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Integrating Substance Use Treatment Into Adolescent Health Care

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Abstract

Substance use (SU) problems are common among adolescents, a serious health risk for them and a major public health problem, but are inadequately addressed in most pediatric health care settings. Primary care offers an excellent context for SU assessment and treatment for adolescents and their families, offering better access and a less stigmatized environment for receiving treatment than specialty programs. This paper examines the literature on the integration of substance use treatment with adolescent health care, focusing on 2 areas: Screening, Brief Intervention, and Referral to Treatment (SBIRT) in Emergency Departments and Primary Care, and School- and College-Based Health Centers.

Keywords

Substance use; Adolescent; Pediatric; Psychiatric disorders; Behavioral health; Comorbidity; Screening, brief intervention, and referral to treatment; SBIRT; Alcohol; Drug; Emergency departments; Primary care; School-based health centers; SBHC; Health care; Integration; Assessment; Treatment

Introduction

Although behavioral health conditions such as substance use (SU) and psychiatric problems are common among primary care patients and may lead to or exacerbate comorbid medical conditions, the assessment and treatment of such conditions have historically been separated

from primary care. SU treatment and medical and psychiatric services typically occur in separate, freestanding agencies, funding mechanisms are siloed, time and resources to develop integrated models of care are limited, differences and deficiencies continue in provider training across disciplines, and differences in treatment philosophy and clinical practice persist [1]. The field recognizes that many patients are not well-served by this fragmentation, particularly in regard to identifying and treating cases early in disease progression, and a now robust literature has demonstrated that for many patients, integrated SU, psychiatric, and medical care produces better outcomes. While the research has mostly involved adults, more recent studies show similar findings for adolescents. Compared with traditional care, integrated treatment, including screening and early intervention in medical settings, can more effectively treat, and in some cases prevent, the development of SU problems [1–3].

Although historically medical providers have played a limited role in SU treatment, influences from several quarters are improving the environment for integrating care. The Accountable Care Act supports the integration of behavioral and physical health, and recent state and federal parity laws require coverage for mental health and SU treatment equal to coverage for medical conditions. This encourages health plans to provide SU treatment in non-specialty care settings [4••]. Many national policy and research institutions (eg, Agency for Healthcare Research and Quality, American Society for Addiction Medicine, the Substance Abuse and Mental Health Services Administration, the Office of National Drug Control Policy, the National Institutes of Health) have developed initiatives to increase such integration. They include: development of brief, evidence-based screening instruments, physician training handbooks, targeted funding and other research initiatives, and national meetings focusing on integration. Congress has also recently appropriated funds to train medical residents to address SU problems [5]. These initiatives will increase organizational and provider attention to SU (much as happened with smoking) as a routine part of health care. Performance measurements for identification of SU problems (including for adolescents) are now being implemented through the National Committee for Quality Assurance's Healthcare Effectiveness Data and Information Set (HEDIS), and the adoption of electronic medical records and Common Procedural Terminology (CPT) codes for the identification and brief treatment of SU problems in primary care provide additional leverage to encourage screening and early identification.

Major healthcare policy institutions have provided leadership. The Institute of Medicine developed a framework for the provision of integrated care [6]. Recent reports from the Surgeon General suggested integration of care improvements in health care settings that treat adolescents with SU problems [7, 8]. More recently, the Milbank Memorial Fund's comprehensive report discusses the evidence-base for integrated care, and outlines several models for implementing various degrees of integration [9••]. The US Preventive Health Services Task Force, the American Medical Association and the American Academy of Pediatrics have all issued policy statements endorsing and encouraging the assessment and/or management of SU and other behavioral health disorders in pediatric primary care [10–12]. Similarly, adolescent health experts have called for routine adolescent SU screening and management in pediatrics [13•, 14].

SU and Adolescent Health

SU is a major contributor to health problems among youth and is a significant public health concern [15, 16]. Surveys of the U.S. adolescent general population assess the prevalence of severe SU disorders as high as 8 % [17], and as high as 19 % among those who have ever used alcohol or drugs [15]. The unmet need for treatment is huge; only about 7 % of US adolescents who need treatment receive it [17]. Less severe but risky use is even more

common among adolescents, and in a recent study of adolescent primary care patients, 15 % screened positive for an SU problem [18]. SU among U.S. teens has declined in recent years, but recent upticks in rates for several substances, including marijuana and synthetic marijuana [19], prescription opiates [20], and continuing high rates of risky practices such as binge drinking [21] are alarming.

Among adults it is now well-established that SU problems increase the risk for developing and exacerbating many medical conditions [22, 23]. For adolescents the evidence is more limited, but growing. Worse health status is associated with problem SU [24–26], including weight loss, eczema, headaches, irritable bowel syndrome, and peptic ulcer [27]. Heavy drinkers are more likely to be obese and have high blood pressure at age 24 [28]. Mertens and colleagues found that compared with matched controls without SU problems, adolescents with SU problems had a higher prevalence of asthma, benign uterine conditions, injury and overdoses, STDs, abdominal pain, sleep disorders, and sinusitis (all $P<0.05$) [29]. They also have higher rates of HIV, sexual risk behaviors, and violence [30, 31].

Adolescents with co-occurring SU and psychiatric problems are now commonly understood to be the rule rather than the exception [32, 33], and psychiatric comorbidities complicate treatment and can result in poorer outcomes [34]. SU treatment samples typically show higher rates of conduct disorder, oppositional defiant disorder, attention deficit hyperactivity disorder, depression, anxiety, post-traumatic stress disorder, and borderline personality than community samples [35, 36]. In a managed care study, over half the sample of adolescents had at least 1 psychiatric diagnosis, with significantly higher rates of depression, anxiety and neurotic disorders, major psychoses, and eating disorders than a group of matched controls without SU problems [3].

