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The need and opportunity to expand substance use disorder treatment in school-based settings

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Abstract

In this paper, we explore the unmet need for substance use disorder (SUD) treatment among youth, its consequences, and the opportunity to address this gap due to the expansion of behavioral health services to school-based settings under the Parity and Affordable Care Acts. We discuss the importance of using evidence-based approaches to assessment and treatment to ensure effectiveness and cost-effectiveness and show how the severity of SUD is related to a wide range of school, substance, mental, health, and health care utilization problems. Next, we introduce the other three articles in the special issue that further demonstrate the feasibility and impact of using these evidence-based practices in school-based settings, the challenges of identifying and interviewing with youth, and the need for a full continuum of interventions. In each of these areas we try to draw out the policy implication of these trends and papers.

Keywords

substance use disorder treatment; health equity; school-based health centers; health care reform

1. The cost, access, and quality chasm of adolescent substance use disorder treatment

Substance use disorders (SUD) and other mental health disorders (MHD) are two of the nation's most costly health problems in terms of dollars (Agency for Healthcare Research and Quality [AHRQ], 2009; Kirschstein, 2000), disability-adjusted life years (Degenhardt et al., 2013; Whiteford et al., 2013; World Health Organization, 2011), and death (Mokdad, Marks, Stroup, & Gerberding, 2004; Neumark, Van Etten, & Anthony, 2000; Scott, Dennis, Laudet, Funk, & Simeone, 2011; Whiteford et al., 2013). In fact, taken together, they

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represent the largest (22.9%) proportion of total years living with a disability of the 10 most expensive chronic conditions (Whiteford et al., 2013). The Institute of Medicine (IOM, 2006) estimated that in the USA, there are 21 million people (9%) with SUD and 58 million (24%) with other MHD; this includes an overlap of 15 million (6%) with co-occurring SUD and MHD. More than 90% of the people with SUD started using between the ages of 12 and 18 years, and approximately two thirds of those with SUD have co-occurring MHD (Chan, Dennis, & Funk, 2008; Dennis & Scott, 2007; IOM, 2006; Substance Abuse and Mental Health Services Administration [SAMHSA], 2013a). In clinical samples, intervention during this first decade of use (basically adolescence or young adulthood) is associated with reductions in lifetime SUD, while the presence of co-occurring MHD are associated with worse treatment outcomes (Dennis, Scott, Funk, & Foss, 2005; Rush, Dennis, Scott, Castel, & Funk, 2008; Shane, Jasiukaitis, & Green, 2003; Weisner, Matzger, & Kaskutas, 2003). It should be noted that the age of onset and prevalence for MHD vary considerably, with externalizing disorders (e.g., attention deficit, hyperactivity, and conduct disorders) starting earlier and starting to decrease at age 15 and internalizing disorders (e.g., depression, anxiety, trauma, psychosis) starting later and increasing with age (Chan et al., 2008). Late adolescences and young adulthood (18–25 years) are the peak period of prevalence for SUD and both types of MHD. Thus, SUD are an adolescent onset disorder where early intervention and intervention for co-occurring MHD matter.

Based on a reanalysis of the 2011 National Survey on Drug Use and Health (NSDUH; SAMHSA, 2012), approximately 4.28 Million (14.4%) of youth aged 12–18 years meet the new definition of SUD based on 2 or more of 11 symptoms (American Psychiatric Association [APA], 2013) with the rate significantly higher among those who drop out of school than those still in school (36.0% vs. 13.6%, OR 3.59, $p < 0.05$). However, 3.87 million (90%) of these youth with SUD are still in school. This includes 4.6% with mild SUD (2–3 symptoms), 4.0% with moderate SUD (4–5 symptoms), and 4.9% with severe SUD (6–11 symptoms). Thus, there is a significant and diverse range of need for SUD services among youth in school.

Of the 3.87 million (13.5%) youth age 12–18 currently enrolled in school with SUD, only 141,000 (4%) or 1 in 25 received treatment in a SUD or MHD program. In fact, only 298,800 (8%) or 1 in 12 reported receiving any kind of intervention, including (with overlap) treatment in an SUD or MHD program (141,000; 4%), a self-help program (99,000; 3%), a medical office (36,000; 1%), emergency room (34,000; 0.9%), or juvenile detention (27,000; 0.7%). Among youth with SUD, the rate of unmet need for any intervention (92.3% overall) is similar by gender but significantly worse for those younger than age 15 years (96.3%) and for African-American youth (95.0%) and for minority girls versus boys within several minority groups. Thus, there is a great need to increase access to care and reduce health disparities in access.

