

Racial/Ethnic Variations in Substance-Related Disorders Among Adolescents in the United States

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Context: While young racial/ethnic groups are the fastest growing population in the United States, data about substance-related disorders among adolescents of various racial/ethnic backgrounds are lacking.

Objective: To examine the magnitude of past-year DSM-IV substance-related disorders (alcohol, marijuana, cocaine, inhalants, hallucinogens, heroin, analgesic opioids, stimulants, sedatives, and tranquilizers) among adolescents of white, Hispanic, African American, Native American, Asian or Pacific Islander, and multiple race/ethnicity.

Design: The 2005 to 2008 National Survey on Drug Use and Health.

Setting: Academic research.

Participants: Noninstitutionalized household adolescents aged 12 to 17 years.

Main Outcome Measures: Substance-related disorders were assessed by standardized survey questions administered using the audio computer-assisted self-interviewing method.

Results: Of 72 561 adolescents aged 12 to 17 years, 37.0% used alcohol or drugs in the past year; 7.9% met criteria for a substance-related disorder, with Native Americans hav-

ing the highest prevalence of use (47.5%) and disorder (15.0%). Analgesic opioids were the second most commonly used illegal drugs, following marijuana, in all racial/ethnic groups; analgesic opioid use was comparatively prevalent among adolescents of Native American (9.7%) and multiple race/ethnicity (8.8%). Among 27 705 past-year alcohol or drug users, Native Americans (31.5%), adolescents of multiple race/ethnicity (25.2%), adolescents of white race/ethnicity (22.9%), and Hispanics (21.0%) had the highest rates of substance-related disorders. Adolescents used marijuana more frequently than alcohol or other drugs, and 25.9% of marijuana users met criteria for marijuana abuse or dependence. After controlling for adolescents' age, socioeconomic variables, population density of residence, self-rated health, and survey year, adjusted analyses of adolescent substance users indicated elevated odds of substance-related disorders among Native Americans, adolescents of multiple race/ethnicity, adolescents of white race/ethnicity, and Hispanics compared with African Americans; African Americans did not differ from Asians or Pacific Islanders.

Conclusions: Substance use is widespread among adolescents of Native American, white, Hispanic, and multiple race/ethnicity. These groups also are disproportionately affected by substance-related disorders.

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PROBLEMATIC ALCOHOL AND drug use in adolescence has a negative influence on the affected individuals, their families, and society.¹ Because psychoactive drugs alter neurotransmission in the brain, repeated use could have long-lasting adverse effects on brain development and overall health.²⁻⁴ Early substance use confers a heightened risk for addiction, psychiatric and medical disorders, poor psychosocial functioning, treatment needs, and mortality.¹⁻⁹ Adolescence marks the period of life with the highest risk for initiating substance use¹⁰; thus, adolescents constitute a high-risk group requiring research to guide preven-

tion efforts and health policy making. Furthermore, there is a growing need for understanding substance-related disorders among adolescents of various racial/ethnic backgrounds to track health statistics, plan for and improve health services, and identify vulnerable subgroups for focused intervention. Children and adolescents of nonwhite race/ethnicity are the fastest growing population; by 2030, adolescents of nonwhite race/ethnicity are projected to represent more than half of the US population younger than 18 years.¹¹ Therefore, many adolescents at risk to begin substance use will be of nonwhite race/ethnicity. For example, young Hispanics, the fastest growing racial/ethnic group in

the United States, have an elevated risk for substance use.¹¹⁻¹⁴

While eliminating racial/ethnic disparities in health problems and their treatment is a mission of the National Institutes of Health, few data about substance-related disorders exist for young groups of nonwhite race/ethnicity. Investigations of adolescents have focused primarily on substance use among students, and assessments for substance-related disorders are not included in school-based surveys; when researchers have examined substance-related disorders, data are frequently limited to alcohol, marijuana, or cocaine, resulting in a lack of data on other drug use disorders.¹⁵⁻¹⁹ In addition, sample sizes of studies are often inadequate for examining young Asians, Native Americans, and groups of multiple race/ethnicity. The 2000 Census was the first US Census to include the classification of multiple race/ethnicity,¹² and data about substance-related disorders for this group are lacking. Results about “substance use” also are limited for discerning important differences in substance use problems across racial/ethnic groups. An improved measure of substance use problems, such as that provided by the *DSM-IV*,²⁰ is needed to better inform research, intervention, and health policy making.

Furthermore, although investigators have reported racial/ethnic differences in substance use, findings of racial/ethnic differences in problems related to various substances are inconsistent and sometimes difficult to interpret.¹⁵ These discrepancies relate to various definitions of substance use and at-risk groups (the denominators) used.¹⁵ Some investigations have examined substance use problems in a total sample, while others have compared them among subgroups of substance users. These variations in study designs complicate efforts to compare substance use problems among racial/ethnic groups and across substance classes. Moreover, US surveys have shown a shifting pattern of substance use. Data suggest that from 1999-2000, nonmedical analgesic opioid use has increased to become more prevalent than inhalant use among adolescents; from 2002 to 2009, past-month use ranged from 2.3% to 3.2% for nonmedical analgesic opioids compared with 1.0% to 1.3% for inhalants.^{10,21-23} In addition, marijuana use has been increasing after a few years of decline; alcohol use and cigarette smoking among adolescents have declined.^{10,24,25} These changing patterns warrant research to identify racial/ethnic groups disproportionately affected by prescription drug or marijuana use and reveal a need to evaluate the comprehensive patterns of substance-related disorders affecting various groups.^{10,25}