Adolescent SU frequently co-occurs with conditions and behaviors such as delinquency, poor academic performance, and suicide behavior, that increase the risk of poor health, psychological, and social outcomes [37]. It is also costly; estimated costs of U.S. underage drinking are \$68 billion (in 2007 dollars) [38], and of drug use (adolescent and adult) at \$181 billion (2002 dollars) [39]. Recent neuroimaging studies have demonstrated that the developing adolescent brain is highly vulnerable to the effects of SU [40, 41, 42]. Thus early identification and treatment are critical for preventing adverse long-term medical and psychiatric outcomes.

Primary care offers an excellent context for SU assessment and treatment for adolescents and their families [43, 44]. Research suggests that adolescents with SU problems are as likely to utilize primary care as adolescents without SU problems [45]. Among adolescents seeking SU treatment in a managed care plan, 81 % had at least 1 primary care visit in the year before treatment [46]. During primary care visits, competing health problems may make addressing SU less likely, but may also give providers an entree for discussing SU.

Medical settings often offer better access and a less stigmatized environment for receiving addiction treatment than specialty programs. Adolescents and their families are receptive to screening and intervention in medical settings, and in fact perceive the quality of care to be higher when SU is addressed [47, 48]. This may be especially salient for ethnic groups or populations for whom these conditions are particularly stigmatized or who are less likely to seek specialty psychiatric or SU treatment [49]. Minority youth and their families often report access barriers, and a review of behavioral health services found that Black and Latino adolescents reported receiving less care than whites for SU problems [50, 51]. Treatments work for adolescents independent of ethnicity or race, however, suggesting that access to care should be expanded for minority youth [50]. Integrating treatment into less stigmatized settings may thus increase access for underserved populations.

In this paper we examine the literature on integration of SU treatment with other adolescent health care focusing on 2 key areas: Screening, Brief Intervention and Referral to Treatment (SBIRT) in pediatric medical settings, and school- and college-based health centers. These models of care are informed by the patient-centered medical home model, which emerged from pediatrics as a model for coordinating the care of complex patients, and has since been adopted more widely in health care. It remains especially relevant for adolescents. While some aspects of confidential adolescent behavioral health (eg, sexual health) have been addressed in schools and medical settings, the treatment of sensitive mental health and SU issues is still far from adequate. Better training for providers, and the placement of specialty care staff in non-traditional settings, may improve this.

SBIRT and Adolescents

SBIRT offers promising mechanisms for integrating treatment for adolescent SU problems into healthcare, and has been widely endorsed by the NIH and SAMHSA and most major medical organizations. SBIRT is an appealing practice in these settings because it is brief, can be used as a stand-alone treatment or combined with other treatment approaches, and is effective in diverse patient populations [52] across a wide range of behavioral domains [53]. It typically involves motivational interviewing or enhancement techniques, uses a patient-centered, non-confrontational approach to discuss sensitive behavioral problems, and may be especially appropriate for the developmental stage of adolescence [54–56].

Although SBIRT for adolescents is less well-studied than among adults, a growing number of studies demonstrate its efficacy, effectiveness, and feasibility on a range of SU outcomes, including reducing use, driving after drinking, smoking, and emergency department (ED) utilization [57–60]. Brief interventions are effective in reducing risk, drinking rates, and harmful behaviors among college-aged youth [61–64].

Emergency Department

Several studies found that brief interventions delivered to adolescents in ED settings produced better outcomes. A brief ED intervention administered to adolescents ($n=152$) following an alcohol-related incident reduced both drinking days and binge drinking days [65]; similar results were found in another study of an ED brief intervention [55]. In another study examining 12-month outcomes, adolescents ($n=127$) who received a brief ED intervention had fewer subsequent substance-related ED visits, and attended more SU treatment [66]. In a randomized trial conducted in a pediatric ED, a brief intervention delivered to adolescents ($n=210$) for marijuana reduced use and resulted in higher abstinence rates [67]. Another randomized trial of a brief intervention delivered in the ED to adolescents ($n=726$) found reduced alcohol-related consequences and aggressive behavior [68•] among those who received a therapist-delivered brief intervention compared with controls who received a brochure.

Primary Care

Researchers have begun adapting brief interventions to pediatric primary care settings. A observational study of the impact of physician training on risk behavior screening and counseling found reduced risky drinking among the 14- and 15-year old patients of those doctors who had been trained, compared with the patients of the doctors who were not trained [69]. A Brazilian study of a primary care physician-delivered brief intervention for adolescents ($n=99$) found reduced use of marijuana, alcohol, inhalants, ecstasy, and tobacco, compared with a control group [70]. Knight and colleagues found reductions in drug use and risk of driving while impaired at 3 months from a pediatric observational pilot study, with the intervention delivered by both pediatricians and non-physicians. However the sample

size was small ($n=33$), attrition was significant, there was not a control group, and they did not examine differences in effectiveness between providers [58]. In a randomized trial, D'Amico et al. examined the impact of a brief intervention for high-risk adolescents ($n=42$) in a primary care clinic and found decreased SU and increased self-efficacy at 3 months compared with those receiving usual care [71•]. This study also had a small sample size and low retention rates.