Even among those admitted to specialized treatment (SAMHSA, 2013a), less than half are discharged successfully or stay in treatment for the 90 days recommended by experts (Brannigan, Schackman, Falco, & Millman, 2004; National Institute on Drug Abuse [NIDA], in press). A recent analysis found that publicly funded programs met only 6 of 14 indicators of quality treatment 80% or more often (Hunter, Griffin, Booth, Ramchand,

& McCaffrey, 2013). The same analysis showed that the introduction of evidence-based assessment called the Global Appraisal of Individual Needs (GAIN; Dennis, Titus, White, Unsicker, & Hodgkins, 2003) significantly improved scores in six indicators with a trend ($p < 0.10$) in two more. Thus, IOM (2006) recommended the increased use of evidence-based screening, clinical assessment, prevention, treatment, and care coordination for SUD and co-occurring MHD. The most recent meta-analysis of adolescent treatment (Tanner-Smith, Wilson, & Lipsey, 2013) shows that relapse is common and that ‘treatment as usual’ does no better than no treatment. The same meta-analysis, however, also shows that a wide range of more recent evidence-based treatments (EBTs) do significantly better. These practices are characterized by being developmentally appropriate, using cognitive and behavioral modification theory, and in the best cases, involving families. While many EBTs had similar outcomes, they varied substantially in costs and, consequently, in their cost-effectiveness (Dennis et al., 2004; French et al., 2003). Thus, it is not enough to just increase initial access to treatment; as a field, we need to keep them engaged there, to identify/address co-occurring issues, and to use EBTs associated with better effectiveness and cost-effectiveness. This is again consistent with the IOM (2006) recommendations.

2. The opportunity to expand SUD treatment in school-based settings

Four recent events have combined to create a new opportunity to address the unmet need for adolescent SUD treatment and to close the quality of care chasm. First, the Mental Health Parity and Addiction Equity Act of 2008 (Public Law 110–344) or ‘Parity’ Act established the requirement that insurance providers and health clinics providing any mental health or addiction services had to provide them with parity to health care services. Second, the Patient Protection and Affordable Care Act of 2010 (Public Law 111–148) or ‘ACA’ prohibited the exclusion due to preexisting conditions, capped out of pocket deductibles across all services, expanded availability of private and public insurance, and expanded community and school-based health centers to serve both insured and uninsured youth (see Henry J Kaiser Family Foundation, 2013 for a more detailed list). Third, on 1 January 2013, Annual Wellness Visits that included substance use, mental health, and behavioral risk factors were added to the current procedural terminology billing codes used by the Center for Medicaid Services, Children Health Insurance Programs, Federally Qualified Health Centers, School Based Health Centers, other state programs, and many private insurers (see <http://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/Downloads/AnnualWellnessVisit-ICN907786.pdf>). Fourth, the essential health benefits final rule under ACA (45 CFR part 156) released on 25 February 2013 included MHD and SUD services effective from 26 April 2013. The combined effect is that in the coming year, many private and public health insurance programs, as well as community and school-based health clinics can no longer exclude people with SUD/MHD, must provide both mental health and SUD services with parity to health services, and will be held financially accountable for the vast majority of their total health care utilization costs, including SUD treatment. These policies provide clear incentives for schools and school-based health centers to increase the identification of SUD/MHD and provide the reimbursable services that are associated with greater clinical and cost-effectiveness.

Above, we focused on where youth with SUD received any intervention, but conversely we can more proactively identify the most promising sites to identify those *not* receiving SUD treatment. Among youth aged 12–18 years with SUD, during 2011: 10% stayed overnight in a hospital, 15% were on probation or parole, 17% were seen in a mental health program, 19% were arrested, 43% visited the emergency room, and 96% attended school (SAMHSA, 2012). Prior research has already shown that the rate of using SUD/MHD services is higher among youth who have these services available in a school-based setting versus community settings only (Anglin, Naylor, & Kaplan, 1996; Armbuster, Gerstein, & Fallon, 1997; Juszczak, Melinkovich, & Kaplan, 2003; Kaplan, Calonge, Guernsey, & Hanrahan, 1998; Kaplan et al., 1999). The potential of school-based settings can also be illustrated by looking at Washington state, where a common screening tool (the GAIN short screener; Dennis, Chan, & Funk, 2006) is used across all adolescent (and adult) school, mental health, substance, child welfare, and justice programs and where school-based SUD/MHD prevention and treatment services were available in all school districts. When the data were pooled across systems of care, it revealed that schools had become the primary location of services for 34% of the youth with SUD, 34% of the youth with MHD, and 34% of the youth with co-occurring SUD and MHD (Lucenko, Mancuso, & Estee, 2008). Given that youth with SUD are overwhelmingly (96%) still in school and that providing services in school-based settings increases utilization, school-based settings are a logical target for the above expansion of access to effective and cost-effective care.