In response to the growing population of adolescents of nonwhite race/ethnicity, the scarcity of substance-related disorder estimates, and shifting patterns of substance use, we examine data from the 2005 to 2008 National Surveys on Drug Use and Health (NSDUH) to fill this critical gap in substance-related disorder estimates for young racial/ethnic groups. The NSDUH is a large ongoing survey, serving as the primary source for national estimates of substance use and substance-related disorders for the noninstitutionalized US population.¹⁰ The selected years included designs that allowed the use of pooled data to examine alcohol and 9 drug use disor-

ders across racial/ethnic groups and to compare the conditional probability of substance-related disorders among adolescent substance users. Multiple years of substance-related disorder data assessed by the same instrument help identify the extent of overlooked substance-related disorders (prescription drug use disorders) for understudied groups (ie, Asian, Native American, and multiple race/ethnicity). To address the limitation of studies with complicated comparisons of racial/ethnic differences owing to various denominators or definitions of substance use, we focus on past-year substance use and substance-related disorders, as they are better indicators of recent or active substance use and treatment needs than lifetime measures.

To better inform etiological efforts, we expand on studies of substance use by examining the frequency of each substance used and conditional probabilities of substance-related disorders to characterize use patterns and identify subsets of adolescent users showing elevated odds of having the disorder. The conditional prevalence of substance-related disorders considers substance-specific variations in use by restricting the denominator for each substance-related disorder to adolescent users of the corresponding substance, thereby allowing comparisons across substances. To mitigate for the confounding effects on associations between race/ethnicity and substance use status, included as control variables were adolescents' age, sex, family income, population density of residence (adjusting for potential effects associated with community economic characteristics, drug-using peers, and availability of substances), and self-rated health (adjusting for potential effects associated with adolescents' substance use and health status), as well as the survey year.^{10,14,26-30}

The following 3 main questions are addressed: (1) Are there racial/ethnic differences in the 1-year prevalence of substance-related disorders? (2) Are there racial/ethnic differences in the 1-year conditional prevalence of substance-related disorders among past-year adolescent users of each corresponding substance class? (3) To what extent is racial/ethnic status associated with each substance-related disorder among adolescent substance users after controlling for potentially confounding effects of adolescents' age, sex, family income, population density of residence, self-rated health, and survey year?

METHODS

DATA SOURCE

This study was approved by the Duke University Institutional Review Board, Durham, North Carolina. Data were from the public use NSDUH data file from 2005 to 2008, the only survey designed to provide ongoing national estimates of substance use and substance-related disorders in the United States.^{31,32} The target population includes residents of households from the 50 states (including shelters, rooming houses, and group homes) and civilians residing on military bases. Participants are selected by multistage area probability methods to ensure that each independent cross-sectional sample is representative of persons aged 12 years or older. The design oversampled people aged 12 to 25 years; because of a large sample

size, there was no need to oversample racial/ethnic groups (as was done before 1999).^{31,32} Detailed information on sample designs is provided by Morton et al.³³

Prospective respondents are assured that their names will not be recorded and their responses will be kept strictly confidential. All study procedures and protections are carefully explained. For adolescents aged 12 to 17 years, the field interviewer first seeks verbal consent from their parents or guardians. Once parental permission is granted, field interviewers then approach the adolescents and obtain their agreement to participate in the study. Parents are asked to leave the interview setting to ensure the confidentiality of their children's responses.

The interview uses computer-assisted interviewing to increase the likelihood of valid respondent reports of substance use behaviors.^{31,32} Sociodemographic questions are administered by interviewers using computer-assisted personal interviewing. Other questions of a sensitive nature (substance use, substance-related disorders, and health) are administered using audio computer-assisted self-interviewing, which provides respondents with a highly confidential means of responding to questions to increase honest reporting of sensitive behaviors. Respondents read questions on the computer screen, or questions are read to them through headphones, and they enter responses directly into a computer provided by the interviewer.

From 2005 to 2008, approximately 67 500 unique persons aged 12 years or older were interviewed annually (weighted interviewing response rates for adolescents aged 12-17 years, 85%-87%).^{31,32} This study examined adolescents aged 12 to 17 years (18 678 in 2005, 18 314 in 2006, 17 727 in 2007, and 17 842 in 2008). Four years of data (n=72 561) were pooled to allow the detection of differences in substance-related disorders among racial/ethnic groups.

STUDY VARIABLES

Substance Use

The survey asked each respondent about his or her use of alcohol and 9 drug classes (inhalant use and illicit use of marijuana or hashish, cocaine or crack, hallucinogens, or heroin, as well as nonmedical use of prescription analgesic opioids, stimulants or amphetamines, sedatives, or tranquilizers). Non-medical use was defined as the use without a prescription or for the experience or feeling the drugs caused; the use of over-the-counter drugs and legitimate use of prescription drugs were excluded.^{22,31,32} Alcohol and drug classes were assessed by discrete questions in 10 different sections. Each included a detailed description of the substance class and a list of substances belonging to the class. For nonmedical use, respondents were provided with pill cards showing color pictures of tablets for analgesic opioids, stimulants, sedatives, or tranquilizers (the computer screen prompts the respondent to obtain pill cards from the interviewer). To determine the extent of co-use of alcohol and drugs, users of both alcohol and a drug were categorized.

