



# Adolescent Substance Use Disorder Treatment: an Update on Evidence-Based Strategies

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## Abstract

**Purpose of Review** To examine the most recent published evidence (2016–2019) regarding the treatment of adolescent substance use disorders and to provide an update on evidence-based strategies, adjunctive interventions, and methods to improve currently established treatment approaches.

**Recent Findings** Recent evidence suggests that psychosocial treatments such as family-based therapy, cognitive behavioral therapy, and multicomponent approaches remain the most effective methods of treatment; however, innovative ways of improving these treatment strategies may include digital and culturally based interventions. New advances in adjunctive treatments such as pharmacotherapy, exercise, mindfulness, and recovery-oriented educational centers may have some clinical utility.

**Summary** Well-established psychosocial interventions remain the primary modality of treatment. Promising new adjunctive treatments and improvements in our currently established treatments may yield significant improvements.

**Keywords** Adolescents · Substance use disorder · Treatments · Interventions · Youth

## Introduction

Trying alcohol and drugs for the first time is common among adolescents, and approximately 5% will develop problematic patterns of use that meet criteria for a substance use disorder (SUD) [1]. Over 90% of adults with a SUD began using alcohol or drugs during adolescence [2], and earlier initiation of substance use corresponds to a greater lifetime risk of adverse effects including increased mental health burden, school-related problems, physical health concerns, and neurocognitive impairments [3–7].

It is critical that clinicians understand the current treatments available for adolescent SUDs, as decreasing or eliminating maladaptive patterns of substance use at early stages could have significant long-term implications. Treatments for adolescent SUDs are primarily psychosocial, including family-based therapy, cognitive behavioral therapy, motivational interviewing,

and contingency management [8, 9]. Previous reviews in this area have utilized Nathan and Gorman's [10] methodologies to assess the quality of evidence in treating adolescent substance use disorders [9, 11]. The quality of evidence and strength of recommendations for each treatment are provided in this review, including *well-established interventions*, *probably efficacious treatments*, and *possibly efficacious treatments*, whether as a standalone treatment or part of a multicomponent approach. Building on previous work and examining the literature published between 2016 and 2019, this review will (1) provide a clinical synthesis of interventions for adolescent SUDs and the general strength of recommendations for each, (2) provide discussion on possible adjunctive interventions, and (3) discuss ways to modify and improve existing interventions. The results of this review are summarized in Table 1.

## Well-Established Interventions: Family-Based Therapy, Cognitive Behavioral Therapy, and Multicomponent Therapy

### Family-Based Therapy

Family-based therapies engage parents, caregivers, and siblings in the treatment of adolescent SUDs. Family-based

This article is part of the Topical Collection on *Child and Adolescent Disorders*

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**Table 1** Adolescent substance use disorder treatment recommendations

Well-established standalone interventions	Family-based therapy, cognitive behavioral therapy, multicomponent psychosocial therapy
Probably efficacious standalone interventions	Motivational interviewing/motivational enhancement therapy, third-wave cognitive behavioral therapies
Possibly efficacious standalone interventions	12-step programs
Possible adjunctive interventions	Pharmacotherapy, exercise, yoga, mindfulness, recovery-specific educational settings, goal setting, progress monitoring
Modifications to improve existing approaches	Digital strategies, culturally based programs

therapies are well-established interventions for treating adolescent SUDs, and are particularly effective at promoting treatment attendance and therapeutic alliance, whereas other treatment modalities have shown only mixed success in these areas [9]. Recent evidence has confirmed that utilizing strategies such as parental monitoring and behavioral management, promoting positive relationships, and encouraging self-regulation and stress management are effective in treating adolescent substance use through family-based approaches [12]. Similarly, A 2018 meta-analysis found that both general and alcohol-specific parenting strategies had a larger average effect size than interventions targeting alcohol-specific parenting only, and that family-based interventions that focus on parents as the agent of change can be advantageous in that they provide flexibility in approach and delivery of the intervention to their child [13•].

Multidimensional Family Therapy (MDFT) is a psychosocial treatment that holistically addresses the individual, family, and environmental factors that contribute to substance use and related problems. MDFT has been found to be comparable or favorable when compared with a broad variety of treatment modalities and has been found to be more beneficial among youth with severe SUDs [14]. A randomized controlled trial compared MDFT with residential treatment for adolescents with SUDs and co-occurring mental health conditions, and found that, at a 1-year follow-up, youth receiving MDFT maintained their improvements in frequency of substance use and delinquent behaviors more so than youth in residential treatment. This suggests MDFT is a promising alternative to residential treatment among youth who meet criteria for a higher level of care and may be less burdensome as an outpatient treatment option [15•]. In addition to demonstrating effectiveness in substance use treatment, MDFT was found to be as effective as CBT in reducing delinquency among adolescents with cannabis use disorder [16] and was more cost effective than CBT when considering costs of delinquency, and not just annual direct medical costs [17].

