



# National Trends in Substance Use and Use Disorders Among Youth

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**Objective:** To examine trends in the 12-month prevalence of patterns of substance use and substance use disorders (SUDs) among US youth during 2002 through 2014.

**Method:** Data were from 288,300 persons 12 to 17 years old who participated in the 2002 to 2014 National Surveys on Drug Use and Health. Descriptive analyses and bivariable and multivariable logistic regressions were applied.

**Results:** During 2002 through 2014, among US youth, the 12-month prevalence of any substance use decreased by 27.1% (from 43.2% to 31.5%); among youth users, the 12-month prevalence of SUDs decreased by 28.9% (from 27.0% to 19.2%), and the ratio of substance dependence to abuse decreased from 2.2 to 1.6. Multiple substance use was common and was associated with SUDs. During 2002 through 2014, the prevalence of using marijuana and alcohol only, using marijuana only, and having marijuana use disorders only increased, whereas most other trends were downward. Increases in age at first substance use

were associated with downward trends in any substance use. Upward trends in age at first substance use, youth and parental strong disapproval of cigarette use, and youths' seatbelt-wearing prevalence and downward trends in substance use patterns were associated with the downward trend in SUDs among youth users.

**Conclusion:** The 12-month prevalence of any substance use among youth and SUDs among youth users decreased during 2002 through 2014. Postponing age at first use of any substance is critical among youth in the United States. Future research is needed to better understand the interrelations between specific risk and protective factors, age at first substance use, substance use patterns, and SUDs among youth users.

**Key words:** youth, substance use, substance use disorders, psychiatric epidemiology

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Substance (alcohol, drug, or tobacco) use among youth has adverse consequences on brain development, school performance, mental and physical health, interpersonal relationships, and life expectancy.<sup>1,2</sup> The use of substances among youth tends to cluster,<sup>3</sup> with the use of one substance increasing the risk for using other substances.<sup>4–8</sup> Furthermore, the combination of substance use by youth has been linked to heavier consumption patterns in adulthood compared with single or dual substance use.<sup>9,10</sup>

Although polysubstance use has more serious consequences than single use,<sup>9–12</sup> most studies focus on single substance use and pay little attention to combinations of substance use and substance use disorders (SUDs) among youth. Because substance use among youth is associated with mental disorders,<sup>13,14</sup> genetics,<sup>15,16</sup> and family and school environment,<sup>17–23</sup> many studies examine risk factors (e.g., genetics,<sup>15,16</sup> age at first tobacco use,<sup>24</sup> depression,<sup>13,18</sup> conduct problem or risk-taking behavior<sup>19</sup>) and protective factors (e.g., substance use prevention programs and messages,<sup>20,21</sup> religiosity,<sup>22,23</sup> youth positive attitudes toward school,<sup>19</sup> youth activity participation,<sup>19</sup> youth

attitudes toward peer substance use,<sup>17–19</sup> parental monitoring,<sup>17,19</sup> parents' attitudes toward substance use<sup>17–19</sup>) for specific substance use or a specific SUD.

Many risk and protective factors change over time.<sup>19</sup> However, how trends in risk and protective factors are associated with trends in any substance use and any SUD among youth is unknown. In particular, none of the existing studies have examined simultaneously how trends in age at first use of any substance and other risk and protective factors are associated with trends in any substance use and how trends in age at first use of any substance, other risk and protective factors, and patterns of substance use are associated with trends in any SUD among youth users in the United States.

This information would provide clinicians, researchers, policy makers, and the general public with a detailed description of substance use and SUDs among US youth, help generate specific and timely recommendations to inform national substance use prevention and treatment efforts, and suggest future research directions. To address these issues, using nationally representative data on substance use and SUD among youth, this study examined the following questions:

1. What are the prevalence and patterns of the various combinations of past-year substance use and SUD among youth 12 to 17 years old in the United States? Were there trends in these combinations from 2002 through 2014?



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2. Were changes in risk and protective factors and age at first substance use associated with trends in any substance use among youth during 2002 through 2014?
3. Were changes in risk and protective factors, age at first substance use, and patterns of substance use associated with trends in SUD among youth users during 2002 through 2014?

## METHOD

### Data Sources

Data were from youth 12 to 17 years old who participated in the 2002 through 2014 National Surveys on Drug Use and Health (NSDUH). The NSDUH is conducted by the Substance Abuse and Mental Health Services Administration (SAMHSA). It provides nationally representative data on substance use and SUD in the civilian, noninstitutionalized population at least 12 years old in the United States. Excluded from the NSDUH are persons without a household address (e.g., homeless persons not living in shelters), active-duty military personnel, and institutional residents (e.g., incarcerated people). The NSDUH data collection protocol was approved by the institutional review board at RTI International (Research Triangle Park, NC). The annual mean weighted response rate of the 2002 through 2014 NSDUH was 66.0% (range 58.3%–71.3%).<sup>25,26</sup> Details on the NSDUH data collection are provided elsewhere.<sup>25</sup>