3. Why schools and existing school-based programs should address SUD

If we are getting buy in from school districts and existing school-based SUD, MHD, and health programs, it is important to understand how the presence of SUD relates to the kinds of academic, behavioral, and health problems on which they currently focus. It is also important to understand the range of severity and how this relates to their focal problems as well.

For a measure of severity we will use the new definition of SUD from the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V) (APA, 2013) that is classified as none (0–1 symptoms), mild (2–3 symptoms), moderate (4–5 symptoms), or severe (6–11 symptoms). For data we will use the nationally representative sample from the NSDUH (SAMHSA, 2012) subset to adolescents (age 12–18) who are in school. Although it lacks the one criterion that was changed in DSM-V (repeated problems with the law was dropped and craving was added), we can still use it to approximate the effect of the change from DSM-IV to DSM-V. Among the 28.5 million youth aged 12–18 years who are in school, shifting definitions raises the prevalence of SUD in schools from 8.0% to 13.5% (4.6% mild; 4.0% moderate; 4.9% severe) (SAMHSA, 2012). Thus, the new definition increases the estimate of the number of youth in need and shows that they range in severity over its full continuum.

Using these data on youth in school, Table 1 shows the rate of various problems overall and by the above rates of no, mild, moderate, and severe SUD problems. To the right are the odds ratios (ORs) for specific problems or the Cohen's effect size *d* for problem counts or costs, in each case relative to the prevalence or grand mean for total population

since our purpose is descriptive. Given the large sample sizes, only those values that are statistically and clinically significant are bolded. For OR, this was based on more than 1.2 (more common) or less than 0.83 (less common). For d , this was based on more than $d = 0.2$ or less than $d = -0.2$ (more than a fifth of a standard deviation in either direction). Thus, SUD and SUD severity are related to many of the common problems that schools want to reduce.

Relative to the total, the section A of Table 1 shows that the rate of any school problems is significantly higher for those with mild (OR = 2.33), moderate (OR = 2.19), and severe (OR = 3.58) SUD. This pattern holds for missing school, serious fighting at school, not doing well at school, hating school, and having an average grade of D or lower. Moreover, the average number of school problems goes up with SUD severity. Thus, SUD is directly related to many of the problems with which schools have traditionally been concerned.

Section B of Table 1 shows the rates of any SUD by type of substance in rows by severity across substances in columns. The most common SUD are related to alcohol and cannabis, both overall and at each level of severity. While rates of SUD related to opiates, stimulants, cocaine, and other drugs are low overall, they are significantly higher among youth in school with severe SUD. Moreover, the average number of substances specific use disorders goes up with severity. While the rate of treatment participation goes up with severity, it is still only 8.1% of those with the most severe SUD. Thus, there is a large amount of unmet need, even among the most severe youth whether defined by symptom counts or type of SUD.

Section C of Table 1 shows the rate of having any of the three mental health problems in the past year measured by the NSDUH goes up with SUD severity. The first indented row shows the rate of major depressive disorders based on a self-reported symptom count screener while the next two are based on youth reporting having been told by a doctor or other medical staff that they have depression or anxiety. The rate is higher when students were proactively screened versus relying only on prior diagnosis. Since the screener, diagnostic measures and count of mental health problems goes up the same with the severity of SUD, it suggests that the screener is finding real cases, not false positives. While the rate of treatment participation is seven times higher for mental health problems than SUD, it is still very low on average. While the rate of mental health treatment participation goes up with SUD comorbidity, even among the most severe SUD population, only a little more than half are receiving it (27% with 1+ indicator vs. 14.8% with any mental health treatment). Thus, the mental health needs of students with SUD are largely not being met.