Pediatricians' low rates of screening, identification, and treatment of adolescent SU are a barrier to the integration of SU treatment into health care. Relatively few of those who screen do so according to guidelines or use evidence-based screening tools [72, 73], and after screening, problem identification and intervention, or referral to specialty care are not guaranteed [74]. Even when given screening results that indicate problematic alcohol and drug use, providers can fail to accurately recognize SU problems. In a study of pediatricians' perceptions of patients' AOD problem severity, and the physicians' follow-up recommendations, Hassan et al. found that, while 14 % of the patients scored 2 on the CRAFFT screener, indicating a likely AOD problem, physicians' diagnostic impressions led them to identify only 4.8 % of the patients ($n=2034$) with problem use. Moreover, almost 20 % of patient perceived by the physicians to have an AOD problem still did not receive a recommendation for an active intervention [75•].

Several studies have examined screening and brief interventions in other settings, such as schools and other community institutions [57, 76, 77]. In a randomized trial of brief interventions delivered to homeless adolescents ($n=285$), Peterson and colleagues found that counselor-delivered interventions produced reductions in use of drugs other than marijuana compared with controls without the intervention [78].

In a cluster randomized trial of brief motivational interviewing delivered by non-physicians in community college settings ($n=200$), McCambridge and Strang found reduced alcohol, marijuana, and tobacco use among 16- to 20-year olds receiving the intervention, compared with those receiving assessment only [79]. In a trial comparing adolescents ($n=79$) with SU problems assigned to receive 1 of 2 therapist-delivered brief interventions vs a control condition, the adolescents receiving an intervention had better 6-month outcomes: fewer days of alcohol use, binge drinking, and illicit drug use, and fewer negative consequences [80]. In another randomized trial of brief intervention delivered to adolescents ($n=315$) in a school context, Winters and colleagues found that adolescents who received intervention sessions showed significantly more reductions in SU behaviors than control groups, but those in sessions with parents did better than those in sessions without 1 % of days abstinence from alcohol or cannabis [81••].

While educational settings in particular serve a large population of students with mild-to-moderate SU, and school personnel are easily trained to conduct brief interventions [77], school settings can also pose practical, systemic, and clinical barriers, including a lack of resources and the potential stigma of having a problematic student population [81••].

School-Based Health Centers

School- and college-based health centers can address the complex behavioral health needs of adolescents in an accessible setting. Offering population-based health services is one approach to addressing behavioral health issues while surmounting some of the barriers faced in traditional medical settings such as confidentiality, funding, culture, and stigma. School based health centers (SBHCs) are uniquely positioned to integrate public health interventions and environmental change strategies, and their proximity to the patient population enables effective follow-up and case management, creating multiple opportunities to provide brief interventions and preventive care [82•]. A review of SBHC

interventions found several advantages over clinic-based interventions, including better access. The authors outline the key components of effective school-based interventions: having a strong conceptual basis for describing, predicting, and interpreting normative and non-normative development patterns; conducting rigorous evaluations on an ongoing basis; combining psychoeducation and skill-building; optimizing the timing, duration, frequency, and intensity of interventions; maintaining fidelity to the implementation of key program components through manualization and ongoing monitoring; adequate training for staff and their involvement in all aspects of program development; engaging program material design; gaining support of key stakeholders by emphasizing the system-wide impact of behavioral health issues and benefits of interventions; development of clear school-wide policies for managing problematic behavior; and development of linkages with other intervention programs in a variety of implementation settings [83].

SBHCs can help address the unique needs of adolescents, including enhancing access to behavioral health services [84]. A study of 451 high school students over 4 years found that 66 % of visits to SBHCs were for medical reasons and 34 % were for mental health services, compared with 97 % of visits for medical reasons in community health centers. Visits were 21 times more likely to be initiated for behavioral health reasons at SBHCs than at community facilities and urgent and ED use was 4 times more likely for adolescents never using a SBHC. These centers also seem to improve access to behavioral health services for hard-to-reach adolescents; behavioral health services were available at all sites, suggesting that SBHCs were more accessible and responsive to adolescents' needs [85]. The location of SBHCs makes them well-suited to offer primary care, including both preventive and chronic care services [86••].

A study of 6 school districts found that those with SBHCs increased the number of students accessing behavioral health services 5.6 % and 5.9 % over 3 years, compared with increases of 2.6 % and 0.2 % in districts without SBHCs. Students receiving behavioral health care in SBHCs had significantly lower total health and behavioral health costs than students without SBHC care. Improvements in health-related quality of life among students receiving SBHC services were also observed [87]. A study of 3818 adolescent students using SBHC services found better health and higher medical visit rates than students using traditional services. The percentage of students using SBHCs for mental health and SU services was comparable to the estimated prevalence of those issues in the adolescent population. This suggests SBHCs provide greater access to care for adolescents than other settings. Also, the mean number of mental health visits to SBHCs compared favorably to visit rates by adolescents receiving services in other settings [88]. SBHCs serve students with serious medical and psychological needs: a survey of 2 SBHCs found that among participating students, rates of cigarette use ranged from 14 % to 38 %, marijuana use from 13 % to 24 %, and alcohol use from 38 % to 53 %. SBHCs provide comprehensive yet flexible care with a team-oriented approach [89].

Other studies support the practicality and effectiveness of SBHCs. A randomized trial of a brief intervention targeted at multiple behaviors delivered in 2 public high schools found a significant decrease in alcohol use [90]. An evaluation of an early intervention found it feasible for school nurses to assess and conduct brief interventions for substance-using adolescents [91]. A family-based intervention in a middle school reduced health risk behaviors and slowed the growth of alcohol, tobacco, and marijuana use compared with a control group [92].