In sum, engagement of family members (particularly primary caregivers) is an important component of successful substance use treatment, and evidence continues to suggest

that family-based interventions are well-established and first-line in the treatment of adolescent SUDs.

### Cognitive Behavioral Therapy

Cognitive behavioral therapy (CBT) is a psychosocial treatment modality intended to teach individuals how to modify problematic thoughts and behaviors. CBT is effective in that thoughts, behaviors, and moods are all interconnected, and by providing an adolescent tools to improve problematic thought processes or behaviors, improvements in mood and desirable substance use outcomes often follow. CBT is well-established as a treatment for adolescent substance use in both individual and group formats [9]. Recent work has focused on third-wave cognitive behavioral therapies or personalized delivery of CBT, discussed below in *probably efficacious standalone treatments*. Attempts at optimizing efficacy through acceptance-based, mindfulness-based, and individualized approaches are feasible, but require further research to determine whether they are more efficacious than standard CBT treatments. At the present time, CBT remains an efficacious standalone treatment for adolescent SUD.

### Multicomponent Psychosocial Therapy

Recent evidence continues to support multicomponent psychosocial treatments, as combinations of family-based therapy, cognitive behavioral therapy, motivational interviewing, and contingency management can be effectively utilized to treat adolescent SUDs [9, 18–23]. Combinations of motivational enhancement therapy (MET; described below in more detail in the “*Probably Efficacious Standalone Treatment: Motivational Interviewing/Motivational Enhancement Therapy and Third-Wave Cognitive Behavioral Therapies*” section) and CBT are well-established interventions for treating adolescent SUD [9, 21], and other studies have found that contingency management, an intervention in which an individual is rewarded for positive behavior, can be an effective supplement to MET, CBT, and family-based therapies [19, 20].

Additionally, multicomponent therapies combining family-based therapies, MET, and contingency management, among others, were also effective in addressing comorbid mental health conditions in addition to SUDs [18]. Given the strong comorbidity between SUDs and other mental health conditions such as posttraumatic stress disorder (PTSD), integrated treatment approaches addressing more than one disorder at the same time have gained popularity due to their reduced burden to clients, better care coordination, and reduced risk of dropout relative to sequential or parallel treatment approaches [24]. Risk reduction through family therapy (RRFT) engages caregivers into an integrative, exposure-based approach to addressing co-occurring symptoms of PTSD, substance use, and other health risk behaviors (such as risky sexual behaviors) among trauma-exposed adolescents [25]. RRFT incorporates components of trauma-focused cognitive behavioral therapy [26] and multisystemic therapy [27], two existing and empirically supported treatments for adolescents. In a recent randomized controlled trial, adolescents who received RRFT had reduced substance use and PTSD symptoms through 18-month follow-up compared with adolescents who received treatment as usual [28].

Multicomponent therapies have strong evidence for treating adolescent SUDs and some combinations of multicomponent therapy may have stronger evidence than others [9], indicating a need for further research as to what combinations of therapy can be most effective.

## **Probably Efficacious Standalone Treatment: Motivational Interviewing/Motivational Enhancement Therapy and Third-Wave Cognitive Behavioral Therapies**

### **Motivational Interviewing and Motivational Enhancement Therapy**

Motivational interviewing (MI) is a strategy by which clinicians help to elicit behavioral change by targeting ambivalence and enhancing internal motivation of an individual, which can lead to a greater recognition of substance use problems and improve help-seeking [29]. Motivational enhancement therapy (MET) utilizes the same principles of motivational interviewing; however, it is delivered in a more structured, manualized way. There has been mixed evidence regarding MI and MET as stand-alone approaches for effecting long-term reductions in adolescent substance use, although they are currently best described as *probably efficacious* in treating adolescent SUDs [9]. There is mixed evidence regarding the effectiveness of standalone motivational-based interviews compared with standard practices of information provision or assessment in reducing alcohol or cannabis use, but other outcomes such as changes in attitude regarding

substance use treatment favor MI and MET [30, 31]. Other studies have suggested potential efficacy of MI when combined with other treatment modalities such as family interventions, acceptance and commitment therapy, and contingency management [22, 23].

