often accompany drug use by addressing the mediating family risk factors, such as poor family communication, cohesiveness, and problem-solving. These approaches are based on the therapeutic premise that the family has the most profound and long-lasting influence on child and adolescent development. Family therapy typically includes the adolescent and at least one other parent or guardian, but can also include siblings, other family members, and friends. There are five evidence-based family-based treatments that are in use today: Brief strategic family therapy; family behavior therapy; functional family therapy; multidimensional family therapy; and multisystemic therapy.
4. Behavior therapy	Behavioral approaches generally focus on teaching and reinforcing new skills, behaviors, and new ways of thinking and coping so as to compete with or minimize drug-using behaviors. The ultimate goal is to reinforce desirable behaviors and eliminate unwanted or maladaptive ones**.**
5. Cognitive-behavior therapy	Cognitive-behavioral therapy (CBT) is centered on the notion that thoughts cause behaviors, and these thoughts determine the way in which people perceive, interpret, and assign meaning to the environment. Thus, maladaptive behaviors can be changed by modifying our thought processes, even if one's environment does not change. In the context of adolescent substance use, CBT encourages adolescents to develop self-regulation and coping skills by teaching youth to identify stimulus cues that precede drug use, to use various strategies to avoid situations that may trigger the desire to use, and to develop skills for communication and problem-solving.

(continued)

Table 2 (continued)

Approach	Description
6. Motivational enhancement therapy/brief intervention	Motivational enhancement therapy is based on motivational interviewing techniques that have come to the forefront of therapeutic approaches for addiction in the past decade, and even more so recently for adolescents. The goal of motivational enhancement therapy is to help encourage the adolescent to engage in treatment and stop using drugs. Motivational enhancement therapists use a person-centered, nonconfrontational style in assisting the youth to explore different facets of his or her use patterns. Adolescents are encouraged to examine the pros and cons of their use and to create goals to help them achieve a healthier lifestyle. The therapist provides personalized feedback and respects the youth's freedom of choice regarding his or her own behavior. Motivational enhancement therapy is typically delivered in conjunction with other treatment approaches, including brief interventions. Brief intervention often consists of educational or brief intervention services that aim to help the adolescent recognize the negative consequences of substance use and to understand and address the adolescent's problems that are likely related to their substance use.
7. Electronic and web-based therapy	Current use of electronic-assisted therapy includes internet "treatment programs" that employ various elements, such as psychoeducation, social support through chat rooms, monitoring of symptoms and progress, and feedback. Also included here are telephone-based treatment approaches.
8. Pharmacotherapy	This treatment approach uses medication to address various aspects of addiction, including craving reduction, aversive therapy, substitution therapy, and treatment of underlying psychiatric disorders. Specifically, medication can be used to treat addiction to opioids, alcohol, or nicotine in adults, but there are no medications approved by the US Food and Drug Administration to treat cannabis, cocaine, or methamphetamine abuse. Research is quite limited on this treatment strategy for adolescents, and there are no medications that are currently approved to treat adolescents. The applicability of adult findings to adolescents is unclear given that youth may react differently to the potential side effects of medications. However, doctors will sometimes prescribe medications to older adolescents.

Note. Adapted from "Adolescent Substance Abuse Treatment: A Review of Evidence-Based Research," by K. C. Winters, A. M. Botzet, T. Fahnhorst, R. Stinchfield, & R. Koskey, 2009, In C. G. Leukefeld, T. P. Gullotta & M. Staton-Tindall (Eds.), *Adolescent Substance Abuse: Evidence-Based Approaches to Prevention and Treatment*, pp. 73-96. New York, NY: Springer

for the levels of drug use frequency. Among youth receiving treatment for an SUD, it can be expected that from one-third to one-half are likely to return to some drug use at least once within 12 months following treatment (Grella, Joshi, & Hser, 2004; National Institute on Drug Abuse, 2014; Williams, Chang, & Addiction Centre Adolescent Research Group, 2000; Winters, 1999).

12-Step-Based Treatment

Organized around the basic tenets of Alcoholics Anonymous (AA), it is generally accepted in the field that this treatment approach is the most commonly applied strategy to youth with an SUD. It is estimated that about two-thirds of treatment programs utilize these basic principles as part of their approach, and some programs are primarily organized around the AA principles (Sussman, 2010). The first 5 steps of the 12 steps are typically addressed with adolescents during the primary treatment experience. These five steps are the following: (1) admitting that you are powerless over the addictive substance and that it has made life unmanageable, (2) believing that a power greater than yourself could restore you to health, (3) making a decision to turn your will over to a higher power as you interpret it to be, (4) taking moral inventory of yourself, and (5) admitting to yourself and to others the nature of your wrongs. One typically embarks upon the remaining seven steps during aftercare.

Applicability of the 12-step method for youth has been questioned due to limitations in developmentally appropriate content. Adolescence is a time of identifying a personal identity and independence from authority figures, developmental milestones that can be inconsistent with the main tenants of AA of acceptance and surrender. In addition, 12-step-based aftercare programs (e.g., AA, NA) are mainly composed of adults. It is estimated that only 2% of participants in self-help groups are under the age of 21 (Alcoholics Anonymous 2001 Membership Survey, 2001), which creates barriers for adolescents as they may struggle to relate to older group members (Kelly, Brown, Abrantes, Kahler, & Myers, 2008; Kelly & Urbanoski, 2012). Thus, efforts to adapt 12-step treatment for adolescents are important. Current adaptations of this approach include the Minnesota Model treatment approach for adolescents (Anderson, McGovern, & DuPont, 1999) and Jaffe's (1990) developmentally appropriate modifications of the first five steps of a 12-step program.