DSM-IV Substance-Related Disorders (Abuse and Dependence)

Respondents who reported alcohol or drug use in the past year were asked a set of structured substance-specific questions designed to operationalize DSM-IV criteria for abuse (role interference, hazardous use, problems with the law, and relationship problems) and dependence (tolerance, withdrawal, taking larger amounts or taking them for longer periods, inability to cut down, time spent using the substance, giving up activities, and continued use despite problems) in the past year.^{20,31,32} De-

pendence on a given substance class included users who met at least 3 dependence criteria for that class in the past year. Abuse applied to users who met at least 1 abuse criterion but did not meet criteria for dependence on that substance class; abuse and dependence were mutually exclusive.^{20,31,32} Assessments were adopted from questions used in the National Comorbidity Survey; as part of an ongoing process to improve the survey, diagnostic questions were cognitively tested to determine how well they were understood by respondents, were evaluated by experts to determine how well the questions captured the DSM-IV criteria, and were modified for DSM-IV criteria.³⁴ The substance-related disorder questions were implemented and assessed using the computer-assisted self-interviewing method.

Sociodemographics

Examined were adolescents' age, sex, family income, population density of residence, self-rated health, and self-reported race/ethnicity (59.9% white, 18.2% Hispanic, 15.3% African American, 4.4% Asian or Pacific Islander, 1.7% multiple race/ethnicity, and 0.6% Native American [American Indian or Alaska Native]).^{12,26-30,32} Population density was based on 2000 Census data and the June 2003 Core-Based Statistical Area classifications and was categorized as large metropolitan (≥ 1 million population), small metropolitan (< 1 million population), or nonmetropolitan (not in a Core-Based Statistical Area). Owing to the nature of a national sample, population density of residence (a proxy for community location) was included as a control variable. Self-rated health (fair or poor vs excellent, very good, or good) was assessed using a widely supported measure of general health ("Would you say your health, in general, is excellent, very good, good, fair, or poor?").²⁸⁻³⁰

DATA ANALYSIS

The distributions of race/ethnicity by survey year and racial/ethnic differences in sociodemographics were determined by χ^2 test. The prevalence rates of substance use and substance-related disorders by race/ethnicity were determined. The conditional prevalence rates of substance-related disorders among adolescent users of each substance class were compared by race/ethnicity. To evaluate conditional rates of substance-related disorders among substance users, the frequency of substance use among past-year users was calculated. Logistic regression analyses estimated associations between race/ethnicity and each substance-related disorder among adolescent users of that substance. Age, sex, family income, population density of residence, self-rated health, and survey year were adjusted in the analyses to mitigate for their confounding effects on associations between race/ethnicity and each substance-related disorder.^{10,12,26-30} Analyses were conducted using commercially available software (SUDAAN, Release 9.0; Research Triangle Institute, Research Triangle Park, North Carolina), considering the complex designs, such as weighting and clustering, of the NSDUH.³⁵ All results are weighted except for sample sizes (unweighted).

RESULTS

SOCIODEMOGRAPHIC CHARACTERISTICS

There were no yearly differences in the distribution of racial/ethnic groups among 72 561 adolescents. Compared with other racial/ethnic groups, more adolescents aged 12 to 13 years were among Hispanics and among those of multiple race/ethnicity (eTable 1; [ARCH GEN PSYCHIATRY/VOL 68 \(NO. 11\), NOV 2011 WWW.ARCHGENPSYCHIATRY.COM](http://www</p></div><div data-bbox=)

Table. One-Year Prevalence of Substance Use Among 72 561 Adolescents Aged 12 to 17 Years by Race/Ethnicity^a

Substance Use	Race/Ethnicity, % (95% CI)						χ^2 Statistic ^b
	White (n=43 778)	African American (n=10 109)	Native American (n=1122)	Asian or Pacific Islander (n=2481)	Multiple (n=2814)	Hispanic (n=12 257)	
Alcohol or drug	39.2 (38.7-39.7)	32.2 (30.9-33.5)	47.5 (42.2-52.9)	23.7 (21.5-26.0)	36.4 (33.6-39.3)	36.7 (35.3-38.0)	257.1
Alcohol and drug	16.2 (15.8-16.5)	11.1 (10.3-12.0)	20.5 (16.2-25.5)	6.8 (5.5-8.4)	18.1 (16.1-20.3)	13.9 (12.8-14.9)	240.3
Alcohol	35.3 (34.8-35.9)	24.8 (23.6-26.0)	37.0 (31.3-42.9)	18.9 (17.2-20.7)	31.1 (28.8-33.6)	32.2 (30.8-33.6)	436.8
Any drug ^c	20.0 (19.6-20.4)	18.6 (17.6-19.7)	31.0 (26.6-35.8)	11.7 (10.0-13.6)	23.3 (20.8-26.1)	18.3 (17.2-19.5)	125.2
Marijuana	13.9 (13.5-14.4)	12.2 (11.3-13.1)	23.5 (19.4-28.2)	5.7 (4.5-7.2)	16.3 (14.4-18.4)	11.8 (10.9-12.7)	163.8
Inhalant	4.5 (4.4-4.8)	2.9 (2.5-3.4)	5.3 (3.3-8.3)	2.8 (2.0-4.0)	4.8 (3.5-6.6)	4.4 (3.8-5.0)	61.8
Cocaine	1.8 (1.7-2.0)	0.2 (0.1-0.4)	3.7 (2.0-6.8)	0.6 (0.4-1.2)	2.3 (1.5-3.5)	1.6 (1.4-2.0)	285.5
Hallucinogen	3.2 (3.0-3.4)	0.7 (0.6-1.0)	4.5 (2.8-7.1)	1.0 (0.6-1.8)	4.6 (3.4-6.1)	2.2 (1.8-2.6)	304.0
Analgesic opioid	7.5 (7.2-7.8)	5.5 (4.9-6.1)	9.7 (7.4-12.6)	4.3 (3.3-5.4)	8.8 (7.2-10.8)	5.6 (5.0-6.4)	120.7
Stimulant	2.2 (2.0-2.3)	0.8 (0.6-1.1)	2.4 (1.5-3.7)	0.8 (0.4-1.7)	1.9 (1.3-2.6)	1.4 (1.1-1.8)	114.5
Tranquilizer	2.6 (2.4-2.8)	0.6 (0.5-0.9)	2.5 (1.6-4.1)	0.7 (0.3-1.4)	2.6 (1.6-4.3)	1.3 (1.0-1.6)	262.4

^aResults for heroin and sedative use (<1% of the sample) are not reported because of the small sample size of users.