Section D of Table 1 shows the rate of physical health problems that a doctor or other medical professional has told them they have in the past year. Though the prevalence of the individual problems is low, each problem and the count of problems varies significantly with SUD severity. High severity SUD is particularly related to pregnancy (OR = 2.16), diabetes (OR = 3.16), other major health problems (OR = 2.65), sexually transmitted diseases (OR = 7.05), and HIV/AIDS (OR = 12.01) as well as the count of major health problems ($d = +0.22$). Note that the rate of any physical health treatment exceeds the rate of any major physical health problem overall and for each level of SUD severity, with utilization going up

with SUD severity. Thus, while there is less unmet need for this area, utilization itself is still related to SUD.

The next rows show that the combined count of the 24 problems across the school, substance use, mental health, and health is significantly higher for mild ($d = +0.50$), moderate ($d = +0.70$) and severe ($d = +1.42$) SUD. These represent moderate to very large effect sizes.

Section E of Table 1 shows the cost to society associated with vocational/legal outcomes (missing school/work, arrests) and health care utilization (substance use, mental health, and health care) using previously published monetary conversion factors (AHRQ, 2009; American Medical Association, 2010; French, Popovici, & Tapsell, 2008; McCollister et al., 2013), adjusted using the consumer price index to 2012 dollars. In general, costs go up with severity with the rate of increasing exponentially with severity. The annual cost of school absences is more than twice as much for those with severe SUD (\$426) as a student without SUD (\$172), with mild and moderate severity students falling in between. As schools increasingly collaborate with local law enforcement to reduce violence and crime, it is also important to note that the annual costs of arrests are seven times higher for those with severe SUD (\$711) as the average student (\$103) and more than 20 times higher than students without SUD (\$36). The rates of health care utilization for those with severe SUD are also 1.5–50 times higher than students without SUD, again increasing exponentially as severity rises. Note that the average amount of money spent per youth on SUD treatment are among the lowest health care costs at each level of severity. (Note that while residential SUD and MHD treatment stays are typically expensive, so few kids get them, the average costs here are very low.) The combination of high need and low treatment is associated with significantly higher rates of hospitalization, emergency room utilization, and total health care costs. This presents an important ‘opportunity’ to better manage this chronic condition by proactively increasing low-cost outpatient treatment targeted at SUD to reduce other types of high cost utilization and total health care costs.

4. Demonstrating the feasibility, effectiveness, and cost-effectiveness of SUD treatment in school-based settings

The rest of this issue contains three papers evaluating SUD treatment in school-based settings. All build on assessment and treatment approaches that were first developed and evaluated as part of the SAMHSA/Center for Substance Abuse Treatment (CSAT) Cannabis Youth Treatment (CYT) experiments (Dennis et al., 2002). All three use data collected with the GAIN (Dennis et al., 2003, 2006) that has been extensively validated and normed on adolescents (see www.gaincc.org/publications for a list). The first two articles examine SAMHSA/CSAT’s large scale replication of the two treatments that were found to be the most effective and cost-effective treatment in CYT (Dennis et al., 2004) using quasi-experimental designs with propensity score matching that have been recommended as a rigorous cost-effective design (Dennis, Perl, Huebner, & McLellan, 2000; Lunceford & Davidian, 2004; NIDA, 2004; Patient-Centered Outcomes Research Institute, 2012).

Belur, Dennis, Ives, Vincent, and Muck (2014) explore the feasibility of implementing five- to seven-session Motivational Enhancement Therapy–Cognitive Behavioral Therapy (MET/

CBT; Sampl & Kadden, 2001) in school-based settings relative to a matched cohort in community settings. Results from 2905 students in 27 sites indicate MET/CBT in school settings is feasible, effective, and cost-effective. In fact, the costs of MET/CBT were completely offset within 12 months by reductions in total health care costs. Moreover, providing treatment in school-based settings was associated with reaching youth earlier after the onset of substance use and reducing existing health disparities in treatment access for girls and ethnic minorities. Both are very important because intervention in the first nine years of use is associated with a 57% reduction in the decade it otherwise takes to reach a year or more of abstinence (Dennis et al., 2005).