An approach that incorporates the 12-step method, the Minnesota Model, has been researched. The Minnesota Model includes a range of therapeutic elements (e.g., group and family therapy) in conjunction with the 12-step method (Winters, Stinchfield, Opland, Weller, & Latimer, 2000). Winters and colleagues followed a group of 179 adolescents who participated in either an outpatient or inpatient Minnesota Model treatment and a group of 66 adolescents who were on a treatment waiting-list (primarily due to insurance coverage limitations or no insurance). Results indicated that among the treated youth, those who finished the treatment program reported superior outcomes in contrast to those who left the program prior to completion and to a waiting-list group (Winters et al., 2000). At the 12-month follow-up, categorical data revealed that 53% of the treatment completers reported abstinence or minor relapse (used once or twice) compared to 15% for the treatment incompleters and to 27% for the waiting-list group. Continuous variable data revealed similar results. The comparison of setting (inpatient versus outpatient) did not yield any outcome differences. A longer-term follow-up study (approximately 5 years post-treatment) of the same youth (Winters, Stinchfield, Latimer, & Lee, 2007) showed a similar pattern of outcome, although the major predictor of favor-

able outcomes was involvement in aftercare. Whereas the studies above showed that favorable outcome is associated with treatment engagement, the study designs did not permit opportunity to evaluate the specific contribution of 12-step elements.

AA/NA attendance has been researched among teenagers who have received 12-step treatment. The prominent work by Kelly and colleagues suggests that despite spotty AA/NA attendance over time, adolescents with greater addiction severity and those who believed that they needed to maintain abstinence had higher attendance rates, and greater early participation was associated with more favorable long-term outcome (Kelly et al., 2008). As many have written (e.g., Kelly, Magill, & Stout, 2009), AA/NA's value to teenagers may be that it provides a free, semi-structured therapeutic service with the flexibility allowing the youth to modulate level of involvement.

Therapeutic Community

Like the 12-step Minnesota Model, TC is typically classified as a community-based therapy based in self-help principles and experiential knowledge of the recovery community (Morral, McCaffrey, & Ridgeway, 2004). This treatment approach views the community as the key agent of change, and it emphasizes mutual self-help, behavioral consequences, and shared values for a healthy lifestyle (Jainchill, 1997). Adolescent TCs tend to be long-term residential treatment programs, and typically include a wide variety of therapeutic techniques, including (but not limited to) individual counseling sessions, family therapy, 12-step method, life-skills, and recreational techniques.

Morral et al. (2004) examined the TC approach using a rigorous evaluation design that compared nearly 450 adolescents in a 9- to 12-month residential TC program (Phoenix Academy) and a comparison group of treatment as usual (probation dispositions). The findings indicated that participation in Phoenix Academy was associated with significantly reduced drug use and improved psychological functioning outcomes compared to the comparison group at 12-month posttreatment.

Family-Based Therapy

The family therapy approach seeks to reduce an adolescent's use of drugs and correct the problem behaviors that often accompany drug use by addressing the mediating family risk factors such as poor family communication, cohesiveness, and problem solving. This approach is based on the therapeutic premise that the family carries the most profound and long-lasting influence on child and adolescent development (Szapocznik & Coatsworth, 1999). Family therapy typically includes the adolescent and at least one other parent or guardian. Ideally, siblings and other adult household members are included. Other approaches and theoretical positions are

commonly integrated into family-based treatment, such as CBT (Latimer, Winters, D'Zurilla, & Nichols, 2003) and family empowerment theory (e.g., Dembo et al., 2000). In addition, social, neighborhood, community, and cultural factors are also considered within the treatment plan (Ozechowski & Liddle, 2002).

Austin and colleagues (Austin, Macgowan, & Wagner, 2005) identified and reviewed five family-based treatment approaches, all of which involved random assignment and other rigorous design features: (1) Brief strategic family therapy (BSFT; Santisteban et al., 2003); (2) Family behavior therapy (Azrin, Donohue, Besalel, Kogan, & Acierno, 1994); (3) Functional family therapy (FFT; Waldron, Slesnick, Brody, Turner, & Peterson, 2001); (4) Multidimensional family therapy (MDFT; also referenced in the Cannabis Youth Treatment, CYT, section of this chapter) (Liddle, Rowe, Dakof, Henderson, & Greenbaum, 2009); and (5) Multisystemic treatment (MST; Henggeler, Clingempeel, Brondino, & Pickrel, 2002; Henggeler, Pickrel, & Brondino, 1999). Of these five, MDFT demonstrated both clinically and statistically significant favorable drug use outcomes at the conclusion of treatment and at the 1-year post- treatment assessment. Whereas the other four approaches (BSFT, MST, FFT, and FBT) showed greater improvement compared to the control group at the completion of treatment, posttreatment follow-up assessments did not reveal group differences for MST and FFT, and there are no posttreatment outcomes reported for the BSFT and FBT studies (Austin et al., 2005).

Smith and colleagues (Smith, Hall, Williams, An, & Gotman, 2006) compared an outpatient family intervention (Strengths oriented family therapy, SOFT; Smith & Hall, 2008), with a group therapy approach (The Seven Challenges®; Schwebel, 2004) The SOFT intervention incorporated a pretreatment motivational family session, multifamily skills training, and case management. The comparison group (Seven Challenges) utilized interactive journaling, skills training, and motivational interviewing. Results at 6-month posttreatment revealed that the two interventions were comparable in terms of achieving abstinence (39% for SOFT and 31% for Seven Challenges), being symptom free (61% and 60%, respectively), and extent of reduction of drug use frequency and affiliated problems (Smith et al., 2006).

Some family therapy models being used to treat adolescent drug use were specifically designed to address the problem of drug use, such as Multidimensional Family Therapy (MDFT) and Brief Strategic Family Therapy (BSFT). Other family treatment models have been applied to adolescent drug use, but were initially designed to treat delinquency more generally. Functional Family Therapy (FFT) and Multisystemic Therapy (MST) are two such family treatment models that have been applied to adolescent drug use problems. Currently, these four family treatment models are the most prevalent in terms of clinical use and empirical research.