Integration of SU treatment into college health centers is similarly effective. College students ($n=08753$) presenting at a student health center who were screened for high-risk alcohol use and received brief interventions showed significant reductions in several

outcomes including typical blood alcohol concentration, number of drinks per week, and binge drinking compared with those receiving usual care [93]. A brief intervention study of 155 college students comparing a multiple behavior health contract, an individually tailored consultation, and a combination of contract and consultation found improvements in behaviors related to drinking and driving, exercise, nutrition, sleep, and health quality of life, suggesting that all 3 methods may improve behavioral health outcomes [94]. In a randomized controlled trial using a web-based alcohol screening and brief intervention for 2435 Australian college students, participants who received the intervention drank less often, drank less per sitting, and consumed less alcohol overall than controls. Intervention effects for drinking frequency and overall consumption persisted at 6-months [95]. A randomized controlled trial of 986 college students screening positive for heavy drinking in 5 college health clinics found that those receiving brief advice from their physician reduced their 28-day drinking totals by 27.2 % compared with a 21 % reduction among the controls [96].

Conclusion

Many factors impede the integration of SU treatment for adolescents into medical and psychiatric settings. In addition to the organizational fragmentation and distinct financing mechanisms, issues of stigma and patient confidentiality also inhibit integration. Although designed to safeguard patient privacy and encourage access, strict laws and regulations governing the disclosure of SU treatment information, even to other medical providers, can restrict the free flow of information necessary to implement integrated treatment approaches. Laws and policies designed to ensure fully confidential adolescent healthcare services may inadvertently obstruct integration; physicians may refrain from screening for SU problems if they are restricted from engaging parents in the treatment process without their patients' permission.

Many adolescents with SU involvement have few medical consequences (compared with many adults with similar substance involvement), which makes it more difficult for adolescents and their families to understand that the adolescent has a problem and is not just “going through a phase,” thus delaying treatment.

In spite of these barriers, the approaches discussed above represent promising strategies for addressing SU problems among adolescents. Attending to SU problems while delivering other healthcare services is a first step toward achieving integration, whether in medical or other non-traditional settings such as SBHCs. Early identification of SU problems is consistent with the preventive orientation of pediatric medicine and the recognition that for most adolescents, behavioral factors pose the greatest risks to their health. Moreover, the growing appreciation that SU disorders are often pediatric-onset and frequently co-occur with other behavioral, psychiatric, and medical conditions, is leading most major medical organizations to conclude that especially for adolescents, comprehensive, “broad-brush” screening is preferable to single-problem screening. In particular, adolescents who exhibit symptoms of psychiatric distress require special attention; as noted above, psychiatric and SU problems are frequently comorbid, and mood and anxiety symptoms should be immediate “red flags” for SU assessment. A pilot study of SBIRT for adolescents ($n=77$) in pediatrics found that while most problems initially identified by pediatricians were related to mood symptoms or stress, upon further assessment, 77 % of the teens endorsed alcohol or drug use or both. (These data were presented at the International Network for Brief Interventions for Alcohol and Other Drugs, Annual Meeting, 2011: “SBIRT for youth alcohol and drug use in primary care: Predictors and implications for practice and policy”).

Many young patients with SU, especially girls, will seek treatment in psychiatric setting, before or instead of specialty SU treatment [97]. SU assessment and treatment in those settings is thus also critical to integration. The “no wrong door” approach to identification of substance SU problems in adolescents with co-occurring conditions facilitates treatment initiation and engagement [98]. Paradoxically, stigma, which can otherwise hinder utilization of specialty SU treatment, might encourage utilization of treatment in non-traditional nonspecialty settings such as primary care or psychiatry.

Based on the literature, this paper recommends approaching the issue from 2 directions: first, bringing SBIRT into pediatric medical settings in order to train pediatricians and primary care teams to identify, assess, and treat SU and other behavioral problems, and refer to specialty treatment when appropriate; second, integrating substance use counseling and brief interventions into school and college settings, where other medical and behavioral health care is already being provided. Combining these approaches maximizes accessibility to SU treatment for adolescents, and helps them before their problems become severe.

As discussed above, evidence is growing on the effectiveness and feasibility of SBIRT and similar models of brief SU treatment in pediatric medical care and, clearly, earlier identification and intervention can prevent or ameliorate development of more severe SU disorders. The SBHC literature suggests that they too offer an effective way to integrate SU and other types of behavioral health care into an adolescent medical care setting. This is an opportune time for adoption, as both models are consistent with the patient-centered medical home model now recommended in health care delivery [99], and with health care reform regulations that emphasize integration and coordination of care [100]. It is incumbent upon leaders in pediatrics, psychiatry, and substance abuse treatment to embrace and champion models of integration, as the health care system undergoes profound change in the coming years.

References

Papers of particular interest, published recently, have been highlighted as:

• Of importance

•• Of major importance

1. Sterling S, Chi F, Hinman A. Integrating care for people with co-occurring alcohol and other drug, medical, and mental health conditions. *Alcohol Res Health*. 2011; 33:338–49. [PubMed: 23580018]
2. Riggs PD, Mikulich-Gilbertson SK, Davies RD, et al. A randomized controlled trial of fluoxetine and cognitive behavioral therapy in adolescents with major depression, behavior problems, and substance use disorders. *Arch Pediatr Adolesc Med*. 2007; 161:1026–34. [PubMed: 17984403]
3. Sterling S, Weisner C. Chemical dependency and psychiatric services for adolescents in private managed care: implications for outcomes. *Alcohol Clin Exp Res*. 2005; 25:801–9. [PubMed: 15897726]
- 4••. Buck JA. The looming expansion and transformation of public substance abuse treatment under the affordable care act. *Health Aff*. 2011; 30:1402–10. This article discusses the implications for the delivery of substance abuse treatment under the provision of healthcare reform legislation.
5. Quenca, D. Rethinking addiction's roots, and its treatment. *New York Times*; Jul 10. 2011 Available at <http://www.nytimes.com/2011/07/11/health/11addictions.html>.
6. Institute of Medicine. Improving the quality of health care for mental and substance-use conditions: quality chasm series. National Academies Press; Washington, DC: 2006.
7. U.S. Department of Health and Human Services. The Surgeon General's call to action to prevent and reduce underage drinking: a guide to action for educators. Office of the Surgeon General; 2007.