Hunter, Godley, and Godley (2014) explore the feasibility of implementing the Adolescent Community Reinforcement Approach (A-CRA; Godley et al., 2001) in school-based settings relative to a matched cohort in community settings. Results from 2768 students in 35 sites indicate that A-CRA in school settings was implemented with equivalent fidelity in terms of independent staff ratings of digitally recorded sessions; equivalent effectiveness in terms of days of substance use, days of illegal activity, and days of trouble at school; and better effectiveness in terms of days in trouble with their families and days spent in a controlled environment. Results also suggest that treatment in school-based settings was more likely to reach youth with shorter substance use histories and girls. It also replicates earlier findings in community settings that using a standardized approach to training, coaching, and implementation is associated with equivalent effectiveness by gender, race, and ethnicity (Godley, Garner, Smith, Meyers, & Godley, 2011; Godley, Hedges, & Hunter, 2011).

Rattermann (2014) examines the impact of the reduction in SUD symptoms measured with the GAIN Short Screener (Dennis et al., 2006) on academic achievement measured with the North West Evaluation Associations' (2003) Measures of Academic Progress (MAP) standardized measure over time. Using data from 44 pairs of pre-post observations for a recovery school (Moberg & Finch, 2008), results suggest that reductions in SUD symptoms were associated with improved academic achievement, while unchanged and increasing rates of SUD symptoms were associated with worsening academic achievement. At a time when schools are under pressure to bring up their standardized test scores to meet no-child-left behind performance mandates, these represent moderate to large effects relative to meta-analyses of the programs commonly being used. It is also important to note that participation in this recovery school was associated with significant decreases in the average number of school days missed (8.1 before vs. 6.3 after) and in the average number of days suspended (9.75 days before vs. 2.9 days after). Again, this is consistent with earlier findings on changes in behavior when providing school-based mental health services in general.

5. Other challenges of identifying and intervening with youth in school settings

In the preceding sections we have discussed how new policies and funding opportunities make it financially feasible to offer services in school settings and recent studies demonstrating the feasibility, effectiveness, and cost-effectiveness of assessment and treatment in school-based settings. It is also important to acknowledge that while there

are new opportunities, there are still many other real barriers. Historically, there has been stigma associated with being identified with substance use problems both for schools and for youth within a school. Even among schools that have embraced providing mental health services, there is often a reluctance to consider providing substance use services (one of the most common mental health diagnoses among teenagers) due to such stigma. In the face of multiple mandates, it is easy to see why a school administrator or teacher might avoid this one. That is part of why it is so important for new efforts to include standardized measures of academic impact and to relate substance use services to the core mission of schools.

Two other important environmental factors are the availability and risk of substance use. Over the past decade there has been a decline in the perceived availability of drugs, but at the same time there has also been a decline in the risk of using substances once or twice a week (particularly marijuana, which dropped from 51.5% in 2002 to 43.6% in 2012) (SAMHSA, 2013b). The first is usually associated with reduced use but the later with increased use. Both vary by geography and represent important environmental factors that may impact any effort as well.

In addition, popular media and cultural representations of substance use tend to ‘normalize’ it, make prescription pain medication seem harmless (in spite of the list of side effects droning in the background) and even make experimentation seem like a right of passage for many teenagers. This pressure is amplified by peers under the same pressure and seeking help may be interpreted as a failure or worse, being a ‘Narc’ who might get your friends in trouble. This can lead to a lack of motivation or resistance to seeking help at the individual level.

During the past decade, medical marijuana has also been legalized in 20 states and the District of Columbia. Of those states, Washington and Colorado have legalized marijuana for recreational use by people aged 21 years or older. In both cases this includes distribution in alternative forms like cookies or brownies for those reluctant to smoke. While still illegal under federal law, the Justice Department is not challenging state marijuana laws as long as they don’t conflict with eight federal enforcement priorities (including selling to minors, trafficking the drug, and funneling marijuana revenue to gangs). Yet, in practice these laws also serve to increase availability, reduce perceived risk, and further normalize marijuana use that both put more youth at exposure and for some subsequent SUD.

These other issues are real and need to be addressed. But the studies in this special issues showed that it is at least ‘feasible’ to do so in general. Yet more work is likely warranted. For instance if the Bureau of Indian Education wanted to replicate in its schools, it might make sense for it to start with a cooperative agreement to review and adapt materials to Indian Country community and youth before trying to replicate and to invest in evaluating these efforts to make sure that they replicate the results found here.