Multidimensional Family Therapy (MDFT) was designed to treat adolescent drug use as well as delinquency (Liddle, 2013). It employs a developmental model and considers risk and resilience factors in terms of their roles in developmental cascades. The treatment has elements that focus on the adolescent and the adolescent-parent relationship, while considering social and contextual factors (Liddle, 2013). MDFT has been tested in several randomized control trials. One review article compared results of randomized controlled trials (RCTs) testing MDFT to those testing

Cognitive Behavior Therapy (CBT) and Motivational Enhancement Therapy (MET), and found evidence in favor of MDFT on cannabis use outcomes for younger adolescents and those with more severe dependence (Walther, Gantner, Heinz, & Majic, 2016). The four RCTs evaluating MDFT reported on in the review were comprised of two studies comparing MDFT to a treatment-as-usual control and two studies comparing MDFT to a CBT control condition (Walther et al., 2016). Those adolescents in MDFT had greater reductions in cannabis use at the end of the treatment compared to treatment-as-usual, with comparable end-of-treatment cannabis outcomes when compared to CBT. However, in one study with a CBT control, there were reductions in dependence for youth in the MDFT treatment condition at a 12-month follow-up, with even greater gains among the higher severity of cannabis use sub-group. Multiple meta-analyses have evaluated the effect size of MDFT treatment from RCTs comparing MDFT to other treatment models (Liddle, 2016). The reductions of drug use outcomes of MDFT from RCTs, even when compared to other high-quality evidence-based treatments such as CBT, tend to be durable and often are preferable to other treatments at 1 year follow-ups (Liddle, 2016).

In a multisite, randomized control trial of outpatient drug treatment for adolescents between the ages of 13–18 in Western Europe, MDFT was compared to individual counseling for the treatment of cannabis use disorder (Rigter et al., 2013). Across five countries (Belgium, France, Germany, The Netherlands, and Switzerland) 450 youth were randomized to either individual psychotherapy (IP) (which referred to the current practice of the clinician or agency, including CBT and other models) or Multidimensional Family Therapy (MDFT). Clinicians administering the MDFT treatment condition reported higher rates of treatment retention to successful completion (90% of cases) than did the clinicians administering the IP treatment condition (48% of cases). For low-severity users (below the median of number of days used in past 90 days), MDFT and IP models were comparatively similar in reducing use at 3, 6, 9, and 12 months post-baseline (Rigter et al., 2013). However, for high-severity users, MDFT reduced the number of days of use notably more than did IP, with the high severity MDFT group nearly matching the 12 month outcome of the low-severity IP group. The effect size of this difference between IP and MDFT reduction in use for the high severity group across sites was medium to large ($d = 0.60$; Rigter et al., 2013).

Multisystemic Therapy (MST) was designed to treat antisocial behavior in youth who are at imminent risk of out-of-home placement and has been applied to drug-abuse populations (Sheidow & Houston, 2013). MST identifies antisocial behavior as resulting from multiple determinants; thus, treatment efforts are made to simultaneously generate change in family, school, community, and peer contexts (Sheidow & Houston, 2013). The modality of MST is intensive and generally involves approximately 60 h with the MST therapist over the course of three to five months. MST includes 24/7 on-call access to MST therapists (Sheidow & Houston, 2013). MST has been tested with many RCTs in terms of delinquency, with considerably fewer studies on MST measuring drug use outcomes. MST generally has greater impact on delinquency than on drug use (Henggeler & Schaeffer, 2016). However, in a meta-analysis of MST RCTs that considered included drug use among delinquency

outcomes ($n = 5$), there was evidence of significant improvements in drug use compared to control groups with a mean of small to moderate effect size ($d = 0.291$) (van der Stouwe, Asscher, Stams, Deković, & van der Laan, 2014).

An adaptation of MST, coined as Multisystemic Therapy—Substance Abuse (MST-SA), was designed to treat adolescents with a substance use disorder (Swenson, Henggeler, Taylor, & Addison, 2005). Henggeler et al. (2006) conducted a randomized controlled trial in which MST-SA in a drug court was compared to three other conditions: family court with usual community services, drug court with usual community services, and drug court with MST. In general, findings supported the view that drug court was more effective than family court services in decreasing rates of adolescent substance use and criminal behavior. MST and MST-SA were equivalent on the drug use outcomes (Henggeler et al., 2006).

Brief Strategic Family Therapy (BSFT) was designed to treat conduct problems, delinquency, and drug use (Szapocznik, Muir, & Schwartz, 2013). BSFT incorporates traditional family therapy models of Structural Family Therapy and Strategic Family Therapy (Szapocznik et al., 2013). BSFT has been tested in fewer RCTs than MDFT and MST; however, there has been two RCTs with adolescents), including one efficacy trial and one effectiveness trial (Szapocznik et al., 2013). The efficacy trial measured marijuana use outcomes compared to group counseling control condition, and it was found that BSFT had preferable outcomes to group counseling. Notably, the group counseling consition demonstrated some potential iatrogenic effects with increased marijuana use among control participants. The effectiveness trial measured drug use through self-reported days of use per month in the past year, and compared BSFT) to a treatment-as-usual control condition (Szapocznik et al., 2013). Using a sample referred from juenvile justice or residential treatment settings with relatively limited drug use, the BSFT intervention group demonstrated fewer days of use per month when compared to the control condition.