Available at: <http://www.niaaa.nih.gov/AboutNIAAA/NIAAASponsoredPrograms/Documents/EducatorGuide.pdf>.

8. Satcher DS. Executive summary: a report of the surgeon general on mental health. *Public Health Rep.* 2000; 115:89–101. [PubMed: 10968589]
- 9••. Collins, C.; Hewson, DL.; Munger, R., et al. [Accessed Apr 26, 2012] Evolving models of behavioral health integration in primary care. Millbank Memorial Fund. 2010. Available at: <http://www.milbank.org/reports/10430EvolvingCare/10430EvolvingCare.html>. This report presents models of behavioral health treatment integrated into primary care settings.
10. Kuehn BM. Integrated care key for patients with both addiction and mental illness. *JAMA.* 2010; 303:1905–7. [PubMed: 20483963]
11. American Academy of Pediatrics/Bright Futures. [Accessed Dec 21, 2011] Recommendations for preventive pediatric health care. Periodicity schedule. 2008. Practice Management Online. Available at: <http://practice.aap.org/content.aspx?aid01599>.
12. U.S. Preventive Services Task Force. Recommendations of the U.S. preventive services task force. Agency for Healthcare Research and Quality; Rockville, MD: 2010. The guide to clinical preventive services 2010–2011.
- 13•. Levy SJ, Kokotailo PK. Substance use screening, brief intervention, and referral to treatment for pediatricians. *Pediatrics.* 2011; 128:e1330–40. [PubMed: 22042818] This policy statement from the American Academy of Pediatrics presents guidelines for the screening, brief intervention and referral to treatment of adolescents with alcohol and drug use problems.
14. Feinstein EC, Richter L, Foster SE. Addressing the critical health problem of adolescent substance use through health care, research, and public policy. *J Adolesc Health.* 2012; 50:431–6. [PubMed: 22525104]
15. The National Center on Addiction and Substance Abuse (CASA) at Columbia. CASA analysis of the youth risk behavior survey (YRBS), 2009 [data file]. U.S. Department of Health and Human Services; Centers for Disease Control and Prevention; National Center for Chronic Disease Prevention and Health Promotion; Atlanta, GA: 2011.
16. Shrier LA, Harris SK, Kurland M, et al. Substance use problems and associated psychiatric symptoms among adolescents in primary care. *Pediatrics.* 2003; 111:e699–705. [PubMed: 12777588]
17. Substance Abuse and Mental Health Services Administration. Results from the 2008 national survey on drug use and health: national findings. Office of Applied Studies; Rockville, MD: 2009. NSDUH Series H-36HHS Publication No. SMA 09-4434
18. Knight JR, Harris SK, Sherritt L, et al. Prevalence of positive substance abuse screen results among adolescent primary care patients. *Arch Pediatr Adolesc Med.* 2007; 161:1035–41. [PubMed: 17984404]
19. Johnston, LD.; O'Malley, PM.; Bachman, JG., et al. Monitoring the future national results on adolescent drug use: overview of key findings, 2011. Institute for Social Research, University of Michigan; Ann Arbor: 2012.
20. National Institute on Drug Abuse. [Accessed Apr 27, 2012] High school and youth trends. 2008. Available at: <http://www.nida.nih.gov/infofacts/hsyouthtrends.html>.
21. National Institute on Alcohol Abuse and Alcoholism. [Accessed Apr 27, 2012] Statistical snapshot of underage drinking. 2008. Available at: <http://www.niaaa.nih.gov/AboutNIAAA/NIAAASponsoredPrograms/StatisticalSnapshotUnderageDrinking.htm>.
22. Mertens JR, Lu YW, Parthasarathy S, et al. Medical and psychiatric conditions of alcohol and drug treatment patients in an HMO: comparison with matched controls. *Arch Intern Med.* 2003; 163:2511–7. [PubMed: 14609789]
23. Mannelli P, Pae CU. Medical comorbidity and alcohol dependence. *Curr Psychiatry Rep.* 2007; 9:217–24. [PubMed: 17521518]
24. Groth SW, Morrison-Beedy D. Smoking, substance use, and mental health correlate in urban adolescent girls. *J Community Health.* 2011; 36:552–8. [PubMed: 21107998]
25. Reid A, Lynskey M, Copeland J. Cannabis use among Australian adolescents: findings of the 1998 national drug strategy household survey. *Aust N Z J Public Health.* 2000; 24:596–602. [PubMed: 11215007]