6. Some concluding thoughts

In summary, SUD are an adolescent onset disorder that, for a subset, will be chronic and will last for decades. The failure to identify and intervene early is costly to the adolescent,

their family, schools, and society in general. At the same time, some youth with mild SUD, subclinical use or who are only experimenting with use may benefit more from early intervention or prevention approaches. Though they are not the focus of this issue, such approaches have also been demonstrated to be effective in school-based settings (Barnett et al., 2012; Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Ellis et al., 2012; Ennett et al., 2011). Standardized assessment of SUD, MHD, and other commonly occurring problems can help with identification, targeting treatment and evaluation. The consistent implementation of treatment protocols that have previously proven effective in community-based programs is feasible and capable of achieving similar (or better) outcomes in school-based settings. The cost of increased outpatient treatment, early intervention or prevention for SUD is equal or exceeded by potential reductions in the cost of the adolescent's use of hospitals, emergency rooms, and total health care utilization (not to mention vocational or legal costs). Providing a continuum of intervention services (prevention, early intervention, treatment) in school-based settings has the further advantage of reaching youth sooner after the initiation of substance use.

It is also important to note that each of these evidence-based practices in assessment (full and short GAIN, MAP) and treatment/recovery services (MET/CBT5, A-CRA) were continued by over two thirds of the grant sites that pilot tested and have been implemented in 12–20 times more non-grant sites as part of regular practice and are being maintained within existing reimbursement frameworks. This is expected to continue to grow as further results on effectiveness and cost-effectiveness are available and the service systems (in both community and school-based settings) grow in the near future as part of the ACA mandates. These studies also demonstrate how evidence-based practices in school-based settings can be used to reach youth sooner in the course of their disorder and to reduce health disparities in access to care and treatment effectiveness. It is also an example of the Federal government playing a key role in developing and helping to disseminate these behavioral health technologies, much as agriculture extension once did to improve the productivity of the American farm.

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Table 1. School, substance, mental, and health problems by SUD severity among youth aged 12–18 years in school.

| Self-reported problems | SUD severity-based on DSM-V | | | | | | | OR or Cohen's <i>d</i> | | |
|---|-----------------------------|---------------|---------------|-------------------|------------------|----------|----------------|------------------------|--------------------|------------------|
| | Total | None (0–1 Sx) | Mild (2–3 Sx) | Moderate (4–5 Sx) | Severe (6–11 Sx) | Stat. | None vs. total | Mild vs. total | Moderate vs. total | Severe vs. total |
| Estimated population (in 1000s) | 28,511 | 24,648 | 1314 | 1150 | 1399 | | | | | |
| Row % | 100% | 86.5% | 4.6% | 4.0% | 4.9% | | | | | |
| A. Any school problem ^a | 62.9% | 60.2% | 79.8% | 78.8% | 85.9% | OR | 0.89 | 2.33 | 2.19 | 3.58 |
| Past month school absence | 40.0% | 37.9% | 51.8% | 50.6% | 59.0% | OR | 0.92 | 1.62 | 1.54 | 2.16 |
| Serious fight at school | 20.4% | 19.1% | 27.8% | 29.1% | 34.4% | OR | 0.92 | 1.50 | 1.60 | 2.04 |
| Teacher says seldom or never doing well | 19.1% | 16.7% | 31.5% | 35.8% | 42.1% | OR | 0.85 | 1.95 | 2.36 | 3.08 |
| Hated school | 17.8% | 15.8% | 28.9% | 29.0% | 39.4% | OR | 0.87 | 1.87 | 1.88 | 3.00 |
| Average grade of D or lower | 5.0% | 3.9% | 10.0% | 12.6% | 16.8% | OR | 0.77 | 2.09 | 2.72 | 3.82 |
| Mean number of 5 school problems | 0.96 | 0.88 | 1.34 | 1.45 | 1.66 | <i>d</i> | -0.08 | 0.40 | 0.50 | 0.72 |
| B. Any SUD ^b | 13.6% | 0.0% | 100.0% | 100.0% | 100.0% | - | - | - | - | - |
| Alcohol use disorder | 5.8% | 0.0% | 52.2% | 22.6% | 48.8% | OR | 0.00 | 17.84 | 4.77 | 15.56 |
| Marijuana use disorder | 5.4% | 0.0% | 36.0% | 25.0% | 55.6% | OR | 0.00 | 9.86 | 5.83 | 21.89 |
| Opiate use disorder | 1.1% | 0.0% | 4.5% | 2.7% | 16.8% | OR | 0.00 | 4.11 | 2.40 | 17.50 |
| Stimulants use disorder | 0.4% | 0.0% | 0.0% | 0.7% | 7.0% | OR | 0.00 | 0.00 | 2.01 | 20.33 |
| Cocaine use disorder | 0.2% | 0.0% | 0.5% | 0.4% | 3.2% | OR | 0.00 | 2.75 | 2.00 | 17.25 |
| Other drug use disorder | 0.8% | 0.0% | 0.2% | 5.2% | 12.0% | OR | 0.00 | 0.20 | 6.83 | 16.93 |
| Mean number of 6 substance problems | 0.14 | 0.0% | 0.93 | 0.56 | 1.42 | <i>d</i> | -0.29 | 1.68 | 0.90 | 2.73 |
| Any SUD treatment | 0.6% | 0.1% | 1.2% | 1.6% | 8.1% | OR | 0.20 | 1.91 | 2.63 | 14.28 |
| C. Any mental health problem | 10.9% | 9.1% | 17.4% | 20.7% | 27.2% | OR | 0.82 | 1.73 | 2.14 | 3.06 |
| Major depressive episode ^c | 8.3% | 6.9% | 14.7% | 17.0% | 20.5% | OR | 0.82 | 1.89 | 2.25 | 2.84 |
| Depression diagnosis ^d | 3.0% | 3.0% | 5.0% | 5.0% | 13.0% | OR | 1.00 | 1.70 | 1.70 | 4.83 |
| Anxiety diagnosis ^d | 3.0% | 2.0% | 2.0% | 5.0% | 11.0% | OR | 0.66 | 0.66 | 1.70 | 4.00 |
| Mean number of 3 mental health problems | 0.14 | 0.11 | 0.21 | 0.26 | 0.43 | <i>d</i> | -0.06 | 0.16 | 0.26 | 0.65 |
| Any mental health treatment | 4.7% | 3.7% | 8.8% | 8.9% | 14.8% | OR | 0.78 | 1.95 | 1.99 | 3.53 |