Functional Family Therapy (FFT) was designed to treat adolescents with conduct disorder, delinquency, and disruptive behavior and their families, and has also been applied to youth with addictive behaviors (Waldron, Brody, Robbins, & Alexander, 2013). FFT considers alcohol and drug abuse as problems that develop in the context of maladaptive family relationships; thus, the mechanism of change is improving family interactions (Waldron et al., 2013). FFT targets the whole family and is designed for all family members who are living together. In three RCTs comparing FFT, CBT, and FFT plus CBT, the outcomes supported FFT as an equivalent or superior choice to CBT (Waldron et al., 2013). FFT had much higher rates of engagement than the comparison of a parenting intervention in one study (93% and 67%, respectively); however, both conditions resulted in equivalent significant reductions in drug use (Waldron et al., 2013). A RCT comparing FFT, FFT + CBT, and CBT found that the FFT conditions generated greater reductions in marijuana use in the first 4 months of treatment when compared to the CBT-only condition. However, by a follow-up assessment at 19 months, all conditions demonstrated comparable reductions in drug use, indicating that while both FFT and CBT are effective, FFT may produce an earlier reduction in drug use when compared to CBT (Waldron et al., 2013). In a second RCT, comparison groups were FFT, FFT + CBT,

individual CBT, and group CBT to address adolescent alcohol-related problems. All four conditions were successful in reducing alcohol use from pretreatment to post-treatment, and additionally the FFT, individual CBT, and group CBT were effective in reducing marijuana use despite not being targeted in treatment (Waldron et al., 2013). In a third RCT comparing FFT + CBT to CBT, the researchers found that while the two conditions were comparably effective for reducing drug use in White, non-Hispanic youth, the FFT + CBT condition was more effective for Hispanic youth in reducing drug use (Waldron et al., 2013).

Whereas several of the family-based treatments show preferable outcomes for the targeted youth compared to traditional individual focused treatments (e.g., Latimer et al., 2003) a perhaps unique benefit of family based treatment is the implications for other members of the family. In MST and FFT, some RCTs have also measured the rates of drug use in siblings of the targeted adolescent. In both MST and FFT trials, the research teams found decreases in the drug use of siblings in the family, not just in the targeted youth (Henggeler & Schaeffer, 2016; Waldron et al., 2013). This has interesting implications for cost-effectiveness analysis from treatment and prevention perspectives if siblings are also reaping the benefits of family treatment modalities.

Behavioral Therapy

Therapeutic techniques based on behavioral psychology theories are another approach to treating adolescent substance abuse. Behavioral strategies, which target actions and behaviors presumed to be influenced by one's environment, include modeling, rehearsal, self-recording, stimulus control, urge control, and written assignments. In current practice, behaviorism is most often coupled with techniques that modify cognitions, referred to as CBT (which we review in the next section). We identified one behavioral study that met our review inclusion criteria. Azrin and colleagues randomly assigned drug-abusing youth to either a supportive counseling group (n = 11) or a behavioral treatment group (n = 15) for ~6 months of treatment (Azrin et al., 1994). The results indicated that drug use significantly decreased over the course of the treatment for the behavioral treatment group, with 73% reporting abstinence during the last month of treatment, compared to only 9% of the comparison group. Other drug use outcome measures were also significantly improved for the behavioral group.

A variant if behavioral treatment is the adolescent community reinforcement approach (A-CRA; Godley et al., 2014, 2017). This intervention targets areas of the adolescent's life and surrounding community that reinforce reducing or eliminating substance use and helps the adolescent to replace these negative influences with healthier prosocial behaviors. A-CRA can address problem-solving, communication skills, relapse prevention, and encourage participation in positive social and community activities.

Cognitive Behavioral Therapy

CBT is based in the belief that thoughts cause behaviors, and these thoughts determine the way in which people perceive, interpret, and assign meaning to the environment (Beck & Weishaar, 2005). Thus, by changing our thought processes, maladaptive behaviors can be changed even if our environment does not change. When used within the context of adolescent substance use, CBT encourages adolescents to develop self-regulation and coping skills. Techniques commonly used include the identification of stimulus cues preceding drug use, the use of strategies to avoid situations that may trigger the urge to use, and skill development for refusal techniques, communication, and problem solving (Waldron et al., 2001). CBT is a frequently used therapeutic approach, but it is commonly integrated into other approaches (Beck & Weishaar, 2005), especially family systems therapy and motivational enhancement/brief interventions (BIs). For this reason, some CBT methods are also mentioned in other sections of this chapter as an integral part of another therapeutic approach.

Barrett and colleagues (Barrett, Slesnick, Brody, Turner, & Peterson, 2001) conducted a randomized clinical trial that compared CBT, family therapy, combined individual and family therapy, and a group intervention for 114 substance-abusing adolescents. Drug use outcomes were the percentage of days that marijuana was used and the percentage of youths achieving minimal use. Each intervention demonstrated some efficacy. From pretreatment to 4 months, significantly fewer days of use were found for the family therapy alone and the combined interventions. Significantly more youths achieved minimal use levels in the CBT, family, and combined conditions. From pretreatment to 7 months, reductions in percentage of days of use were significant for the combined and group interventions, and changes in minimal use levels were significant for the family, combined, and group interventions.

Kaminer, Burleson, and Goldberger (2002) examined a sample of 51 adolescents who were randomly assigned to a CBT intervention in comparison to 37 adolescents who received psychoeducational treatment. A greater reduction in substance use was found for older adolescents and for males in the CBT group at a 3-month follow-up, as compared to the psychoeducational group, but at 9-month follow-up the two groups did not differ on drug use outcome.

Motivational Enhancement Therapy (MET)/Brief Intervention

MET techniques have recently come to the forefront of therapeutic approaches for addiction, and even more so recently for adolescents. MET (also referred to as motivational interviewing) utilizes a person-centered, nonconfrontational approach to assist the youth to explore the different facets of their use patterns. Clients are encouraged to examine the pros and cons of their use and to create goals to help them achieve a healthier lifestyle. The therapist provides personalized feedback and respects the youth's freedom of choice regarding his/her own behavior. Although

the relationship between the therapist and client is more of a partnership than an expert/recipient role, the therapist is directive in assisting the individual to examine and resolve ambivalence and to encourage the client's responsibility for selecting and working on healthy changes in behavior (Rollnick & Miller, 1995).

