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Youth tobacco use type and associations with substance use disorders

Patricia A. Cavazos-Rehg, Ph.D.^a, Melissa J. Krauss, M.P.H.^a, Edward L. Spitznagel, Ph.D.^b, Richard A. Grucza, Ph.D.^a, and Laura Jean Bierut, M.D.^a

^aDepartment of Psychiatry, Washington University School of Medicine, St. Louis, MO 63110

^bDepartment of Mathematics, Washington University in St. Louis, St. Louis, MO 63130

Abstract

Aims—To examine the associations between youth poly-tobacco use and substance use disorders.

Design—Analysis of data from the 2007–2011 U.S. National Survey on Drug Use and Health.

Setting—Randomly selected, household-dwelling adolescents from the noninstitutionalized, civilian population of the U.S.A.

Participants—A total of 91,152 adolescents (ages 12–17).

Methods—Logistic regression models were used to examine the associations between type of tobacco user (non-user, users of alternative tobacco products only, users of cigarettes only, and users of cigarettes plus alternative tobacco products) with past year alcohol, marijuana, or other illicit drug use disorders, adjusting for demographic and social variables.

Findings—Compared with non-users of tobacco, the greatest risk for substance use disorders was among users of cigarettes plus alternative tobacco products (alcohol disorder adjusted odds ratio [aOR] 18.3, 95% confidence interval [CI] 16.2–20.6; marijuana disorder aOR 37.2, 95% CI 32.5–42.7; other drug disorder aOR 18.4, 95% CI 15.4–21.8), followed by users of cigarettes only (alcohol disorder aOR 9.6, 95% CI 8.8–10.6; marijuana disorder aOR 20.4, 95% CI 18.1–23.0; other drug disorder aOR 9.4, 95% CI 7.8–11.4), then users of alternative tobacco products only (alcohol disorder aOR 8.1, 95% CI 6.7–9.6; marijuana disorder aOR 9.2, 95% CI 7.5–11.4; other drug disorder aOR 3.2, 95% CI 2.4–4.3).

Conclusions—Tobacco use in adolescence is associated with higher rates of substance use disorders across all tobacco users, especially among those who use cigarettes plus other tobacco products.

Keywords

substance use disorders; poly-tobacco use; risk perceptions; youth tobacco use

Please address correspondence and reprint requests to: Patricia A. Cavazos-Rehg, Ph.D., Campus Box 8134, Department of Psychiatry, 660 South Euclid, St. Louis, MO 63110, Phone: (314) 362-2152, FAX: (314) 362-4247, rehgp@psychiatry.wustl.edu.

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INTRODUCTION

Less progress has been made in reducing the use of alternative (non-cigarette) tobacco products relative to cigarette use in the U.S., especially among underage youth (<18 years of age). In 2001, ~30% of high-school youth in the U.S. were current cigarette smokers versus 18% in 2011 [1]. In contrast, the prevalence of youth using alternative tobacco products has remained static for nearly a decade with 12% of youth currently using alternative tobacco products [2, 3]. Alternative tobacco products are not currently regulated by the U.S. Food and Drug Administration and they are inexpensive versus conventional cigarettes [4–7]. In addition, the popular notion that alternative tobacco products are less harmful than conventional cigarettes likely contributes to their popularity [2, 4–11]. Still, many of these products contain a substantial amount of nicotine and are associated with serious health risks [12–14].

The combination of cigarette smoking with alcohol and illicit drug use behaviors has been well-documented [15–18]. Rates of cigarette smoking in the U.S. are quite high among those with substance use disorders with estimates up to 80% [19, 20]. Tobacco use is associated with poorer treatment outcomes for substance use disorders. For instance, youth with substance use disorders have a high relapse rate of up to 50% within 3 months of completing substance use treatment [21]. Youth who continue or initiate smoking cigarettes during or following substance use treatment are even more likely to relapse [22] and report heavier use of alcohol and drugs following relapse than non-tobacco users [23].