| Self-reported problems | SUD severity-based on DSM-V | | | | | | OR or Cohen's d | | | |
|---|-----------------------------|---------------|---------------|-------------------|------------------|-------|-----------------|----------------|--------------------|------------------|
| | Total | None (0-1 Sx) | Mild (2-3 Sx) | Moderate (4-5 Sx) | Severe (6-11 Sx) | Stat. | None vs. total | Mild vs. total | Moderate vs. total | Severe vs. total |
| D. Any physical health problems ^d | 15.3% | 14.7% | 16.8% | 16.9% | 22.9% | OR | 0.96 | 1.12 | 1.13 | 1.64 |
| Asthma | 10.0% | 9.8% | 9.8% | 12.4% | 11.3% | OR | 0.98 | 0.98 | 1.27 | 1.14 |
| Bronchitis | 2.6% | 2.5% | 4.2% | 1.8% | 3.4% | OR | 0.96 | 1.61 | 0.67 | 1.32 |
| High blood pressure | 1.1% | 1.0% | 1.5% | 1.4% | 1.8% | OR | 0.94 | 1.35 | 1.26 | 1.60 |
| Pneumonia | 0.8% | 0.7% | 1.5% | 0.9% | 1.4% | OR | 0.90 | 1.88 | 1.18 | 1.77 |
| Pregnancy (females only) | 0.7% | 0.6% | 0.6% | 0.2% | 1.5% | OR | 0.86 | 0.86 | 0.28 | 2.16 |
| Sinusitis | 0.6% | 0.6% | 0.2% | 0.9% | 0.7% | OR | 1.02 | 0.30 | 1.57 | 1.13 |
| Sexually transmitted disease | 0.5% | 0.3% | 1.2% | 1.5% | 3.4% | OR | 0.50 | 2.46 | 2.93 | 7.05 |
| Diabetes | 0.5% | 0.4% | 0.5% | 0.7% | 1.5% | OR | 0.87 | 1.00 | 1.46 | 3.16 |
| HIV/AIDS | 0.01% | 0.00% | 0.00% | 0.00% | 0.1% | OR | 0.00 | 0.00 | 0.00 | 12.01 |
| Other health problems ^e | 1.1% | 1.0% | 1.3% | 1.5% | 3.0% | OR | 0.88 | 1.18 | 1.32 | 2.65 |
| Mean number of 10 physical health problems | 0.17 | 0.16 | 0.20 | 0.20 | 0.26 | d | -0.02 | 0.06 | 0.07 | 0.22 |
| Any physical health treatment | 31.5% | 30.0% | 38.6% | 42.0% | 42.7% | OR | 0.93 | 1.37 | 1.57 | 1.62 |
| Mean number of 24 problems across areas | 1.32 | 1.09 | 2.45 | 2.34 | 3.53 | d | -0.16 | 0.75 | 0.68 | 1.48 |
| E. Vocational/legal costs to society ^f | | | | | | | | | | |
| Days of missed school costs | \$196 | \$172 | \$298 | \$315 | \$426 | d | -0.06 | 0.24 | 0.28 | 0.55 |
| Days of missed work costs | \$177 | \$140 | \$440 | \$294 | \$484 | d | -0.03 | 0.20 | 0.09 | 0.24 |
| Arrest costs | \$103 | \$47 | \$315 | \$370 | \$711 | d | -0.09 | 0.33 | 0.41 | 0.94 |
| Total of 3 Vocational/legal costs | \$474 | \$358 | \$1043 | \$969 | \$1580 | d | -0.07 | 0.36 | 0.31 | 0.70 |
| F. Health care utilization costs ^e | | | | | | | | | | |
| SUD outpatient cost | \$2 | \$0 | \$4 | \$8 | \$22 | d | -0.04 | 0.09 | 0.15 | 0.49 |
| SUD residential cost | \$6 | \$2 | \$5 | \$2 | \$85 | d | -0.04 | 0.01 | -0.03 | 0.65 |
| Mental health outpatient cost | \$6 | \$4 | \$10 | \$12 | \$26 | d | -0.03 | 0.17 | 0.09 | 0.24 |
| Mental health hospital cost | \$5 | \$3 | 5 | \$0 | \$33 | d | -0.01 | 0.00 | -0.04 | 0.23 |
| Physical health hospital cost | \$401 | \$325 | \$496 | \$801 | \$1319 | d | -0.03 | 0.07 | 0.09 | 0.33 |
| Physical health emergency room cost | \$4191 | \$3968 | \$5076 | \$5783 | \$5951 | d | -0.03 | 0.16 | 0.25 | 0.23 |
| Total of these 6 health care costs per person | \$4445 | \$4141 | \$5504 | \$6367 | \$7229 | d | -0.04 | 0.19 | 0.27 | 0.31 |