^bAll values are $P < .01$.

^cIncludes any of the following for illicit or nonmedical use: marijuana, inhalant, cocaine, hallucinogen, heroin, analgesic opioid, stimulant, sedative, and tranquilizer.

archgenpsychiatry.com). More African Americans (63.8%), Hispanics (56.7%), and Native Americans (56.2%) were in the lowest annual income group (<\$40 000) compared with other racial/ethnic groups (range, 25.7%-37.7%) (eTable 1). Most Asians or Pacific Islanders (75.9%), African Americans (63.8%), and Hispanics (63.5%) resided in large metropolitan areas, while Native Americans were more likely to reside in non-metropolitan areas (34.4%). More Native Americans (6.8%), African Americans (4.9%), and Hispanics (4.9%) reported poor or fair health than adolescents of white race/ethnicity (3.1%).

PREVALENCE OF SUBSTANCE USE

Overall, 37.0% (n=27 705) of adolescents used alcohol or drugs in the past year (32% any alcohol, 19% any illicit or nonmedical drugs, and 15% alcohol and drugs). Of all drug classes, the use of marijuana (13% of all adolescents) or analgesic opioids (7%) was more prevalent than the use of other drugs (range, 0.1%-4%). Native Americans had the highest prevalence of substance-related use (47.5%); Native Americans (20.5%), adolescents of multiple race/ethnicity (18.1%), and adolescents of white race/ethnicity (16.2%) had a higher prevalence of using both alcohol and drugs than other groups (Table). For all racial/ethnic groups, there was an age-related increase in alcohol or drug use (eTable 2).

PREVALENCE OF SUBSTANCE-RELATED DISORDERS

Among all adolescents aged 12 to 17 years, 7.9% (n=6166) met criteria for a substance-related disorder, and 2.0% met criteria for both substance-related disorders in the past year (5.4% any alcohol use disorder and 4.6% any drug use disorder). Marijuana (3.4%) and analgesic opioid (1.2%) use disorders were the most prevalent drug use disorders. The prevalence of various substance-

related disorders is summarized in eTable 3. Native Americans had the highest prevalence of substance-related disorder (15.0%), followed by adolescents of multiple race/ethnicity (9.2%), adolescents of white race/ethnicity (9.0%), Hispanics (7.7%), African Americans (5.0%), and Asians or Pacific Islanders (3.5%) (Figure 1).

CONDITIONAL PREVALENCE OF SUBSTANCE-RELATED DISORDERS AMONG SUBSTANCE USERS

Conditional rates of substance-related disorders (the prevalence of substance-related disorders among users of the corresponding substance), suggesting the substance-specific liability for having a substance-related disorder among users, showed that 21.5% of past-year alcohol or drug users met criteria for a substance-related disorder (Figure 2). Marijuana (25.9% of marijuana users), heroin (26.4%), cocaine (23.4%), and sedative (22.8%) use demonstrated similarly high conditional rates. Among alcohol users, 16.7% had an alcohol use disorder.

Substance-specific frequency of use helps in interpreting conditional rates (Figure 3). Marijuana users on average spent the highest mean number of days per year using the drug (79 days), followed by stimulant users (47 days), analgesic opioid users (39 days), alcohol users (36 days), sedative users (35 days), heroin users (33 days), tranquilizer users (33 days), cocaine users (31 days), inhalant users (29 days), and hallucinogen users (20 days). Substance-specific frequency of use by race/ethnicity is summarized in eTable 4.

RACIAL/ETHNIC DIFFERENCES IN CONDITIONAL PREVALENCE OF SUBSTANCE-RELATED DISORDERS

There were notable racial/ethnic differences in the conditional prevalence of various substance-related disorders (eTable 5). Among alcohol or drug users (n=27 705),