### Measurements

The NSDUH collected data on 12-month use of tobacco, alcohol, and illicit drugs (e.g., marijuana, cocaine, hallucinogens, heroin, and inhalants and 12-month nonmedical use of prescription pain relievers, sedatives, and stimulants) from all respondents.<sup>25</sup> The NSDUH also estimated the 12-month prevalence of each specific SUD (dependence on or abuse of alcohol, marijuana, cocaine, hallucinogens, heroin, inhalants, or nonmedical use of prescription pain relievers, sedatives, or stimulants) based on assessments of individual diagnostic criteria from the *DSM-IV*.<sup>27</sup> Nicotine dependence among cigarette smokers was assessed using the Nicotine Dependence Syndrome Scale.<sup>28</sup> Moreover, the 2004 through 2014 NSDUH estimated 12-month major depressive episode among youth based on the diagnostic criteria specified in the *DSM-IV*.<sup>27</sup> These measurements have shown good validity and reliability.<sup>29,30</sup> For example, one clinical validation study reported that for alcohol, marijuana, cocaine, and any drug use disorders, sensitivity values were 0.78 to 0.97 and specificity values were 0.68 to 0.95.<sup>29</sup> The 2006 NSDUH Reliability Study has reported that the  $\kappa$  value was 0.62 for illicit drug use disorders and 0.67 for illicit drug or alcohol use disorders.<sup>30</sup>

In addition to age at first substance use and major depressive episode, the NSDUH asked youth respondents a series of questions related to risk and protective factors of substance use and SUD: their attitudes toward school, parental monitoring, parental attitudes toward substance use as perceived by the youth respondent, youth attitudes toward peer substance use, activities attended outside of school, exposure to alcohol and drug educational programs or messages, religious activity attendance and beliefs, conduct problems, and risk-taking behaviors. These risk and protective factors have been associated with youth substance use.<sup>13–24</sup> Sociodemographic characteristics examined in this study included age, sex, race and ethnicity, health insurance, metropolitan statistical area, annual family income, census region, and year.

### Statistical Analyses

All analyses were conducted for youth 12 to 17 years old. For each examined year from 2002 through 2014, descriptive analyses were conducted to estimate the 12-month prevalence of combinations of substance use among youth, combinations of SUD among youth users, and risk and protective factors among youth. Bivariate logistic regression models were applied to assess the unadjusted annual prevalence, to test for differences between the 2002 estimate and each annual estimate in 2003 through 2014 (using PREDMARG and PRED\_EFF statements in SUDAAN,<sup>31,32</sup> 2-sided *t* test with a significance level of 0.05), and to test *p* values of  $\beta$  coefficients of the year variable. A Bonferroni correction was used to decrease chances of type I errors of testing overall trends.

Bivariable and multivariable logistic regressions were applied to assess unadjusted and model-adjusted relative risk (using PREDMARG and PRED\_EFF statements in SUDAAN<sup>31,32</sup>) for any past-year substance use among youth and for any past-year SUD among youth users. The multivariable analyses specified a fixed order of entry for variables to test the independent effects of certain predictors and to identify characteristics associated with trends in examined outcomes. SUDAAN software was used to account for the complex sample design and sampling weights of NSDUH data.<sup>31</sup> Multicollinearity (using variance inflation factors) and potential interaction effects between examined factors were assessed and were not identified in final multivariable models.

## RESULTS

### Trends in Any Past-Year Substance Use Among Youth

Based on 288,300 sampled youth 12 to 17 years old from the 2002 through 2014 restricted NSDUH data, we identified and estimated all 16 combinations of substance use categories (Table S1, available online). More than 97% were represented in the top 11 categories, which were those with a prevalence of at least 1% in 2014 (Table 1).

Among youth 12 to 17 years old in the United States in 2014, 31.5% used at least 1 substance (Table S1, available online). Combinations of past-year substance use were common, with 16.1% using more than 1 substance and 15.4% using only 1. Specifically, 9.3% used alcohol only; 3.6% used alcohol, marijuana, and tobacco only; 3.1% used alcohol and marijuana only; 2.8% used alcohol and tobacco only; 2.6% used alcohol, marijuana, tobacco, and drugs other than marijuana; 2.5% used drugs other than marijuana only; 2.0% used tobacco only; and 1.6% used marijuana only.

Among US youth during 2002 through 2014, the 12-month prevalence of any substance use decreased by 27.1% (from 43.2% to 31.5%), the 12-month prevalence of any combination of substances use decreased by 34.3% (from 24.5% to 16.1%), and the 12-month prevalence of any single substance use decreased by 17.6% (from 18.7% to 15.4%; Table 1). During 2002 through 2014, most trends in the prevalence of various combinations of substance use were downward, with a few exceptions: the prevalence of marijuana and alcohol use only among youth increased by 55.0% (from 2.0% to 3.1%), and the prevalence of marijuana use only increased by 128.6% (from 0.7% to 1.6%).

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