Given that MI and MET can be delivered as brief interventions by a variety of clinicians, they may have some utility in primary care settings. For example, brief MI interventions delivered in primary care settings have shown to exert lasting effects on negative consequences related to alcohol and cannabis use, and MI interventions delivered in these settings may be more effective for younger and less severe users of substances [32–34]. In addition to primary care settings, recent studies have found that brief MI sessions may have a place in acute settings such as the emergency room [35]. In acute settings, MI interventions are feasible and may be more effective in younger adolescents under the age of 16 years [36], as well as with adolescent girls more so than boys [37].

MI can also be utilized as a school-based intervention, and recent studies in the last three years overall have been mixed in regard to the effectiveness of school-based MI interventions. There have been some encouraging findings among smaller randomized controlled trials ( $n = 167–252$ ) which have found that school-based MI can effectively reduce alcohol consumption but not alcohol-related problems [38], can reduce cannabis use but not alcohol use [39], and can reduce cannabis use and the negative consequences of cannabis use [40].

Overall, MI and MET are effective interventions in that they may help elicit change in adolescents regarding their attitudes toward treatment, but as a standalone treatment, motivational interviewing does not appear to be as strong as other more well-established interventions. However, given the accessibility (schools, primary care, acute care) and brief nature (10–20 min) of MI and MET, these interventions may become a key component in a comprehensive approach to treating adolescent SUDs.

### **Third-Wave Cognitive Behavioral Therapies**

“Third-wave” CBTs, such as acceptance and commitment therapy (ACT) and mindfulness-based cognitive therapy, emphasize acceptance (e.g., accepting rather than avoiding or denying feelings) and mindfulness (e.g., meditation) techniques. Adolescents and young adults engaged in a single-arm motivational interviewing/ACT intervention [23] and a single-arm mindfulness-based cognitive therapy intervention both showed reductions in substance use during treatment [41]; however, randomized controlled trials are currently lacking.

Adolescent Community Reinforcement Approach (A-CRA) is an empirically supported behavioral treatment based on principles of operant conditioning. In A-CRA, clinicians

deliver tailored modules to the adolescent based on presenting concerns with the goal of helping adolescents develop a rewarding, non-substance use lifestyle [42]. It is feasible for adolescents with alcohol, cannabis, and/or opioid use disorders [43]. One study examined the utility of 10 weeks of A-CRA versus individualized CBT for adolescents who did not achieve abstinence during an initial 7-week MET/CBT treatment protocol [44]. The authors did not report group differences in A-CRA versus individualized CBT for initial non-responders; however, the study was likely underpowered to detect treatment effects.

### **Possibly Efficacious Standalone Treatments: 12-Step Programs**

Until recently, there has been limited data regarding efficacy of 12-step programs for youth. A 2016 study described the development of an outpatient adolescent 12-step program, which included MET and CBT elements, and was found to be compatible with youth and readily adopted, implemented, and sustained. This preliminary development of a 12-step program for youth found that it was a replicable treatment, and that greater attendance in the program was associated with greater percentage of days abstinent from substance use [45].

A follow-up study compared the effectiveness of a drug counseling and 12-step program with a 10-session MET/CBT model and found the 12-step program to be associated with fewer substance-related consequences, to be at least as beneficial in reducing substance use frequency and prolonging abstinence over time compared with MET/CBT, and also found that 12-step meeting attendance was associated with longer abstinence during and following treatment [21].

There currently is limited evidence to suggest that 12-step programs are effective as standalone treatments; however, much like MI/MET, they may be an effective component of a more comprehensive approach to treatment.

### **Possible Adjunctive Interventions**

#### **Pharmacotherapy**

Given only modest efficacy of current psychosocial treatments, pharmacotherapy has been explored as a potential complement to the standard of care [46]. However, there is limited data regarding the efficacy of pharmacotherapy in treating adolescent SUDs; there are currently no FDA-approved pharmacotherapies for adolescent SUDs other than buprenorphine, which has been indicated down to age 16 for opioid use disorder and has demonstrated efficacy and feasibility among treating opioid-using adolescents [47–51].

Some of the most widely used substances among adolescents are alcohol, tobacco, and cannabis, and clinically relevant findings for treating SUDs with pharmacotherapies have been limited. Although there has been some promise in naltrexone for alcohol use [52–54], N-acetylcysteine for cannabis use [55–57], and bupropion for nicotine use [58–60], there have not been any recent studies published between 2016 and 2019 suggesting the effectiveness of pharmacotherapy as a standalone treatment for adolescent SUDs.