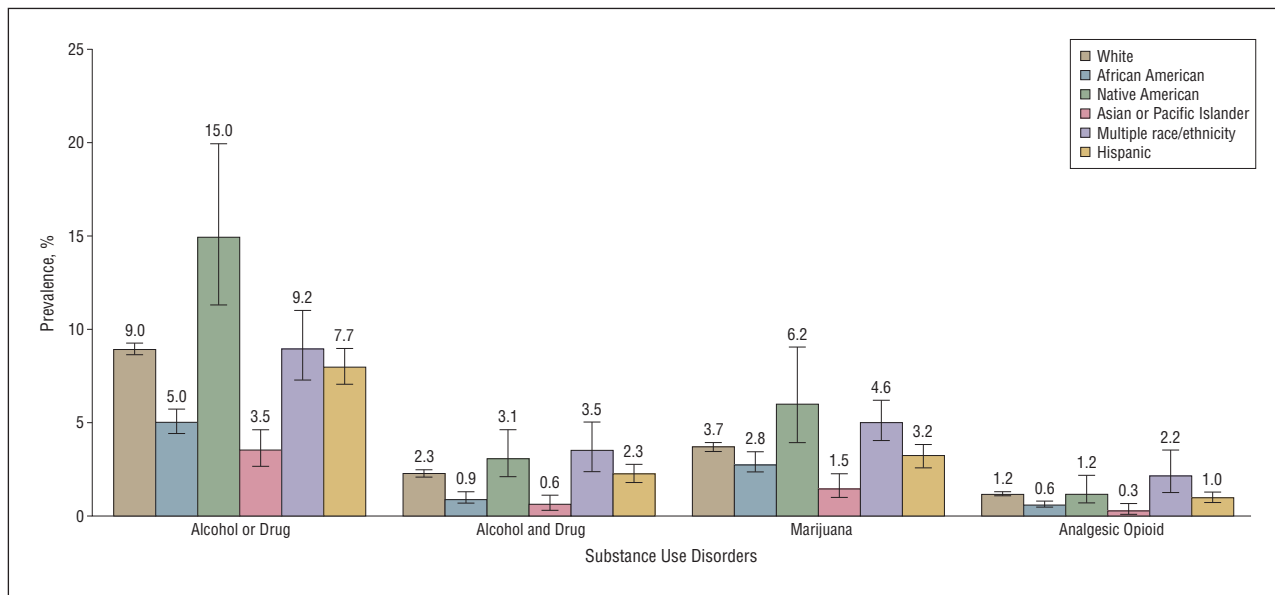


Figure 1. One-year prevalence of substance use disorders (abuse or dependence) among 72 561 adolescents aged 12 to 17 years by race/ethnicity. Lines extending from bars indicate 95% CIs of the estimates.

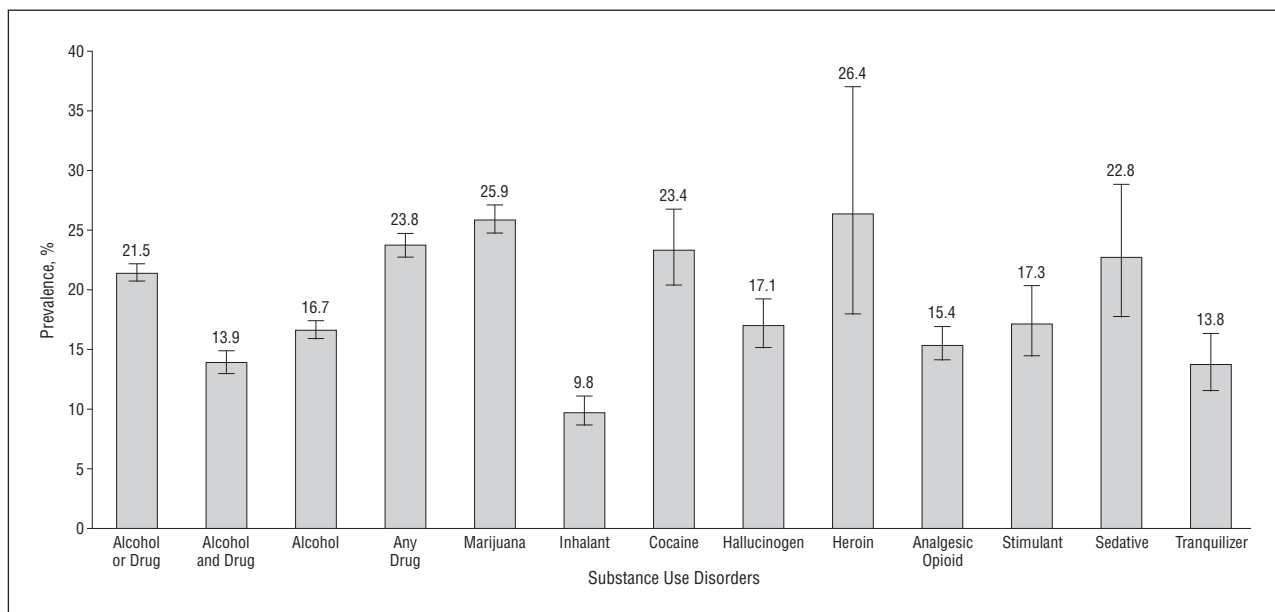


Figure 2. One-year conditional prevalence of substance use disorders (abuse or dependence) among 27 705 adolescent substance users aged 12 to 17 years by substance used. Lines extending from bars indicate 95% CIs of the estimates.

Native Americans (31.5%) and adolescents of multiple race/ethnicity (25.2%) exhibited comparatively high conditional rates of any substance-related disorder (**Figure 4**). Native American users had a higher conditional rate of any substance-related disorder than adolescents of white race/ethnicity (22.9%), Hispanics (21.0%), African Americans (15.5%), and Asians or Pacific Islanders (14.9%). Adolescents of multiple race/ethnicity (19.4%), Hispanics (16.2%), and adolescents of white race/ethnicity (14.3%) had higher conditional rates of comorbid alcohol and drug use disorders than African Americans (8.3%).

CONDITIONAL PREVALENCE OF ABUSE VS DEPENDENCE AMONG SUBSTANCE USERS

In response to recent findings showing that nonwhite adults are more likely than those of white race/ethnicity to have dependence than abuse,³⁶ conditional rates of abuse were distinguished from conditional rates of dependence to discern whether dependence disproportionately affected adolescents of nonwhite race/ethnicity (eTable 6). Among alcohol users, a higher prevalence of alcohol abuse vs alcohol dependence was more common among adolescents of white race/ethnicity (11.4%

