

Current advances in the treatment of adolescent drug use

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Abstract: Research on the development and efficacy of drug abuse treatment for adolescents has made great strides recently. Several distinct models have been studied, and these approaches range from brief interventions to intensive treatments. This paper has three primary aims: to provide an overview of conceptual issues relevant to treating adolescents suspected of drug-related problems, including an overview of factors believed to contribute to a substance use disorder, to review the empirical treatment outcome literature, and to identify areas of need and promising directions for future research.

Keywords: adolescent drug abuse, treatment

Introduction

Alcohol and other drug use by adolescents remains a significant public health concern.¹ Despite drug (the term drugs throughout refers to alcohol and other drugs) use levels waxing and waning over the years, recent surveys still paint a picture of relatively high prevalence rates for alcohol, marijuana, and tobacco use among teenagers and lower although still significant prevalence rates for many other drugs (eg, prescription opiates, hallucinogens, amphetamines). Based on the University of Michigan's annual survey of adolescents nationwide, by the time students are seniors, almost 70% will have tried alcohol, half will have taken an illegal drug (primarily marijuana), nearly 40% will have smoked a cigarette, and more than 20% will have used a prescription drug for a nonmedical purpose.²

While drug use is a normative behavior among youth, it is risky and not always benign. Perhaps most importantly, adolescence is the at-risk period for development of a substance use disorder.³ In fact, the likelihood of meeting criteria for either a substance abuse or dependence disorder is significantly higher if use occurs in the early teenage years. For example, 15.2% of individuals who start drinking by age 14 eventually develop alcohol abuse or dependence (as compared with just 2.1% of those who wait until they are 21 or older).⁴ Further, binge drinking and heavy alcohol consumption peak during late adolescence and early adulthood,⁴ increasing the risk for alcohol poisoning. Moreover, adolescent-initiated drug use is associated with a greater likelihood of a range of social and personal problems, including but not limited to, the three leading causes of death in this age group (accidents, homicide, suicide), educational problems (eg, school drop-out), legal problems (eg, drug trafficking, violence-related crimes), driving under the influence of a drug, victimization, and interference with normal brain development.¹ Regarding the latter issue, chronic

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marijuana use in adolescence has been shown to be associated with possible permanent loss of IQ and other functions related to memory and thinking.⁵ It is disheartening that the popularity of some drugs, particularly marijuana, is growing across all ages, including teenagers. The pro-marijuana bills that advocate for medical and recreational marijuana use may be contributing to this attitude shift among adolescents. In the context of attitudes by youth that marijuana is not harmful is a large body of knowledge of the health and safety risks of drug use.

This paper provides an overview of the adolescent treatment research field by discussing important conceptual issues related to adolescent treatment, typical treatment strategies and the research on treatment effectiveness.

Factors contributing to problems associated with drug involvement

Numerous personal and environmental factors contribute to the initiation and maintenance of adolescent drug involvement, including drug availability, family environment and parenting factors, school connectedness, affiliation with delinquent peers, personality traits (eg, poor impulse control), mental illness (eg, depression, attention deficit hyperactivity disorder), and genetic vulnerability.^{6,7} This coupled with a developing and malleable brain (a property known as neuroplasticity) during the teenage years heightens not only the risk for use but also the potential for a long-lasting substance use disorder. At a decision-making level, this neurodevelopmental process is believed to impact how a teenager assesses a situation and makes decisions. Because the regions of the brain that are generally linked to controlling emotions and impulses are not mature until a person is in his or her mid-20s, it is believed that the teenager is highly motivated to pursue pleasurable rewards at a time when their ability to weigh risks accurately and make sound decisions are compromised.⁸ This developmental tendency may contribute to an initial curiosity to use and to subsequent continued use to the point of abuse or dependence.⁹ Also, because critical neural circuits are still developing during neuroplasticity, there are concerns that the toxicity of drugs may alter these circuits in such a lasting way that developing a future drug problem is more likely.⁸