The recent rise of e-cigarettes has led to more questions than answers regarding the treatment of nicotine use [61]; less than 8% of adolescents who use e-cigarettes do so for combustible cigarette cessation [62], and there have been no published studies regarding the utility of vaping in treating combustible cigarette smoking among adolescents. Recent evidence shows only mixed evidence treating tobacco use with pharmacotherapy [63]; however, the behavioral cues of e-cigarettes (in addition to the physiologic effects of inhaled nicotine) may allow them to be a viable treatment strategy that should be further explored in future research studies.

Although there have been some promising findings for pharmacotherapy in treating adolescent SUDs, the research as it stands remains quite limited [46]. More robust, longitudinal, and randomized controlled trials in broad and diverse populations are indicated to assess the effectiveness of pharmacotherapy in augmenting treatment for adolescent SUDs.

#### **Exercise, Yoga, and Mindfulness**

Recent studies have found that exercise and yoga may be promising as potential adjunctive therapies, as early studies have indicated that consistent exercise among substance-using adolescents can help improve sleep, establish structure, strengthen relationships, and improve self-perception [64–66]. Treatments which also focus on distress tolerance, mindfulness, and emotion regulation have been promising avenues of research as well, as emotion regulation difficulties often underpin adolescent substance use [67]. Treatment strategies such as exercise, yoga, and mindfulness have limited clinical burden on an adolescent, and could have benefits in a wide variety of other physical and mental health conditions and are therefore recommended despite the limited but emerging evidence presented.

#### **Recovery-Specific Educational Settings**

Recent research has also led to encouraging findings regarding recovery-specific educational settings. Youth who attended a recovery high school for at least four weeks were significantly more likely than non-recovery attending peers to report complete abstinence from substance use at six-month follow-up [68]. More research is indicated in order to definitively determine whether recovery-specific educational settings are a

viable treatment option given their lack of accessibility and potential disruption to adolescent and family life structure.

## Goal Setting

According to social cognitive theory, individuals work harder and are more confident in their ability to achieve goals when they have actively formed them. Recent studies have shown mixed findings for goal choices predicting drinking outcomes. However, youth who report a goal of total abstinence have better clinical outcomes, suggesting that goal choice may have clinical utility as a predictor of clinical course [69]. Among youth in a 10-week treatment program, commitment to a goal of abstinence consistently predicted abstinence from cannabis use at the end of treatment [70]. Although there is limited evidence for goal setting, there is little clinical burden with providing this as a treatment strategy for youth in combination with other more established standalone or multicomponent strategies.

## Progress Monitoring

Progress monitoring, the periodic and reliable assessment of progress to evaluate and inform treatment, allows clinicians to adapt or problem-solve aspects of treatment in real time and has shown some promising results [71]. Progress monitoring is a feasible way of identifying individuals who may not be responding to treatment and allows for adaptation of treatment based on an adolescent's needs.

## Modifications to Improve Existing Approaches

### Digital Strategies

The rapid advancement of technology has introduced innovative methods of treatment in computerized brief interventions. Web-based and mobile technologies are highly accessible and appealing to adolescents [72]. In 2018, 95% of adolescents reported that they own or have access to a smartphone, a figure that is not significantly influenced by gender, race, ethnicity, or socioeconomic status [73]. Almost half of teens report that they are online "almost constantly" [73], indicating the potential for digital interventions to be broadly accessible to youth. Digital interventions are not only perceived as more private and less stigmatized than traditional clinical evaluations, but have also been found to facilitate participant motivation, self-efficacy, relapse prevention, and social support [72–75].

Digitized interventions can offer automated feedback, individually tailored messages, and can assess outcome expectations, motivation, and self-efficacy [76]. In the last three years,

there have been several studies examining the effectiveness of digitized interventions such as web applications [77, 78], text messaging [79], video games [80], and cognitive bias training [81]. Development of many of these promising interventions has been based on interventions such as MI [77, 82, 83], with the aim of effectively reducing substance use and substance-related cravings and problems through the delivery of automated, personalized text messages [83–85].

Recent studies in digital interventions have reported both positive and mixed results. Positive studies have found that texting and web-based interventions can effectively reduce risky drinking and drinking frequency as well as lessen existing substance use [76, 82]. However, the effects of some of these technology-based interventions may be limited, as one study found that digital interventions are more effective among highly educated adolescents compared with less-educated adolescents [86], as well as among youth with less severe substance use disorders [85].

Although not necessarily treatment interventions, digital prevention interventions are noteworthy given that they have led to some relevant findings [80, 87]. For example, one recent study found that a brief text message intervention on the day before and of an individual's 21st birthday was associated with reduced perceived norms of alcohol use but did not necessarily affect alcohol use that day [88]. Another interesting study is currently underway which will examine the effects of students viewing digital representations of their aged faces based on the effects of smoking (brittle hair, earlier hair loss, acne, wrinkles, larger pores, pale skin, yellow teeth) after 1, 3, 6, 9, 12, and 15 years of smoking a pack per day [89].