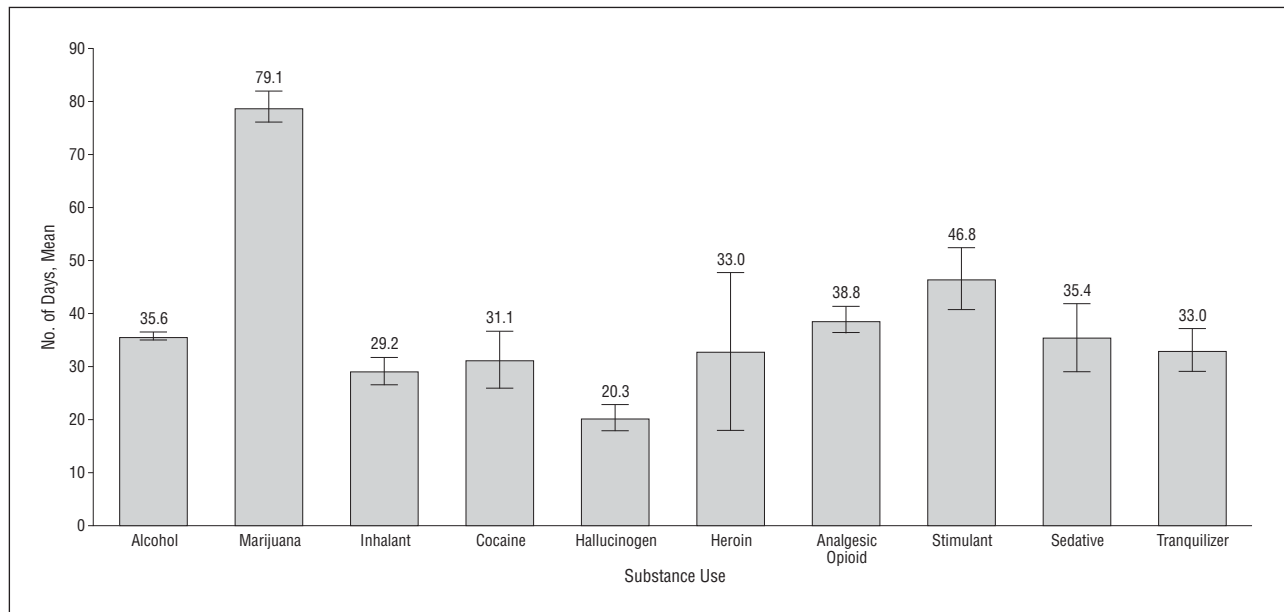


Figure 3. Mean number of days of substance use in the past year among 27 705 adolescent past-year users aged 12 to 17 years by substance used. Lines extending from bars indicate 95% CIs of the estimates.

vs 6.5%, $P < .05$) and Hispanics (10.4% vs 6.7%, $P < .05$). Among any drug users, Asians or Pacific Islanders (12.8% vs 4.3%, $P < .05$) and adolescents of multiple race/ethnicity (18.4% vs 8.9%, $P < .05$) were more likely to have drug dependence vs drug abuse. White inhalant users were more likely to have inhalant abuse than inhalant dependence (6.5% vs 3.2%, $P < .05$). Given the scarcity of information about substance-using adolescents of multiple race/ethnicity, their sociodemographic characteristics were explored (eTable 7).

ADJUSTED ODDS RATIOS OF SUBSTANCE-RELATED DISORDERS AMONG SUBSTANCE USERS

Logistic regression analyses were conducted to determine whether substance-using adolescents of white race/ethnicity, Native Americans, adolescents of multiple race/ethnicity, or Hispanics showed a higher likelihood of having substance-related disorders than substance-using African Americans, adjusting for age, sex, family income, population density of residence, self-rated health, and survey year (eTable 8). Adolescents of white race/ethnicity, Native Americans, adolescents of multiple race/ethnicity, and Hispanics had greater odds than African Americans of having alcohol, any drug, and comorbid alcohol and drug use disorders (adjusted odds ratio [aOR] range, 1.35-3.36). Multiple-race adolescents (aOR, 2.42; 95% CI, 1.21-4.81), adolescents of white race/ethnicity (1.46; 1.02-2.07), and Hispanics (1.63; 1.07-2.49) also had greater odds than African Americans of having an analgesic opioid use disorder. Compared with those aged 16 to 17 years, these analyses also showed an age-related increase in alcohol use disorders (aOR, 0.45; 95% CI, 0.37-0.54 for ages 12-13 years; and 0.72; 0.66-0.79 for ages 14-15 years) and any drug use disorders (0.36, 0.29-0.44 for ages 12-13 years; and 0.83; 0.74-0.93 for ages 14-15 years). Poor or fair health was associated with

increased odds of any substance-related disorder (aOR, 1.60; 95% CI, 1.39-1.86), comorbid alcohol and drug disorders (1.36; 1.09-1.70), or any drug use disorder (1.69; 1.44-2.00). Large metropolitan residence was associated with reduced odds of alcohol use disorders compared with nonmetropolitan residence (aOR, 0.83; 95% CI, 0.70-0.99).

Finally, we explored whether the association between race/ethnicity and substance-related disorder might be influenced by differences in frequency of use across racial/ethnic groups by adjusting the frequency of use of the corresponding substance for each model. All results showed minimal changes on aORs.

COMMENT

This study documents national estimates of past-year substance-related disorders among adolescents aged 12 to 17 years. The findings should prove useful to concerned citizens, health professionals, researchers, and health policy experts. First, past-year alcohol or drug use is widespread (37.0%), and about 1 in 12 adolescents self-reported having a substance-related disorder, with Native Americans showing the highest prevalence of use and disorders. Second, analgesic opioids have replaced inhalants as the second most commonly used drug (following marijuana), and analgesic opioid use disorders comprise the second most prevalent illicit drug use disorder. Third, close to one-fourth of adolescent alcohol or drug users met *DSM-IV* criteria for a substance-related disorder, and users of marijuana, heroin, cocaine, or sedatives showed an elevated rate of abuse or dependence on these drugs. Fourth, adolescents used marijuana more frequently than alcohol or other drugs. Fifth, adolescents of Native American, white, Hispanic, and multiple race/ethnicity are disproportionately affected by substance-related disorders.