26. Clark DB, Lynch KG, Donovan JE, et al. Health problems in adolescents with alcohol use disorders: self-report, liver injury, and physical examination findings and correlates. *Alcohol Clin Exp Res*. 2001; 25:1350–9. [PubMed: 11584156]
27. Arria AM, Dohey MA, Mezzich AC, et al. Self-reported health problems and physical symptomatology in adolescent alcohol abusers. *J Adolesc Health*. 1995; 16:226–31. [PubMed: 7779833]
28. Oesterle S, Hill KG, Hawkins JD, et al. Adolescent heavy episodic drinking trajectories and health in young adulthood. *J Stud Alcohol*. 2004; 65:204–12. [PubMed: 15151351]
29. Mertens JR, Flisher AJ, Fleming MF, et al. Medical conditions of adolescents in alcohol and drug treatment: comparison with matched controls. *J Adolesc Health*. 2007; 40:173–9. [PubMed: 17259058]
30. Ammon L, Sterling S, Mertens J, et al. Adolescents in private chemical dependency programs: who are most at risk for HIV? *J Subst Abuse Treat*. 2005; 29:39–45. [PubMed: 15979530]
31. Berenson AB, Wiemann CM, McCombs S. Exposure to violence and associated health-risk behaviors among adolescent girls. *Arch Pediatr Adolesc Med*. 2001; 155:1238–42. [PubMed: 11695933]
32. Diaz R, Goti J, Garcia M, et al. Patterns of substance use in adolescents attending a mental health department. *Eur Child Adolesc Psychiatr*. 2011; 20:279–89.
33. Wu LT, Gersing K, Burchett B, et al. Substance use disorders and comorbid axis I and II psychiatric disorders among young psychiatric patients: findings from a large electronic health records database. *J Psychiatr Res*. 2011; 45:1453–62. [PubMed: 21742345]
34. Rowe CL, Liddle HA, Greenbaum PE, et al. Impact of psychiatric comorbidity on treatment of adolescent drug abusers. *J Subst Abuse Treat*. 2004; 26:129–40. [PubMed: 15050090]
35. Grilo CM, Walker ML, Becker DF, et al. Personality disorders in adolescents with major depression, substance use disorders, and coexisting major depression and substance use disorders. *J Consult Clin Psychol*. 1997; 65:328–32. [PubMed: 9086698]
36. Kandel DB, Johnson JG, Bird HR, et al. Psychiatric comorbidity among adolescents with substance use disorders: findings from the MECA study. *J Am Acad Child Adolesc Psychiatr*. 1999; 38:693–9.
37. Substance Abuse and Mental Health Services Administration. [Accessed May 4, 2012] SAMHSA report to congress. The prevention and treatment of co-occurring substance abuse disorders and mental disorders. Nov. 2002 Available at: <http://www.samhsa.gov/reports/congress2002/CoOccurringRpt.pdf>.
38. Office of Juvenile Justice and Delinquency Prevention. Pacific Institute for Research and Evaluation. Underage drinking costs. Underage Drinking Enforcement Training Center; 2012. Available at: <http://www.udetc.org/UnderageDrinkingCosts.asp>.
39. Office of National Drug Control Policy. The economic costs of drug abuse in the United States, 1992–2002. Executive Office of the President; Washington, DC: 2004. Publication No. 207303
40. Bava S, Tapert SF. Adolescent brain development and the risk for alcohol and other drug problems. *Neuropsychol Rev*. 2010; 20:398–413. [PubMed: 20953990] This review article summarizes the influences of substance use on adolescent brain development.
41. Windle M, Spear LP, Fuligni AJ, et al. Transitions into underage and problem drinking: developmental processes and mechanisms between 10 and 15 years of age. *Pediatrics*. 2008; 121(Suppl):S273–89. [PubMed: 18381494]
42. Squeglia LM, Jacobus J, Tapert SF. The influence of substance use on adolescent brain development. *Clin EEG Neurosci*. 2009; 40:31–8. [PubMed: 19278130]
43. Merenstein D, Green L, Fryer GE, et al. Shortchanging adolescents: room for improvement in preventive care by physicians. *Fam Med*. 2001; 33:120–3. [PubMed: 11271739]
44. Levy S, Vaughan BL, Knight JR. Office-based intervention for adolescent substance abuse. *Pediatr Clin North Am*. 2002; 49:329–43. [PubMed: 11993286]
45. Freeborn DK, Polen MR, Mullooly JP. Adolescent drug misuse treatment and use of medical care services. *Int J Addict*. 1995; 30:795–822. [PubMed: 7558471]
46. Sterling, S.; Weisner, C. The role of primary care in addressing adolescent substance use: screening, treatment, and coordination. “Not just small adults: new insights on adolescent brain