MET is frequently incorporated into a brief intervention format, in which a therapist meets with the client for only a brief period, anywhere from a single 10-min session to multiple 1-h sessions (Winters, 2016). BIs are becoming an attractive therapeutic approach due to cost-containment policies of managed care, and many BIs are included in a more comprehensive model, Screening, Brief Intervention and Referral to Treatment (SBIRT; Vendetti et al., 2017). They may be particularly attractive to youth because of the brief number of therapeutic contacts, and the approach is developmentally fitting given that many drug-abusing youth are not "career" drug abusers and young people are likely to be more receptive to self-guided behavior change strategies, a cornerstone of MET (Miller & Sanchez, 1994; Winters, Leitten, Wagner, & O'Leary Tevyaw, 2007).

There is growing support for the efficacy of MET/BI. We located eight published meta-analyses or literature reviews of this model for adolescents (Carney & Myers, 2012; Erickson, Gerstle, & Feldstein, 2005; Grenard, Ames, Pentz, & Sussman, 2006; Jensen et al., 2011; Macgowan & Engle, 2010; Tait & Hulse, 2003; Tanner-Smith & Lipsey, 2015; Wachtel & Staniford, 2010). These meta-analyses concur that, despite some exceptions (see Haller et al., 2014; McCambridge & Strang, 2004; Walker et al., 2011; Walker, Roffman, Stephens, Berghuis, & Kim, 2006), the efficacy of MET/BI is generally encouraging. These findings have occurred in multiple settings, including schools (e.g., Winters, Lee, Botzet, Fahnhorst, & Nicholson, 2014), juvenile offender (e.g., Dembo et al., 2014; Stein et al., 2006), primary care (e.g., Levy & Knight, 2008), and emergency departments (e.g., Monti et al., 1999; Walton et al., 2010). Of note is that this approach significantly outperformed control or comparison conditions, which include education (e.g., Ögel & Coskun, 2011) and assessment-only conditions (e.g., Conrod, Castellanos-Ryan, & Mackie, 2011; Goti et al., 2010; Winters, Lee, et al., 2014; Winters, Tanner-Smith, et al., 2014).

Electronic-Based Therapy

The use of technology for behavioral interventions and therapies has become an emerging approach for supporting the delivery of treatment and aftercare for youth populations challenged with substance use disorders. With increasing advances in technology, the types of technology-based applications have grown in diversity over the years, ranging from computers/Internet, tablets, iPads, mobile apps, and text messaging. Access to, and usage of such devices among youth populations is common. According to the International Telecommunications Union (2012), ownership of mobile phones is particularly pervasive within youth culture, with roughly 90% of this segment of the population having access to mobile devices and texting being "the preferred form of communication" (Campbell & Park, 2014; ITU, 2012;

Madden, Lenhart, Duggan, Cortesi, & Gasser, 2013). Such high access increases the possibility of reaching youth who are unlikely to return to the traditional system for aftercare services, for example (Moore, Dickson-Deane, & Galyen, 2011).

Computer-based interventions and text-messaging resources have become embraced and accepted as a promising and effective technology-based health tools within behavioral health systems for preventing, treating, and supporting therapeutic regimens (i.e., medication compliance) for a wide array of health issues, including but not limited to diabetes, mental health (schizophrenia, depression, anxiety), smoking cessation, sexual and reproductive health, asthma, alcohol drinking and substance use (e.g., Bickel, Christensen, & Marsch, 2011; Kaltenthaler, Parry, Beverley, & Ferriter, 2008; Rooke, Thorsteinsson, Karpin, Copeland, & Allsop, 2010). Online consultation is also available in which individuals can chat online with therapists who have verified credentials (e.g., the International Society for Mental Health Online, www.ismpo.org). Feasibility studies have demonstrated high acceptance and satisfaction for using cell phones as a means of communicating about health and service delivery (e.g., Gonzales, Ang, Murphy, Glik, & Anglin, 2014).

Based on a systematic review of the literature, there have been growing outcome-based studies conducted on the efficacy and effectiveness of technology-based approaches. Collective results show high promise: lowering rates of impairment, improving functioning, decreasing risk behaviors, and increasing adherence or compliance with therapeutic/recovery regimens. Unfortunately, to date, few studies are available that examine the cost efficiency of technology-based approaches.

There are several benefits to integrating technology based approaches for supporting the delivery of treatment and aftercare for youth populations challenged with substance use disorders. One major advantage is maintaining therapeutic fidelity, i.e., ensuring the delivery of evidence based content effectively, reliably, and flexibly. Workforce costs are also minimized with such methods (Newman, Szkodny, Llera, & Przeworski, 2011), as the majority of costs are directed to development rather than delivery; however there is monitoring and follow-up that needs to be built in. Also, technology-based approaches increase the degree of therapeutic flexibility a program or provider has to address treatment and aftercare participation barriers linked to youth concerns about physically attending programs to receive services. Studies support that youth in particular are a group that tends to prefer such interactions more favorably than face-to-face meetings with providers (Pilowsky & Wu, 2013). Technology is also a way to address access and service obstacles specific to youth with unstable housing as they are not required to have a physical residence address to receive services as is required of most treatment programs. Technology devices also enhance the system's ability to readily monitor and assess for youth progress and outcomes via the collection of real time data (in the moment during lived recovery experiences), as well as, increase the likelihood of honest reporting linked to privacy and confidentiality provided by such devices (Turner et al., 1998; Weisband & Kiesler, 1996). Lastly, such technologies allow for potential tailoring and personalization of services (Ondersma, Chase, Svikis, & Schuster, 2005), which is important for youth with substance use issues who tend to have divergent experiences, risk and protective factors, and pathways to recovery.