Given the accessibility and recent advancements of digital technologies, it is believed that these strategies may play a strong role in becoming adjunctive interventions for treating adolescent SUDs. Treatments that are far-reaching, reduce stigma, and increase the discourse of substance use among adolescents are strongly needed, and digital interventions offer a unique treatment strategy to fulfill these roles. However, despite the potential benefits of these interventions, there is also concern that these popular applications may have less than stringent data-sharing policies, leading to shared information from the applications with commercial entities [90].

## Culturally Based Programs

Historically, most treatment programs for individuals with substance use disorders have been designed and validated with homogenous, predominantly white youth [91]. Adolescents of diverse racial, ethnic, and cultural backgrounds vary in risk factors, patterns of use, response to treatment, and consequences of substance use [92]. Research in the last three years has added to our understanding of the

importance of tailoring adolescent SUD treatment within a culturally sensitive context.

Among all ethnic and racial subgroups, substance use disorders are significantly higher among Latino youth [93, 94]. A 2018 randomized trial found that among Latino adolescents, culturally accommodated group CBT was superior to standard CBT [95], and a similar study suggested that tailored cultural approaches can lead to more effective interventions [96]. A 2017 meta-analysis found that culturally sensitive treatments were associated with significantly larger reductions in post-treatment substance use levels when culture-based considerations were incorporated into the design and delivery of SUD interventions [92].

These findings indicate that tailoring treatment in a culturally competent way may be a promising avenue of treatment in the future given that risk factors and response to treatment among adolescent substance users can vary based on race, ethnicity, and culture. Future research should be performed among broad and diverse adolescent populations and continue to investigate the influence of race, ethnicity, and culture in treatment and prevention strategies.

## Conclusions

Overall, the recommendations in the literature remain relatively unchanged over the last three years regarding the primary treatment modalities for adolescent SUDs, as psychosocial interventions such as family-based therapies, CBT, and multicomponent interventions (including MI/MET and contingency management) remain the primary strategies. There remains uncertainty regarding the extent and effectiveness of pharmacotherapy in the treatment of adolescent SUDs. Future research is warranted for exploring pharmacotherapy options for adolescent SUDs, specifically as augmentative agents among those engaged in psychosocial treatments. Additionally, the ubiquity of technology, social media, and other digital experiences points to a promising direction of treatment which can help adolescents more effectively engage in treatment and retain information. Future interventions may also consider improving accessibility to culturally sensitive substance use treatment for racial and ethnic minority adolescents, as this is a promising approach to treating adolescents of diverse racial, ethnic, and cultural backgrounds. Future research should also consider focusing on more clearly understanding the accessibility gaps and issues on the individual, organizational (the treating agency), and systems (state policy and regulation) level [97].

Future research and treatment should also account for changes in policy and state laws, specifically around the legalization of cannabis. Research suggests that the legalization of cannabis may be linked to an increase in use among adolescents as a result of increased accessibility and social

acceptance [98]. Given the evolving norms and evidence regarding adolescent cannabis use, clinicians should emphasize relevant evidence-based information when working with patients and families. Specifically, providers should present clear and objective information that emphasizes that the effects of cannabis vary based on its constituency, the characteristics of the user, and the context of usage, as well as the adverse effects cannabis has on the adolescent brain, cognition, emotion, and development [99, 100]. Given the impact that early and effective treatment interventions for adolescent SUDs can have, the need for understanding potential treatment options and research advances in the field is imperative. Table 1 provides a summary of the current treatment recommendations and options for adolescent substance use disorders. Further research is needed to ensure that treatments remain durable and continue to exert their effect well into adolescence and young adulthood.

**Funding Information** This study was supported by the National Institute on Drug Abuse R25 DA020537 (Back and Brady), U01 DA041093 (Squeglia and Gray); and the National Institute on Alcohol Abuse and Alcoholism R01AA027399 (Gray and Squeglia), K23 AA025399 (Squeglia), and K12 HD055885 (Tomko).

## Compliance with Ethical Standards

**Conflict of Interest** Matthew C. Fadus, Lindsay M. Squeglia, Emilio A. Valadez, Rachel L. Tomko, and Brittany E. Bryant each declares no potential conflicts of interest.

Kevin M. Gray provided consultation on smoking cessation pharmacotherapy for Pfizer.

**Human and Animal Rights and Informed Consent** This article does not contain any studies with human or animal subjects performed by any of the authors.

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