- development and implications for adolescent substance abuse treatment conference” Sponsored by the California Society of Addiction Medicine; Los Angeles, CA. Jun. 2007 2007
47. Yoast RA, Fleming M, Balch GI. Reactions to a concept for physician intervention in adolescent alcohol use. *J Adolesc Health*. 2007; 41:35–41. [PubMed: 17577532]
 48. Brown JD, Wissow LS. Discussion of sensitive health topics with youth during primary care visits: relationship to youth perceptions of care. *J Adolesc Health*. 2009; 44:48–54. [PubMed: 19101458]
 49. Campbell CI, Weisner C, Sterling S. Adolescents entering chemical dependency treatment in private managed care: ethnic differences in treatment initiation and retention. *J Adolesc Health*. 2006; 38:343–50. [PubMed: 16549294]
 50. Alegria M, Carson NJ, Goncalves M, et al. Disparities in treatment for substance use disorders and co-occurring disorders for ethnic/racial minority youth. *J Am Acad Child Adolesc Psychiatr*. 2011; 50:22–31.
 51. Cummings JR, Ponce NA, Mays VM. Comparing racial/ethnic differences in mental health service use among high-need sub-populations across clinical and school-based settings. *J Adolesc Health*. 2010; 46:603–6. [PubMed: 20472219]
 52. Schmidt L, Greenfield T, Mulia N. Unequal treatment: racial and ethnic disparities in alcoholism treatment services. *Alcohol Res Health*. 2006; 29:49–54. [PubMed: 16767854]
 53. Dunn C, Deroo L, Rivara FP. The use of brief interventions adapted from motivational interviewing across behavioral domains: a systematic review. *Addiction*. 2001; 96:1725–42. [PubMed: 11784466]
 54. Tevyaw TO, Monti PM. Motivational enhancement and other brief interventions for adolescent substance abuse: foundations, applications and evaluations. *Addiction*. 2004; 99(Suppl):63–75. [PubMed: 15488106]
 55. Monti PM, Colby SM, Barnett NP, et al. Brief intervention for harm reduction with alcohol-positive older adolescents in a hospital emergency department. *J Consult Clin Psychol*. 1999; 67:989–94. [PubMed: 10596521]
 56. Gates S, McCambridge J, Smith LA, et al. Interventions for prevention of drug use by young people delivered in non-school settings. *Cochrane Database Syst Rev*. 2009 doi: 10.1002/14651858.CD005030.pub2.
 57. Martin G, Copeland J, Swift W. The adolescent cannabis checkup: feasibility of a brief intervention for young cannabis users. *J Subst Abuse Treat*. 2005; 29:207–13. [PubMed: 16183469]
 58. Knight JR, Sherritt L, Van Hook S, et al. Motivational interviewing for adolescent substance use: a pilot study. *J Adolesc Health*. 2005; 37:167–9. [PubMed: 16026730]
 59. Colby SM, Nargiso J, Tevyaw TO, et al. Enhanced motivational interviewing versus brief advice for adolescent smoking cessation: results from a randomized clinical trial. *Addict Behav*. 2012; 37:817–823. [PubMed: 22472523]
 60. Colby SM, Monti PM, Barnett NP, et al. Brief motivational interviewing in a hospital setting for adolescent smoking: a preliminary study. *J Consult Clin Psychol*. 1998; 66:574–8. [PubMed: 9642898]
 61. Baer JS, Kivlahan DR, Blume AW, et al. Brief intervention for heavy-drinking college students: 4-year follow-up and natural history. *Am J Public Health*. 2001; 91:1310–6. [PubMed: 11499124]
 62. Borsari B, Carey KB. Effects of a brief motivational intervention with college student drinkers. *J Consult Clin Psychol*. 2000; 68:728–33. [PubMed: 10965648]
 63. Barnett, NP.; Monti, PM.; Wood, MD. Motivational interviewing for alcohol-involved adolescents in the emergency room. In: Wagner, EF.; Waldron, HB., editors. *Innovations in adolescent substance abuse interventions*. Pergamon/Elsevier Science Inc; Amsterdam, The Netherlands: 2001. p. 143-68.
 64. Murphy JG, Duchnick JJ, Vuchinich RE, et al. Relative efficacy of a brief motivational intervention for college student drinkers. *Psychol Addict Behav*. 2001; 15:373–9. [PubMed: 11767271]
 65. Spirito A, Monti PM, Barnett NP, et al. A randomized clinical trial of a brief motivational intervention for alcohol-positive adolescents treated in an emergency department. *J Pediatr*. 2004; 145:396–402. [PubMed: 15343198]

66. Tait RJ, Hulse GK, Robertson SI, et al. Emergency department-based intervention with adolescent substance users: 12-month outcomes. *Drug Alcohol Depend.* 2005; 79:359–63. [PubMed: 16102378]
67. Bernstein E, Edwards E, Dorfman D, et al. Screening and brief intervention to reduce marijuana use among youth and young adults in a pediatric emergency department. *Acad Emerg Med.* 2009; 16:1174–85. [PubMed: 20053238]
- 68•. Walton MA, Chermack ST, Shope JT, et al. Effects of a brief intervention for reducing violence and alcohol misuse among adolescents: a randomized controlled trial. *JAMA.* 2010; 304:527–35. [PubMed: 20682932] This article presents findings from a randomized controlled trial of brief interventions delivered to adolescents in an emergency department setting.
69. Ozer E, Lustig JL, Adams S, et al. Integrating training into practice: increasing the delivery of adolescent clinical preventive services. *J Adolesc Health.* 2003; 32:130–1.
70. De Micheli D, Fisberg M, Formigoni ML. Study on the effectiveness of brief intervention for alcohol and other drug use directed to adolescents in a primary health care unit. *Rev Assoc Med Bras.* 2004; 50:305–13. [PubMed: 15499485]
- 71•. D'Amico EJ, Miles JN, Stern SA, et al. Brief motivational interviewing for teens at risk of substance use consequences: a randomized pilot study in a primary care clinic. *J Subst Abuse Treat.* 2008; 35:53–61. [PubMed: 18037603] This article presents findings of a randomized pilot study of a brief intervention for adolescent alcohol and drug use in a primary care setting.
72. American Academy of Pediatrics. [Accessed April 6, 2009] Periodic survey of fellows: 45 % of fellows routinely screen for alcohol use. 2002. Available at: <http://aapnews.aappublications.org/cgi/content/short/14/10/1>.
73. Bethell C, Klein J, Peck C. Assessing health system provision of adolescent preventive services: the young adult health care survey. *Med Care.* 2001; 39:478–90. [PubMed: 11317096]
74. Wilson CR, Sherritt L, Gates E, et al. Are clinical impressions of adolescent substance use accurate? *Pediatrics.* 2004; 114:e536–40. [PubMed: 15520086]
- 75•. Hassan A, Harris SK, Sherritt L, et al. Primary care follow-up plans for adolescents with substance use problems. *Pediatrics.* 2009; 124:144–50. [PubMed: 19564294] This paper reports findings of a prospective observational study of adolescent reports of primary care provider screening and intervention behaviors.
76. Grenard JL, Ames SL, Wiers RW, et al. Brief intervention for substance use among at-risk adolescents: a pilot study. *J Adolesc Health.* 2007; 40:188–91. [PubMed: 17259065]
77. Winters KC, Leitten W, Wagner E, et al. Use of brief interventions for drug abusing teenagers within a middle and high school setting. *J Sch Health.* 2007; 77:196–206. [PubMed: 17425522]
78. Peterson PL, Baer JS, Wells EA, et al. Short-term effects of a brief motivational intervention to reduce alcohol and drug risk among homeless adolescents. *Psychol Addict Behav.* 2006; 20:254–64. [PubMed: 16938063]
79. McCambridge J, Strang J. The efficacy of single-session motivational interviewing in reducing drug consumption and perceptions of drug-related risk and harm among young people: results from a multi-site cluster randomized trial. *Addiction.* 2004; 99:39–52. [PubMed: 14678061]
80. Winters KC, Leitten W. Brief intervention for drug-abusing adolescents in a school setting. *Psychol Addict Behav.* 2007; 21:249–54. [PubMed: 17563146]
- 81••. Winters KC, Fahnhorst T, Botzet A, et al. Brief intervention for drug-abusing adolescents in a school setting: outcomes and mediating factors. *J Subst Abuse Treat.* 2012; 42:279–88. [PubMed: 22000326] This article discusses findings of one of the few randomized controlled trials of brief interventions in a school setting.
- 82•. Clayton S, Chin T, Blackburn S, et al. Different setting, different care: integrating prevention and clinical care in school-based health centers. *Am J Public Health.* 2010; 100:1592–6. [PubMed: 20634447] This article provides an overview of school-based health centers and their provision of primary, secondary, and tertiary prevention.
83. Wagner EF, Tubman JG, Gil AG. Implementing school-based substance abuse interventions: methodological dilemmas and recommended solutions. *Addiction.* 2004; 99(Suppl):106–19. [PubMed: 15488109]