Pharmacotherapy

Various medications with different approaches have been used to address addiction. These approaches include craving reduction, aversion aversive therapy, substitution therapy, and treatment of underlying psychiatric disorders. Medications approved by the US Food and Drug Administration can be used to treat addiction to opioids, alcohol, or nicotine in adults, but there are no approved medications to treat cannabis, cocaine, or methamphetamine addiction, and no medications are currently approved to treat adolescents. Anecdotal reports indicate that doctors will sometimes prescribe addiction-treatment medications to older adolescents, but the applicability of adult findings to adolescents is unclear given that youth may react differently to the potential side effects of medications (Deas & Thomas, 2001). The approved medications that target alcohol dependence are disulfiram (Fuller et al., 1986), a type of aversive therapy that causes severe nausea, vomiting, and flushing (via the blockage of an enzyme involved in the metabolism of alcohol), and two that seek to reduce cravings—Naltrexone (ReVia) (Morris, Hopwood, Whelan, Gardiner, & Drummond, 2001) and Acamprosate (Campral) (Mann, Lehert, & Morgan, 2004).

Cannabis Youth Treatment Study

One of the largest and most comprehensive research studies to examine the effectiveness of adolescent drug treatment. The Cannabis Youth Treatment Study (CYT), initiated by the Center for Substance Abuse Treatment, was designed to compare the clinical efficacy and cost-effectiveness of multiple short-term (less than 3 months) interventions for adolescents who have a cannabis use problem (Dennis et al., 2004). Researchers from four sites [University of Connecticut Health Center (UCHC), Operation PAR, Inc. (PAR), Chestnut Health Systems (CHS), and Children's Hospital of Philadelphia (CHOP)], along with other community stakeholders, formed a 35-member steering committee and selected five short-term, manual-driven interventions to investigate. Feasibility limitations guided the study to be divided into two trials. Trial 1, implemented at UCHC and PAR, compared three interventions (1) MET and five sessions of CBT; (2) MET and 12 sessions of CBT; and (3) Family Support Network (FSN). Trial 2, conducted at CHS and CHOP, also compared three interventions: (1) MET and five sessions of CBT; (2) Adolescent community reinforcement approach (A-CRA); and (3) MDFT. Participants were randomly assigned to the various interventions per site and qualified for this study if they were 12–18 years old, reported one or more cannabis abuse or dependence symptom(s) (*DSM-IV*; American Psychiatric Association, 1994), and qualified for outpatient treatment (American Society of Addiction Medicine, 2013). Additional information about participant qualifications and other methodological specifications of this study are reported elsewhere (Dennis et al., 2004; Diamond et al., 2002).

Favorable treatment effects, as defined by increased days of abstinence during the 12 months following treatment and percentage of adolescents in recovery at the end of the study were found to be stable across sites and conditions (Dennis et al., 2004). Highly similar clinical outcomes were also observed across sites and conditions. Additional findings were that increased dosage was not necessarily associated with improved outcomes and a cost-effectiveness analysis indicated that FSN in Trial 1 and MDFT in Trial 2 were the least cost-effective.

Meta-Analysis of Outpatient Treatment

Given that outpatient treatment is the predominant setting in which adolescents receive drug treatment, it is pertinent to highlight the recent analyses performed by Tanner-Smith and colleagues (Tanner-Smith et al., 2013). They conducted a meta-analysis on the effects of outpatient treatment on substance use outcomes for adolescents with substance use disorders. Whereas a systematic literature review identifies and summarizes the empirical evidence from the studies that fits prespecified eligibility criteria, a meta-analysis is the use of statistical methods to summarize the results of these studies.

The authors located 45 eligible experimental or quasi-experimental studies reporting 73 treatment–comparison group pairs, with many of the comparison groups also receiving some treatment. The most prevalent treatment types were family therapy, MET/motivational interviewing, psychoeducational therapy (PET), adolescent community reinforcement approach (ACRA), and CBT. In order to assess the comparative effectiveness, the authors examined the effect sizes for pre–post changes in substance use of each treatment type compared to whatever diverse treatment or control conditions was used in the respective studies.

Results from the pre–post analysis indicated an almost universal reduction in substance use between treatment entry and termination regardless of treatment type. A closer look at the results indicated that family therapy, behavioral therapy, CBT and MET were among the treatment types showing the largest substance use reductions. The most convincing and consistent comparative effectiveness finding was for family therapy, which showed relatively large positive effects relative to other treatments in both analyses. Not surprisingly, placebo and no treatment controls were among those showing the smallest reductions.

The authors reported an additional exploratory analysis of pooled data from Chestnut Health System's GAIN database pertaining to outpatient treatment (Dennis, White, Titus, & Unsicker, 2008). They conducted a meta-analysis analogous to that reported above. Analyses were based on data from 102 outpatient treatment programs serving over 9000 adolescents across the United States. Those results provided convergent results - there was almost universal reduction in substance use between treatment entry and termination regardless of treatment type.

Thus, one major take-away from the Tanner-Smith et al. (2013) work is that most types of treatment appear to be beneficial in helping adolescents reduce their sub-

stance use. As the authors note, "given the indications that at least some treatments are effective in reducing substance use, it is encouraging to see widespread reductions among the adolescents in the research studies" (p. 154–155).

A final topic addressed in this study was the issue of outcome and adolescent characteristics. The authors coded all the baseline information reported in the studies about those characteristics and included them in the analysis to identify subgroups more or less responsive to treatment. The analysis of pre–post reductions in substance use showed that, save for one variable, there were no differences related to gender, race/ethnicity, age, baseline substance use severity, comorbidity, or delinquency level. Also, the authors examined the interactions of these variables with the different distinct treatment types and found only a handful of chance levels of statistical significance. The one participant variable related to outcome was type of substance. The pre–post comparison showed that reductions in substance use were smaller for alcohol and other substances (e.g., heroin and cocaine) than for marijuana. But in the main, these analyses, albeit far short of definitive, suggest that treatments are relatively effective across a wide range of youth that differ in terms of demographics and problem severity.