Conceptual issues in treating adolescents with a drug problem Need for services

As noted above, the potential harm to youth from drug abuse, including lasting deleterious brain changes, reinforces

the importance of addressing drug involvement early. The clinical science of brief intervention programs aimed at intervening with early-stage drug users (eg, those meeting abuse criteria) are an effective way to stem the escalation of use in a young person.^{10,11} In other words, the progression of drug use does not have to – and should not – reach dependence levels before steps are taken to initiate change. In fact, there is increasing recognition regarding the need to screen youth for varying levels of substance use in all locations where they can be found (eg, pediatricians offices, schools, juvenile justice system) so that nonuse can be reinforced, use targeted, and youth triaged to different types of services based upon use severity.¹² This approach (screening coupled with brief intervention and treatment referrals when indicated) has a growing body of evidence supporting its efficacy in reducing drug use among teenagers.^{11,13–15}

While brief interventions are efficacious for youth with lower levels of drug use severity, youth who meet dependence criteria require more. Specifically, a more specialized, lengthier form of treatment is warranted. Unfortunately, among the estimated 1.5 million teenagers meeting criteria for a substance use disorder (abuse or dependence),⁴ only about 10% receive treatment for the disorder.⁴ Several factors may contribute to this treatment gap, including low motivation by the youth or parents, lack of specialized adolescent treatment programs, poor health care coverage, and inconsistent quality in adolescent treatment services.^{16,17}

Differences in treatment needs between adolescents and adults

It is widely recognized that adolescents have unique treatment needs and as such require developmentally focused treatment. At a most basic level, there are significant clinical differences between adolescents and adults in the presentation of a drug problem. For example, compared with adults, adolescents tend to be polydrug users, tend to not reveal withdrawal symptoms, and can experience serious problems without meeting diagnostic criteria for the disorder (the diagnostic orphan). Additionally, teenagers are less likely than adults to seek treatment on their own. This may be due to several factors, including but not limited to, a shorter history of drug use, fewer perceived drug-related consequences, enabling behaviors by parents, use within the peer group, normalizing the behavior, and a lack of maturity that contributes to poor insight that a problem exists.^{18,19} Lack of treatment-seeking behavior combined with the notion that drug use is not a problem is a primary reason why the application of motivational enhancement techniques is viewed as so important at the front

end of a counseling experience with adolescents.²⁰ Another difference pertains to issues of confidentiality. Only a few states allow a teenager to receive drug treatment without the consent of a parent. Also, mandated reporting requirements dictate that some issues disclosed by an adolescent cannot be fully confidential. Finally, psychopathology commonly co-occurs with a substance use disorder among adolescents, with the most common being attention deficit hyperactivity disorder, conduct disorder, depression, anxiety, and post traumatic stress disorder.²¹ In many instances, the co-occurring disorder precedes the drug use, and thus may be importantly linked to the adolescent's drug problem. Importantly, when drug treatment addresses the co-occurring problem, abstinence rates are higher compared with rates when treatment is singly focused on drug issues.²²

Various forms of treatment are available that focus on the acute phase of the disorder

Treatment of adolescent substance abuse tends to be delivered in outpatient settings²³ using a variety of therapeutic approaches. Family-focused treatments, cognitive behavioral therapy, motivational enhancement therapy, and trauma-informed care are just a few of the evidence-based or evidence-informed strategies used to treat this disorder in its acute phase. In addition to these more behaviorally focused treatments, there is growing interest in pharmacological approaches (eg, anticraving medications) to augment treatment, but one should proceed cautiously along these lines given that the efficacy data are limited.²⁴

Finally, the initial treatment experience is a first step along a sometimes drawn-out and complex pathway. In fact, while adolescents show significant reductions in drug use shortly after treatment, the longer-term recovery process may include lapses and relapses. This suggests, and research supports, the role of continuing care in sustaining treatment gains. Continuing care through self-help programs, recovery high schools, alternative peer groups, and the adolescent community reinforcement approach (A-CRA) have proven beneficial.^{17,25,26}