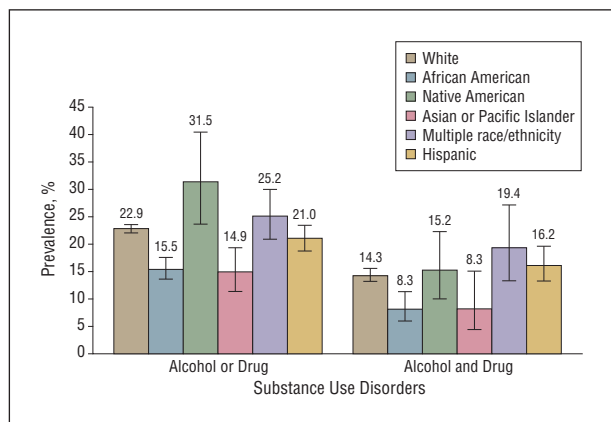


Figure 4. One-year conditional prevalence of substance use disorders (abuse or dependence) among 27 705 adolescent substance users aged 12 to 17 years by race/ethnicity. Lines extending from bars indicate 95% CIs of the estimates.

HIGH RATES OF SUBSTANCE-RELATED DISORDERS AMONG ADOLESCENTS OF NATIVE AMERICAN, WHITE, HISPANIC, AND MULTIPLE RACE/ETHNICITY

Prior school-based investigations have not assessed substance-related disorders; prescription drug problems were not a major concern, and data for adolescents of multiple race/ethnicity were unavailable.^{17,18,37} The growing sizes of racial/ethnic groups, plus the elevated rate of prescription drug use problems, necessitate updated and systematic research to discern intervention needs across these groups.^{11,13,38} This study expands on earlier studies by including school dropouts and adolescents of multiple race/ethnicity, examining substance-related disorders to improve measures of substance use burden, and presenting new data on all available substance-related disorders to make direct comparisons of indicators of intervention needs across racial/ethnic groups. In addition to supporting a high prevalence of substance use among those of Native Americans, white, and Hispanic race/ethnicity,^{17,18,37} adolescents of multiple race/ethnicity were found to have the second highest prevalence of alcohol use (following those of white race/ethnicity) and any drug use (following Native Americans). Close to one-tenth of adolescents of multiple race/ethnicity self-reported having a substance-related disorder, and one-fourth of substance-using adolescents of multiple race/ethnicity exhibited a substance-related disorder. These estimates were as high as those for adolescents of Native American, white, and Hispanic race/ethnicity. These 4 groups are disproportionately affected by symptoms of substance-related disorders.

When distinguishing abuse from dependence,³⁶ drug-using adolescents of multiple race/ethnicity exhibited a higher prevalence of dependence than abuse, suggesting that substance use problems could be a unique challenge for research and intervention as this population grows.^{11,12} While substance use is influenced by multiple peer, individual (depression and delinquency), family (poor parenting), school (location), and community (neighborhood deterioration) domains,³⁹⁻⁴² research also has identified cultural-specific risk (greater accultura-

tion) and protective correlates (cultural pride and ethnic/racial identity) for substance use, suggesting that cultural-specific issues should be addressed for interventions to be effective.^{13,14,43-45} However, cultural-related factors have yet to be investigated for adolescents of multiple race/ethnicity. About 2% of the US population are of multiple race/ethnicity, which includes 3 subgroups of similar size (white and African American, white and Native American, and white and Asian or Pacific Islander) and a small subgroup self-identifying themselves as more than 3 races/ethnicities.⁴⁶ Heterogeneous cultural backgrounds of individuals of multiple race/ethnicity emphasize the need for multidisciplinary approaches to disentangle cultural related factors that can guide prevention and treatment.^{12,14,47}

NATIVE AMERICAN ADOLESCENTS REQUIRE CONCERTED RESEARCH AND INTERVENTION EFFORTS

Another concern is the high rate of substance-related disorders among Native Americans. Consistent with earlier studies,^{17,37,48} Native Americans showed the highest prevalence of substance-related use (47.5%). Native Americans also demonstrated the highest rate of substance-related disorder (15.0%); among past-year substance-using Native Americans, 31.5% met criteria for a substance-related disorder. In a sample of 651 indigenous adolescents from a single culture in the northern United States and Canada aged 13 to 15 years, Whitbeck et al⁴⁹ found that 12.7% self-reported having a past-year alcohol use disorder, and 15.4% had a past-year marijuana use disorder. However, there is a scarcity of research on young Native Americans who obtain addiction treatment.⁵⁰ Given that this population is generally younger (39% are <20 years) and poorer than other ethnic/racial groups,⁵¹ young Native Americans have great need for intervention to reduce burdens from substance use. There are 562 federally recognized American Indian tribes in the United States; the cultural diversity and geographic dispersion of these tribes have important implications for research and service provision, requiring policy support to develop culturally appropriate interventions to improve their health.⁵²⁻⁵⁴

MARIJUANA AND ANALGESIC OPIOIDS CONSTITUTE THE PRIMARY DRUGS OF ABUSE

The results also support rising concerns about adolescent marijuana use.²⁵ Marijuana use disorders constituted 74.0% of all illicit or nonmedical substance-related disorders, and 25.9% of marijuana users exhibited a marijuana use disorder, which (along with heroin, cocaine, and sedatives) represented the highest conditional rate of substance-related disorders. The high rate can be related to frequency of use, as marijuana users (on average) spent the most days using the drug compared with other substance users. This is the first known study to present such findings for all substance classes, and it reveals cause for concern owing to the large number of past-year marijuana users (13.0% of all adolescents), a recent increase in marijuana use, increased levels of mari-

juana potency, and potential adverse effects on adolescents' health and subsequent productivity.^{24,25,55,56} Research is needed to closely monitor marijuana use and associated disorders among adolescents and identify prevention programs that truly work.