Approaches Aimed at Maximizing Outcome

Recovery Schools

School is a critically important social environment for adolescents with SUDs. Developing new, sober peer groups is an important yet challenging aspect of recovery for youth completing SUD treatment. Given the documented environmental substance-exposure risk in high schools, and the vulnerability to early relapse following SUD treatment, school environments play a vital role in maintaining or undermining treatment gains.

On the one hand, school sits at the heart of the threat of relapse and other unhealthy and maladaptive behaviors. For youth in recovery from SUDs, traditional high school is a context likely to involve interactions with peer groups who are actively using alcohol and other drugs. The National Survey of American Attitudes on Substance Abuse annual survey of students ages 12–17 found that about two-thirds of high school students say drugs are used, kept, or sold on the grounds of their schools (Johnson, Shapiro, & Zill, 2009). Association with drug-using peers, alcohol or drug availability, and academic challenges are significant relapse-risk factors for youth after drug treatment (Clark & Winters, 2002; Svensson, 2000). For the student who attempts to resist peer pressure, difficulty coping with negative feelings and interpersonal conflict may endanger a teen's newly established sobriety.

Conversely, schools can be opportunities for promoting recovery and protecting students. Treatment for substance use disorders in any age group does not produce certain remission. The course of substance use disorders is characterized by cycles

of recovery and relapse (Dennis & Scott, 2007), which may endanger academic achievement and social functioning. Abstaining represents a challenge for students, who are especially vulnerable to relapse during the 6- to 12-month post-treatment period (Winters, Stinchfield, et al., 2007).

Any approach addressing recovery from substance use disorders among youth therefore must involve school settings. School bonding, school interest, and academic achievement are negatively associated with substance use, particularly among low-achieving students (Bryant, Schulenberg, O'Malley, Bachman, & Johnston, 2003). Succeeding academically can help students stay sober and ultimately graduate, given that "connectedness with school" is a protective factor for adolescents (Resnick et al., 1997). Continuing care and peer networks are integral to sustaining long-term sobriety (Brown, 2004; Karakos, 2014; McKay et al., 2009; Stout, Kelly, Magill, & Pagano, 2012). For high school students, knowing how to relate and respond to peers given newfound sobriety is a difficult challenge (Finch & Wegman, 2012) and increasing social interaction with non-substance-using peers is associated with greater odds of remission and recovery. Youth who abstain from substance use posttreatment report a higher number of non-using social supports (including peers) than youth who return to heavy drug use (Anderson, Ramo, Schulte, Cummins, & Brown, 2007; Richter, Brown, & Mott, 1991).

Recovery high schools are an alternative high school option that provides recovery support and a protective environment for students with SUDs and related behavioral, emotional, or mental health needs. Having been diagnosed with a substance use disorder is not a requirement of most recovery high schools, but SUDs and prior treatment are the norm for recovery high school students (Moberg & Finch, 2008; Moberg, Finch, & Lindsley, 2014).

The first recovery high school opened in Maryland in 1979 as a public alternative school called "Phoenix". The Association of Recovery Schools (ARS) was formed in 2002 to advocate for "the promotion, strengthening, and expansion of secondary and postsecondary programs designed for students and families committed to achieving success in both education and recovery" (Association of Recovery Schools, 2016). There are currently 40 recovery high schools in 16 states, with at least five additional schools under development. Over 85 recovery high schools have operated since 1979 (Association of Recovery Schools; https://recoveryschools.org/).

Recovery support programs such as recovery high schools enhance "recovery capital," which encompasses all resources related to the recovery process, including financial, human, social, and community factors (Granfield & Cloud, 1999; Hennessy & Finch, 2015; Kelly & Hoeppner, 2015). Recovery high schools provide services supporting both the academic and therapeutic needs of students. The schools attempt to support recovery and academic achievement by creating connectedness and building social and recovery capital in a context with clear pathways to success.

Recovery high schools are typically small, with an average enrollment of about 30 students. The programs are schools of choice for which the willingness of a student to attend is an enrollment criterion. Students ultimately may either graduate from the recovery high school or transition to a more traditional school. While there

is no one recovery high school model, certain elements are common (Finch, Moberg, & Krupp, 2014; Hennessy & Finch, 2015; Moberg & Finch, 2008):

1. Building a base of peer/family connection, social structures, accountability, psychoeducational information, and recovery resources;
2. Repairing/replacing disconnected or unhealthy peer, family, and authority relationships and minimizing contact with high-risk peers during school hours;
3. Providing students the opportunity to meet other students with similar histories and goals and to practice skills, including how to have sober fun;
4. Identifying and responding to behaviors indicating potential substance use or the symptoms of a co-occurring disorder by taking advantage of smaller school environments and specialized staff;
5. Requiring participation in support and mutual aid groups outside school to promote contact with additional positive peers and mentors; and
6. Providing an individualized, accredited curriculum taught by licensed teachers to give students a chance to stay on-course for earning a high school diploma.

Recovery high school-specific research has expanded in recent years (Botzet, McIlvaine, Winters, Fahnhorst, & Dittel, 2014; Finch et al., 2014; Finch, Tanner-Smith, Hennessy, & Moberg, 2017; Karakos, 2014; Moberg et al., 2014; Moberg & Finch, 2008). Finch et al. (2017) provides the strongest evidence yet of a positive effect of RHSs for adolescents who have received treatment for SUDs. This article emerges from the first NIH-funded comparative outcomes study of recovery high schools (RHS). The study used a longitudinal quasi-experimental design to examine the effects of RHS attendance on adolescents' outcomes, specifically examining whether students *who have received treatment for SUDs* and who subsequently attend RHSs, experience significantly better behavioral outcomes (less alcohol and other drug use) and educational outcomes (higher GPA, better attendance) compared to recovering students who attend school in other settings. The study was unique in the inclusion of propensity score modeling of a wide range of important correlates of outcomes selected based on prior meta-analytic research on adolescent treatment outcomes.