Treatment intensity

An adolescent's treatment level is determined by assessing the individual in six critical areas developed by the American Society of Addiction Medicine.²⁷ These include the following:

- severity of intoxication and withdrawal potential both currently and in the past

- current and past medical conditions
- mental health conditions including emotional, behavioral, and cognitive conditions
- youth's readiness to change his/her substance use behavior
- risk of relapse and potential for continued substance use
- environment for recovery, including the youth's family, friends, and living situation.

Based upon the information assessed above, an adolescent referred to treatment is placed into one of the following five treatment levels.²⁷

Early, brief intervention services

These services are for individuals who do not meet the criteria for a substance dependence disorder. Early 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.

Outpatient treatment

During outpatient treatment, adolescents typically meet with a therapist for 6 hours a week or less for a period dependent on progress and the treatment plan. This level of treatment is appropriate for adolescents whose assessment indicates a less severe level of care is warranted, as a step down from a more intensive treatment or to increase the adolescent's motivation to engage in a higher level of care. Individual, group, and family therapy are some of the options for outpatient treatment.

Intensive outpatient treatment and partial hospitalization

Adolescents in intensive outpatient treatment are in need of a treatment program that can offer comprehensive services for up to 20 hours per week. The adolescents often attend in the evening or weekends but live at home (ranging in length from 2 months to one year). Partial hospitalization is for adolescents who have a more severe substance use disorder, but their living environment does not negatively impact their treatment. These programs are often 4–6 hours a day for 5 days a week.

Residential/inpatient treatment

This is a high level of care for adolescents who have not only severe addiction but also have complex mental health, family, or medical problems that would interfere with treatment

and the ability to get and stay clean and sober. Residential/inpatient treatment includes programs that provide treatment services in a residential setting (lasting from one month to one year).

Medically managed intensive inpatient treatment

This is the highest level of treatment and is most appropriate for adolescents whose substance use, biomedical, and emotional problems are so severe that they require 24-hour primary medical care. The length of care is dependent on the adolescent's needs and progress.

Treatment strategies and approaches

Within these five levels of care, practitioners may utilize a wide variety of theoretical orientations or modalities. To date, most adolescent treatment programs have used an eclectic treatment approach, integrating multiple therapeutic models within their treatment service framework. To make sure approaches are matched to a youth's needs, the results of a comprehensive assessment should inform an individualized treatment approach. A common theme among all of them is 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 (eg, trauma, mental health, school affiliation, delinquent behavior, family issues), and identify and build upon a youth's strengths. Provided below is a brief description of the main treatment approaches that characterize the public and private adolescent treatment sectors in the USA, many of which have been the focus of treatment outcome studies (addressed in a subsequent section: Synthesis of treatment outcome research).

Behavioral approaches

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.

Cognitive-behavioral 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.²⁸ Thus, maladaptive behaviors can be changed by modifying our thought processes, even if our

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.²⁹ Trauma-focused CBT was developed to treat adolescents who have experienced a severe trauma (eg, sexual abuse, domestic violence) and have other emotional and behavioral problems.³⁰ Substance use can be addressed during trauma-focused CBT since it is commonly experienced by traumatized youth. The parent, an essential part of this treatment, will attend parallel sessions and eventually joint sessions with the youth.

Contingency management

This strategy encourages healthy changes in behavior by providing adolescents with immediate rewards for positive changes in behavior, such as negative urine tests³¹ or meeting treatment goals. This approach, based on the conceptual framework of behavior analysis and behavioral pharmacology, regards substance use and related behaviors as operant behaviors that are reinforced by the effects of the drugs involved. Following the operant conditioning model, the adolescent's drug use will subside when tangible incentives are offered for abstinence. These incentives include low-cost prizes or cash vouchers that are redeemable for gift cards to retail stores, food items, or other goods the youth finds rewarding. Contingency management can be delivered by parents at home, but is usually combined with other treatment approaches.