| Self-reported problems | SUD severity-based on DSM-V | | | | | OR or Cohen's <i>d</i> | | | | |
|-----------------------------------|-----------------------------|---------------|---------------|-------------------|------------------|------------------------|----------------|----------------|--------------------|------------------|
| | Total | None (0-1 Sx) | Mild (2-3 Sx) | Moderate (4-5 Sx) | Severe (6-11 Sx) | Stat. | None vs. total | Mild vs. total | Moderate vs. total | Severe vs. total |
| Total of 9 costs above per person | \$4918 | \$4498 | \$6547 | \$7338 | \$8798 | <i>d</i> | -0.04 | 0.14 | 0.21 | 0.34 |

Source: Based on data from SAMHSA (2012).

^aNot asked of 18-year-olds.

^bBased on DSM-V (2013), 2 or more of 11 symptom-based criteria.

^cBased on symptom count.

^dRespondent reported being told of diagnosis in the past year by a doctor or other medical professional.

^eOther health problems including hepatitis, tuberculosis, cirrhosis of the liver, heart disease, lung cancer, pancreatitis, sleep apnea, stroke, tinnitus, and ulcers.

^fMonetary conversion factors for physical health, mental health, and substance abuse treatment services came from the AHRQ (2009), American Medical Association (2010), French et al. (2008), and McCallister et al. (2013), adjusted using the consumer price index to 2012 dollars for unit costs of \$19.58 per day missed school; \$116.63 per day missed work; \$2237.92 per arrest (past year arrest limited to 3+); \$33.18 per day in SUD outpatient; \$124.14 per night in SUD residential; \$81.44 per day in mental health outpatient; \$479.44 per night in a mental health hospital; \$2248.46 per night in a physical health hospital; and \$6611.08 per visit to an emergency room.