Results at 6 months compared adolescents attending RHSs following treatment for SUDs to non-RHS students who had received similar SUD treatment:

- RHS students were twice (59% versus 30%) as likely to report complete abstinence from alcohol, marijuana, and other drugs at the 6-month follow-up.
- RHS students reported significantly fewer days of marijuana use (9 days compared to 26 days in the past 3 months), and
- RHS students reported significantly less absenteeism from school.

While studies suggest recovery high schools offer a promising approach to improve both academic and behavioral outcomes, more research is needed (US Office of the Surgeon General, 2016), especially with regard to diverse populations and long-term (i.e., post-high school) trajectories.

Overall, reports indicate that recovery high schools are feasible to implement and sustain, and participating students and staff believe they have positive educational

and behavioral outcomes (Moberg & Finch, 2008). Assuming overall effectiveness continues to be demonstrated, additional analyses to characterize the most effective program elements will be needed to guide policy and service development.

Employing Reinforcements to Promote Recovery

Incentive-based approaches, which include contingency management, encourages healthy changes in behavior by providing adolescents with immediate rewards contingent on positive changes in behavior, such as negative urine tests or meeting treatment goals. This approach is based on the operant conditioning principle that the use of consequences can modify behavior. Rewards are often in the form of award prizes (e.g., dollar prizes) (Sindelar, Elbel, & Petry, 2007). Community reinforcement plus vouchers approach (CRA) is an example. Key features of this strategy are vouchers to reward treatment compliance and abstinence, frequent and random urine screens to detect drug use, and several tools to support successful recovery (e.g., functional analyses to identify triggers for drug use; self-management plans to address identified triggers; and the development of drug avoidance skills). Incentive-based strategies merit greater research attention and utilization in the treatment field; they can be readily integrated into the variety of treatment approaches that are becoming the mainstay in adolescent treatment, including behavior therapy, cognitive behavior therapy, family therapy, and motivational enhancement.

Adapting Treatment

A promising model to optimize treatment effectiveness is personalizing the content and or delivery to address those who do not respond readily to the first-line treatment offered. This model, referred to as a "SMART" (Sequential Multiple Assignment Randomized Trials) approach (Murphy, Lynch, Oslin, McKay, & TenHave, 2007) applies an algorithm of enhanced treatment for poor responders. Given that many youth do not initially respond to treatment, the field may benefit from use of this strategy. The adaptive approach has the potential to increase rates of participation; the burden on the patient is lower at the outset, and the tailoring that occurs for nonresponders may be perceived favorably by these clients. Adaptive care may also increase cost-effectiveness and cost benefit, because lower intensity treatments are also often less costly.

A challenge of adaptive treatment models is how to define poor treatment response and when to apply the next step of treatment. Should the client be switched from initial treatment and switched to a different strategy? If so, what type of second-line treatment? Perhaps the client should receive a more intensive version of the first-line treatment, or have a supplemental treatment to augment what the client is already receiving (McKay, 2009).

Adaptive or stepped care treatment algorithms have been developed and evaluated for adults. McKay (2009) summarized 15 adult drug treatment studies; most of these studies concluded that the adaptive approach was associated with either better drug use outcomes or equivalent outcomes compared to treatments with other advantages (e.g., lower cost and lower patient burden). The senior author knows of several SMART studies in progress for youth but no published results yet.

Summary

Overall, great advances have been made since 1990 in the development and evaluation of treatments for adolescent drug abuse. This body of research reflects a greater focus on varying interventions using different theory-based psychotherapies, as well as a recognition of the unique developmental milestones specific to adolescents. The field is revealing its maturity in several ways: the use of assessment tools developed and validated on adolescent populations is the norm; many treatment approaches target multiple drugs, reflecting the fact that most clinical populations of teenagers abuse multiple substances; treatment manuals and specific protocols that permit treatment replication are available; and an increased rigor in evaluating the effectiveness of these approaches. We can now say with relative certainty that several modalities and approaches meet standards of evidence-based treatments, and that, in general, they are comparable in terms of outcomes.

It is our assessment of the treatment outcome studies that family systems-based treatments and MET/BI approaches have received the most empirical support compared to other modalities. Two approaches that have been applied to drug-abusing youth over time and still retain a core position among treatment options—the 12-step approach and TCs—have received very little investigation with clinical trials. Also, few pharmacological treatments of adolescents with an SUD have been published; their role as an effective adjunct to psychosocial-based approaches merits more research.

Moreover, very little is still known as to what extent community programs provide essential clinical elements or characteristics of effective treatment (e.g., use of standardized adolescent assessment measures and developmentally adjusted strategies for treatment engagement). Also, the use by community programs of treatment reinforcements, adaptive treatment strategies, and electronic resources to supplement treatment and promote recovery is an open question.

Despite a maturing treatment outcome research field, important knowledge gaps exist. Because most treatment research in this field examines stand-alone approaches, it is not clear to what extent this body of work generalizes to the wider treatment community field where electric approaches are commonly utilized. Addressing this issue, along with cost-efficient and sustainable ways to translate research findings into day-to-day practice with fidelity, is needed. One effort along these lines is the use of the Screening, Brief Intervention and Referral to Treatment (SBIRT) approach as means to expand the identification of and treatment for youth

with a substance use problem (Vendetti et al., 2017; Winters, 2016). Other research needs include the following: which pharmacological treatments for substance use disorders are effective for adolescents; what factors mediate and moderate engagement in the behavior change process; what variables may be related to treatment effectiveness for specific substances (e.g., marijuana; opioids); how to maximize the role of parents in treatment engagement and support of recovery; the role of technology to promote treatment effectiveness; and understanding how to make quality treatment across the entire continuum of care accessible to adolescents with varying degrees of substance use.

In summary, the adolescent substance abuse treatment field has benefitted by targeted research resulting in evidence-based treatments and practices that are associated with reductions in substance use and the associated short-term individual and societal costs that result from this disorder. Quality treatment approaches are now available for a wide range of youth suspected of a substance use problem.

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