Motivational enhancement therapy

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. It is typically delivered in conjunction with other treatment approaches. Motivational enhancement therapists use a person-centered, non-confrontational 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. 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, but generally remains neutral.³²

Adolescent community reinforcement approach

This intervention targets areas of the adolescent's life that reinforce substance use and helps the adolescent to replace these negative influences with healthier prosocial behaviors. The adolescent's needs are assessed and the therapist then chooses the appropriate topics for sessions. A-CRA can address problem-solving, communication skills, relapse prevention, and encourage participation in positive social and community activities. Role-playing is an integral part of the intervention and the adolescent is often given homework in which they must practice the skills they have learned in sessions in real-world situations.³³ The adolescent's caregiver is involved in treatment and will attend individual and joint sessions.

Twelve-step facilitation therapy

The goal of twelve-step facilitation 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.³⁴ 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 (ie, attending AA, Narcotics Anonymous, or Cocaine Anonymous meetings). Approximately 2.3% of AA members in the USA and Canada are under the age of 21.³⁵ Within this approach, participants are urged to accept that life has become unmanageable and they must quit using drugs or alcohol. Individuals support each other's sobriety through encouragement of mental and spiritual health.

Family-based approaches

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.³⁶ 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

This approach views the adolescent's substance use and other problem behaviors as stemming from an unhealthy family system. The counselor will meet with each family member and observe their interactions in order to address ways to change their negative interactions. As positive changes begin to occur in the family system, the adolescents' problem behaviors will improve. Brief strategic family therapy is implemented over 12–16 sessions in various treatment settings.

Family behavior therapy

Family behavior therapy involves the adolescent and at least one parent in treatment to address the adolescent's substance use as well as other problem behaviors. This intervention combines contingency management (described above), behavioral contracting, and other evidence-based interventions that are chosen by the adolescent and his/her family. As with A-CRA, the family is encouraged to use the skills taught during their sessions in their everyday lives.

Functional family therapy

Functional family therapy uses behavioral approaches to improve negative family interactions that are believed to contribute to the adolescent's problem behaviors. The therapist will work with the family to increase engagement in treatment and motivation for change and to improve parenting, communication, and problem-solving skills.

Multidimensional family therapy

This comprehensive approach not only works with the family system to address the adolescent's substance use, but also incorporates community systems such as the school or courts into treatment. The flexibility of multidimensional family therapy allows the therapist to conduct sessions over a 12–16-week time period in various locations including the home, schools, and courts. Sessions can occur weekly or twice weekly.³⁷

Multisystemic therapy

Multisystemic therapy is a family-based and community-based treatment that views the adolescent's substance use as resulting from characteristics of the adolescent, family, peers, school, and neighborhood. Multisystemic therapy uses multiple evidence-based treatments including cognitive behavioral therapy and contingency management over a course of approximately 4–6 months depending on the adolescent's other problems (eg, need for psychiatric supports, involvement in the juvenile justice system).³⁸

Other treatment approaches

Therapeutic community

The therapeutic community is typically rooted in self-help principles and experiential knowledge of the recovery community.³⁹ 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.⁴⁰ 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.

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.⁴¹ However, doctors will sometimes prescribe medications to older adolescents.

Continuing care and recovery supports

Adolescents often experience reductions in drug use by the end of treatment,²³ but research has shown that these treatment effects decrease over time.^{19,42} Continuing care and recovery supports, while not a substitute for treatment, are services that an adolescent can utilize post-treatment to maintain or enhance their recovery. There is preliminary research evidence for some of these services, but there is a need for controlled trials. We discuss five types of continuing care and recovery supports below.