Lastly, analgesic opioids constitute the second most commonly used illicit drug among all racial/ethnic groups, with adolescents of Native American, white, and multiple race/ethnicity showing comparatively high rates of use. The large sample helped identify analgesic opioid-using adolescents of these racial/ethnic groups exhibiting elevated odds of analgesic opioid use disorders. Compared with results from earlier studies,^{17,37,48} findings herein support an elevated rate of nonmedical analgesic opioid use and analgesic opioid-related problems across various racial/ethnic groups. This finding is consistent with evidence showing that one-fourth of users of nonmedical analgesic opioids aged 12 to 17 years had never used other illicit or nonmedical drugs²² and that adolescents have generally considered analgesic opioids safer and easier to get than illicit drugs, and reported parents' medicine cabinets, family members, or friends as primary sources.^{57,58} Unfortunately, analgesic opioids are among the most addictive and lethal drugs when used improperly.^{59,60} Clearly, educational or prevention interventions should incorporate effective messages about health risk for nonmedical use or abuse of prescription drugs, and screening for nonmedical drug use should be considered for high-risk adolescents.

LIMITATIONS AND STRENGTHS

These findings should be interpreted with caution. The NSDUH relies on self-reports, which can be influenced by memory error and underreporting. As in other surveys, substance-related disorders are surveyed in the NSDUH based on standardized questions designed to operationalize *DSM-IV* criteria for substance-related disorders; these rates are self-reported estimates, not clinical diagnoses. Of note, the NSDUH-based past-year 6.7% prevalence of substance-related disorders (alcohol or drug) among adults in 2000 resembled the 7.4% prevalence of substance-related disorders among adults in the National Longitudinal Alcohol Epidemiologic Survey.³⁴ Findings also do not apply to institutionalized or homeless adolescents, who were not included in the NSDUH. Nicotine dependence is excluded because it was not based on *DSM-IV* criteria; hence, adolescents' substance-related disorder problems are greater than our findings have suggested. This study also does not address the influence of community-level poverty or intraethnic differences (eg, differences among Hispanic groups) in substance-related disorders, as detailed measures are unavailable.^{13,39,43,61} Given the increasing cultural diversity of the US population, the availability of data sets for specific racial/ethnic groups and community-level poverty in future NSDUH would make it possible to monitor disparities in substance-related disorders for heterogeneous racial/ethnic groups.

The NSDUH also has noteworthy strengths. These results have a higher level of generalizability than those of a regional sample owing to high response rates and the

large sample consisting of students and nonstudents or school dropouts. The 3.8% proportion of nonstudents or school dropouts among adolescents aged 16 to 17 years in this sample was similar to the 3.9% proportion of dropouts among US public high school students.⁶² While the US Census does not provide detailed information about racial/ethnic groups for adolescents aged 12 to 17 years, this study's distributions resemble those of all ages in the United States among groups of Native American (0.6% vs 0.7%), Asian or Pacific Islander (4.4% vs 4.4%), and multiple (1.7% vs 1.6%) race/ethnicity.⁴⁶

Furthermore, based on continuous research efforts and enhancements to improve national substance-related disorder estimates, the NSDUH uses the most sophisticated survey methods available to improve the quality of self-reported data (detailed probes, color pictures of prescription drugs to augment assessments for substance use, and computer-assisted self-administration interviewing and anonymous data collection to enhance privacy).³¹ A large reliability study⁶³ found substantial (for abuse or dependence questions) to almost perfect (for cigarette, alcohol, and marijuana use questions) response agreement for key NSDUH measures; another NSDUH validity study⁶⁴ revealed high agreement between self-reported use and urine drug test results (84.6% for tobacco, 89.8% for marijuana, and 95.5% for cocaine). The trend data of the NSDUH on various drug use patterns among adolescents are remarkably consistent with trend data from Monitoring the Future.^{10,31} Given the growing diversity and size of the young population and the scarcity of substance-related disorder indicators, this study makes a unique contribution by providing new information to elucidate the magnitude of illicit and prescription drug use disorders for understudied Asians or Pacific Islanders, Native Americans, Hispanics, and African Americans.

CONCLUSIONS

Native Americans have the highest prevalence of substance use and substance-related disorders, adding to evidence that young Native Americans are a vulnerable group facing numerous stressors, trauma, and health disparities (eg, highest rate of suicide, underfunded systems of care, and lack of access to appropriate care).⁶⁵ The results herein highlight a critical need for intervention to reduce their burdens from substance use and for policies to address presently underfunded systems of care and improve infrastructures linking behavioral and primary health care services.^{34,65} In addition, high rates of substance use and substance-related disorders among adolescents of multiple race/ethnicity provide a rationale for including them in research analysis and reporting findings as appropriate. Furthermore, while health care providers who regularly see adolescents for periodic checkups can have a critical role in screening for substance use and early intervention, substantial barriers to recommended practices exist, and research is needed to identify incentives and means to promote screening and timely intervention.^{66,67} Finally, many addiction treatment programs either exclude adolescents from treatment (eg, pro-

gram policies) or integrate adolescents into programs serving adults. Even within adolescent-specific programs, key elements for effective treatment are often inadequately addressed, and a lack of cultural competence is identified as a major gap, as insensitivity to cultural differences can limit the ability to treat and retain minority adolescents.^{14,68-70} Taken together, these findings call for efforts to identify and expand prevention measures that are culturally effective and address the quality and acceptability of treatment for adolescents with substance use problems.^{67,70}

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