84. Weinstein J. School-based health centers and the primary care physician: an opportunity for collaborative care. *Prim Care*. 2006; 33:305–15. [PubMed: 16713764]
85. Juszczak L, Melinkovich P, Kaplan D. Use of health and mental health services by adolescents across multiple delivery sites. *J Adolesc Health*. 2003; 32:108–18. [PubMed: 12782449]
- 86••. Federico SG, Marshall W, Melinkovich P. School-based health centers: a model for the provision of adolescent primary care. *Adv Pediatr*. 2011; 58:113–21. [PubMed: 21736978] This article provides an overview of school-based health centers including history, models of care, services, and financing.
87. Guo JJ, Wade TJ, Keller KN. Impact of school-based health centers on students with mental health problems. *Public Health Rep*. 2008; 123:768–80. [PubMed: 19711658]
88. Anglin TM, Naylor KE, Kaplan DW. Comprehensive school-based health care: high school students' use of medical, mental health, and substance abuse services. *Pediatrics*. 1996; 97:318–30. [PubMed: 8604264]
89. Pastore DR, Techow B. Adolescent school-based health care: a description of 2 sites in their 20th year of service. *Mt Sinai J Med*. 2004; 71:191–6. [PubMed: 15164134]
90. Werch CE, Bian H, Carlson JM, et al. Brief integrative multiple behavior intervention effects and mediators for adolescents. *J Behav Med*. 2011; 34:3–12. [PubMed: 20661637]
91. Pirskanen M, Laukkanen E, Pietila AM. A formative evaluation to develop a school health nursing early intervention model for adolescent substance use. *Public Health Nurs*. 2007; 24:256–64. [PubMed: 17456127]
92. Stormshak EA, Connell AM, Veronneau MH, et al. An ecological approach to promoting early adolescent mental health and social adaptation: family-centered intervention in public middle schools. *Child Dev*. 2011; 82:209–25. [PubMed: 21291438]
93. Schaus JF, Sole ML, McCoy TP, et al. Screening for high-risk drinking in a college student health center: characterizing students based on quantity, frequency, and harms. *J Stud Alcohol Drugs Suppl*. 2009; 16:34–44. [PubMed: 19538911]
94. Werch CE, Bian H, Moore MJ, et al. Brief multiple behavior interventions in a college student health care clinic. *J Adolesc Health*. 2007; 41:577–85. [PubMed: 18023787]
95. Kypri K, Hallett J, Howat P, et al. Randomized controlled trial of proactive web-based alcohol screening and brief intervention for university students. *Arch Intern Med*. 2009; 169:1508–14. [PubMed: 19752409]
- 96•. Fleming MF, Balousek SL, Grossberg PM, et al. Brief physician advice for heavy drinking college students: a randomized controlled trial in college health clinics. *J Stud Alcohol Drugs*. 2010; 71:23–31. [PubMed: 20105410] This article presents findings from a large, randomized controlled trial of brief physician advice in a college health clinic setting.
97. Scott M, Parthasarathy S, Kohn C, et al. Adolescents with substance diagnoses in an HMO: factors associated with medical provider referrals to substance abuse and mental health treatment. *Ment Health Serv Res*. 2004; 6:47–60. [PubMed: 15002680]
98. Chi FW, Sterling S, Weisner C. Adolescents with co-occurring substance use and mental conditions in a private managed care health plan: prevalence, patient characteristics, and treatment initiation and engagement. *Am J Addict*. 2006; 15(Suppl):67–79. [PubMed: 17182422]
99. Croghan, TW.; Brown, JD. Integrating mental health treatment into the patient centered medical home. Agency for Healthcare Research and Quality; Rockville, MD: 2010. AHRQ Publication No. 10-0084-EF
100. Rittenhouse DR, Shortell SM. The patient-centered medical home: will it stand the test of health reform? *JAMA*. 2009; 301:2038–40. [PubMed: 19454643]