Assertive continuing care

This type of continuing care is usually used after the adolescent receives A-CRA (a behavioral approach described above) and requires a multidisciplinary team of professionals to implement. The goal of assertive continuing care is to prevent relapse through a home-based program that uses positive and negative reinforcement change behaviors.

In addition, assertive continuing care trains the adolescent in problem-solving and communication skills and helps to engage them in healthy social activities.

Peer recovery support services

Peer recovery support services link individuals in treatment or recovery to peers in their community who have had experiences with addiction. These can consist of groups or a single peer mentor, or links to new drug-free social networks and activities. Alternative peer groups are an example of this.⁴³ Alternative peer groups are developmentally appropriate and can provide enjoyable experiences for the adolescent. They also involve the parent in the adolescent's recovery.

Twelve-step and mutual help groups

These are free groups in the community that provide ongoing support to people with addictions. The groups include 12-step programs, like AA, which give participants a set of "steps" to work through that will hopefully lead to sobriety and a spiritual renewal. These groups normally meet weekly, but an individual can attend more if desired in many locations and are even available online.

Recovery high schools

Recovery high schools provide a supportive peer group and specialized staff for adolescents who are in recovery from drugs and alcohol. They are usually within the public school system, but are separated from other students by their schedule or the school can be housed in a separate building. Students may or may not be receiving substance abuse treatment from a treatment provider while attending a recovery high school.

Collegiate recovery communities

Similar to recovery high schools, collegiate recovery communities provide a supportive peer environment for students in recovery.⁴⁴ Collegiate recovery communities vary in services offered, but can include sober housing and other campus supports to promote academic performance.

Synthesis of treatment outcome research

Reviews of the literature provide an opportunity to synthesize findings across multiple research studies and are strong approaches for understanding the current best evidence in the field. Systematic reviews are literature reviews that summarize the empirical evidence on a research topic using systematic and transparent methods designed to minimize bias

in the literature review process. A meta-analysis approach refers to statistical techniques used to synthesize quantitative findings across multiple studies included in a review. Meta-analyses, which are based on systematic reviews, provide a comprehensive picture of an entire research literature on a topic, and permit a broader scope and generality of conclusions than any single primary study alone.

To date, there have been several comprehensive systematic reviews and meta-analyses providing evidence on the effectiveness of substance use treatment for adolescents. Here we briefly summarize findings from a recently completed meta-analysis on adolescent substance use treatment effectiveness research, across the continuum of care.⁴⁵ Although other high quality narrative reviews on the topic are available,⁴⁶⁻⁴⁸ in the interests of brevity we will only focus on findings from systematic reviews or meta-analyses.

Early and brief interventions

On the continuum of care for adolescent substance use, the lowest level of care involves universal or primary prevention programs that do not explicitly target adolescents at risk of substance use disorders. Evidence about the effectiveness of such universal prevention programs is beyond the scope of the current article, which focuses on treatment for adolescents with, or at risk of, developing substance use disorders. Instead, we refer readers interested in universal prevention program effectiveness to existing systematic reviews and meta-analyses of that literature.⁴⁹⁻⁵³

Further along the continuum of care are early interventions that provide services to adolescents who are consuming substances at levels that place them at risk for developing subsequent substance use disorders but typically do not perceive that their drug use is a problem¹¹ (ie, selective or indicated prevention approaches). These secondary prevention programs often use a combination of treatment approaches as outlined above (eg, cognitive behavioral therapy, motivational enhancement therapy), but they tend to be delivered in a relatively brief, circumscribed period. In a recent systematic review and meta-analysis from 24 studies on brief interventions for alcohol among youth conducted by Tanner-Smith and Lipsey,⁴⁵ brief alcohol interventions were found to utilize a variety of therapeutic approaches, most commonly motivational enhancement therapy, combined motivational enhancement and cognitive behavioral therapy, or generic psychoeducational therapy. Relative to no treatment or treatment as usual, brief alcohol interventions were associated with significant reductions in alcohol use (standardized mean difference effect size

$d=0.27$, number of studies $k=24$), and alcohol-related problems ($d=0.19$, $k=8$).

Note that most of the meta-analyses reported here used a small sample correction factor⁵⁴ to adjust the standardized mean difference effect sizes. In those cases, the authors often referred to the effect sizes as Hedges' g effect sizes. Throughout our review, we use the more generic term d to refer broadly to any standardized mean difference effect size indexing differences in post-treatment means between two groups. Also, note that we present effect sizes here so that positive valences indicate a beneficial treatment effects, relative to comparison conditions.

Despite the brief duration of the interventions (all involved less than 5 hours of intervention contact) the beneficial effects persisted for up to one year after receipt. These effects were also relatively consistent across the different therapeutic approaches, delivery sites, delivery formats, and intervention length. However, the authors found that brief alcohol interventions that used decisional balance exercises produced larger beneficial effects than those that did not; interventions using goal-setting or contracting exercises also produced larger beneficial effects than those that did not. The results of this study are remarkably consistent with findings from an earlier meta-analysis where brief interventions were associated with significant reductions in adolescent alcohol use ($d=0.28$, $k=8$).⁵⁵

Other recent systematic reviews and meta-analyses have synthesized research on the effectiveness of motivational interviewing and motivational enhancement therapy for adolescent substance use (most of which are delivered in a brief format or targeted toward selected or indicated populations at risk for developing substance use disorders). With respect to motivational interviewing, the literature is fairly consistent, ie, relative to control conditions, motivational interviewing interventions that targeted alcohol and other drug use were associated with significant reductions in adolescent substance use ($d=0.15$, $k=16$).^{20,56} Although these effects decreased in magnitude over time, they persisted for up to 6 months after intervention receipt.

Outpatient treatment

Further along the continuum of care for adolescent substance use are treatments delivered in outpatient settings that explicitly target youth with substance use disorders and related problems. Tanner-Smith et al²³ conducted a systematic review and meta-analysis of outpatient treatment options for adolescents with substance use disorders (see also Tanner-Smith et al⁵⁷). This meta-analysis was unique in that few of the included studies

included no-treatment or treatment as usual comparison conditions, so most of the comparisons focused on the comparative effects of different types of treatment approaches. Based on findings from 45 studies, they found that programs using family therapy approaches yielded larger beneficial effects on adolescent alcohol and substance use outcomes relative to the other types of treatment approaches ($d=0.26$, $k=25$). Treatments using motivational enhancement also tended to yield beneficial effects relative to other treatment approaches. However, overall, and across almost all treatment approaches, adolescents significantly reduced their substance use between treatment entry and discharge ($d=0.52$, $k=44$). They found that reductions in substance use were largest for marijuana outcomes and smallest for alcohol or other hard drug use outcomes; otherwise, effects were relatively consistent across different demographic characteristics of the studies. Results from this study are similar to findings from other meta-analyses on this topic, which have concluded that outpatient programs using family therapy approaches are promising for reducing substance use among adolescents.⁵⁸⁻⁶¹

Bender et al⁶² synthesized findings from 15 randomized controlled evaluations of interventions explicitly aimed at reducing cannabis use among adolescents. They found that, relative to treatment as usual or alternative treatment types, cannabis intervention programs were effective when delivered in both family ($d=0.40$, $k=7$), and individual settings ($d=0.44$, $k=7$). These effects tended to wane over time, particularly when measured for longer than 6-months post-treatment.

Inpatient/residential care

To date, we are unaware of any systematic reviews or meta-analyses that have synthesized the effectiveness of inpatient or residential treatment for adolescent substance use disorders. This is likely due to the small number of controlled experimental or quasi-experimental studies available on the topic, but clearly this is an important gap in the evidence base that needs to be addressed in future research syntheses.

Principles of adolescent substance use disorder treatment

Research has established that several types of therapeutic practices, regardless of level of care or specific therapeutic approach, can be effective in reducing substance use and related problems among adolescents. These are termed “evidence-based practices”. According to the National Institute of Drug Abuse, there are 13 principles that should guide treatment of adolescent substance abuse.⁶³ As shown

in Table 1, treatment for substance use should not be contingent upon a diagnosis of severe substance use but should be identified and addressed as early as possible. Screening for substance use can occur during medical visits, and legal and family pressure can facilitate treatment entry. Treatment should be individualized and behaviorally focused, and address more than the use itself by assessing and treating when present sexually transmitted infections, comorbid mental health conditions, and sensitive topics such as abuse and trauma. Community and family support, continuing care, and treatment monitoring of progress are important. Cacciola et al⁶⁴ have also identified ten features with 62 discrete practices that are associated with quality substance abuse care (eg, assessment, attention to mental health, comprehensive treatment, family involvement in treatment, developmentally informed programming, engaging and retaining adolescents in treatment, staff qualifications and training, culturally competent care, continuing care and recovery supports, program evaluation). These closely parallel National Institute of Drug Abuse principles.

Summary and future directions

There are encouraging findings as to the efficacy of treatment approaches for adolescent drug involvement. Great advances have been made in the past decade with regard to 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 (although psychosocial approaches are more the norm than other approaches), as well as a recognition of the unique developmental milestones specific to adolescents. Whereas the evaluation research in this area is still small compared with the adult drug outcome literature, and there is still a lack of systematic investigation as to what types of treatment programs work best for whom and the extent research literature supports the view that most treatment approaches for adolescents are associated with reduced drug use at post-treatment. However, these reductions generally diminish within 3–6 months after treatment,^{42,65,66} indicating the need for continuing care.

Despite the array of new knowledge regarding what works in adolescent substance abuse treatment, knowledge in other areas is lacking. First, because most community-based treatment programs utilize an eclectic approach, research on stand-alone approaches (the most common treatment effectiveness studies conducted) may not be as generalizable to the wider treatment community. Addressing this topic along with cost-efficient and sustainable ways to translate research findings into day-to-day practice with fidelity is sorely needed.

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 (eg, 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. ^{12,67}
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. ⁶⁸
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.
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. ⁷⁰ 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 (eg, 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.

Notes: Data from the National Institute on Drug Abuse. *Principles of Adolescent Substance Use Disorder Treatment: A Research-Based Guide*. Bethesda: 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>. Accessed August 5, 2014.⁶³

Second, very little is still known as to what extent community programs provide essential clinical elements or characteristics of effective treatment (eg, use of standardized adolescent assessment measures and developmentally adjusted strategies for treatment engagement) or how to efficiently improve the quality of services that do exist. Third, there are critical research needs, including the following: understanding which pharmacological treatments for substance use disorders are potential medications for adolescents; factors that mediate and moderate engagement in the behavior change process, including the extent to which problem recognition is associ-

ated with treatment outcome; the role of parents in treatment engagement and support of recovery; and the role of technology (eg, smart phones as a relapse prevention tool) to promote treatment effectiveness. At the practice level, working with insurers and other payers to fund high-quality services across the entire continuum of care rather than discrete focused payment on an acute care episode is particularly needed.

In summary, the field of adolescent substance abuse has benefitted by targeted research resulting in evidence-based treatments and practices that are effective in reducing use and the associated short-term individual and societal costs that

result from this disease. Understanding how to make quality treatment across the entire continuum of care accessible to adolescents with varying degrees of substance use and how to extend these gains for longer periods of time is especially needed. Given the Affordable Care Act as well as the Parity Legislation, drug treatment services, including those for an adolescent, are now covered by health insurance. Thus, the time is now to enhance our efforts to close the treatment gap and deliver services that make a difference.

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The authors report no conflicts of interest in this work.

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