Deleterious health consequences are greater for youth poly-tobacco users who are more likely to engage in alcohol and illicit drug use versus users of one tobacco product [24, 25]. In a study that examined characteristics of tobacco use in a large population of Air Force recruits, poly-tobacco users reported more total alcohol use and binge drinking [26]. In a related national study, youth poly-tobacco users were most likely to have used alcohol, marijuana, and/or cocaine in the last 30 days versus non-tobacco users and users of one tobacco product [27]. Taken together, the findings underscore the clustering of substance use behaviors that are more pronounced for poly-tobacco users.

Therefore, while it is clear that tobacco use is more frequent and heavier among individuals with alcohol and other drug problems [28, 29], the extent to which these associations vary across different types of tobacco users (i.e., non-users versus alternative tobacco users only, conventional cigarette users only, poly-tobacco users who combine alternative tobacco products plus conventional cigarettes) is unknown. In the present study, we examine the associations between different types of youth tobacco users and substance use disorders using data from a nationally representative sample. We also focus our analysis on clinically diagnosable substance use behaviors because tobacco has a strong contemporaneous relationship with alcohol and illicit drug use behaviors and potentially impedes abstinence following substance use treatment. Given the changing tobacco use landscape among U.S. youth we distinguish between conventional cigarette users and alternative tobacco product users. Moreover, because alternative tobacco products can be viewed as “less harmful” than conventional cigarettes [2, 4–11], we additionally examine if youth who use alternative

tobacco products are more conscientious of the adverse outcomes for substance misuse, in general, versus users of conventional cigarettes.

METHODS

Survey setting and tools

The analyses presented in this study utilized public use files of the 2007–2011 National Survey on Drug Use and Health (NSDUH) [30]. The NSDUH is an annual nationwide cross-sectional survey that provides population estimates of substance use and health status of the noninstitutionalized U.S. civilian population aged 12 or older. Independent, multistage area probability samples are collected for each of the 50 states and the District of Columbia. Informed consent was obtained from all participants. A total of 283,216 respondents completed the survey in 2007–2011 and present analyses include subjects that are ages 12–17 years old at the time of participation (n=91,152). We used five recent years of NSDUH data in order to increase the total sample size of youth tobacco users, specifically alternative tobacco users, thus increasing power for analyses.

Measures

Past month tobacco use was assessed for the following products: cigarettes, cigars, pipe, chew, and snuff. Youth were classified into tobacco user groups representing a) non-tobacco users (did not use any of the above tobacco products in the past month), b) users of alternative products (cigars, chew, snuff, and/or pipe) but not cigarettes in the past month, c) users of only cigarettes in the past month, and d) users of cigarettes plus alternative products (cigars, chew, snuff, and/or pipe) in the past month.

The NSDUH substance use disorder assessment queries past year alcohol, marijuana, or other illicit drug use disorder and is specified to be consistent with DSM-IV criteria; this instrument has been clinically validated [31]. Given the new diagnostic criteria for DSM-5, we developed an algorithm to make these diagnoses. Participants were identified as having a DSM-5 diagnosis for a substance use disorder if they endorsed two or more criteria within a 12-month period which included hazardous use, social/interpersonal problems related to use, neglected major roles to use, withdrawal, tolerance, used larger amounts/longer, repeated attempts to quit/control use, much time spent using, physical/psychological problems related to use, activities given up to use. The craving symptom was not included in the NSDUH assessment. Legal problem(s) is a DSM-IV symptom but is not a symptom to meet criteria for a DSM-5 diagnosis and was therefore excluded from our analysis of DSM-5 diagnoses. Illicit drug disorder (other than marijuana) was defined based on criteria for cocaine, heroin, pain relievers, sedatives, stimulants, hallucinogens, inhalants, or tranquilizer disorders.

The NSDUH asks participants aged 12 to 17 how much people risk physical and other harm when they smoke one or more packs of cigarettes per day, drink four to five alcoholic drinks nearly every day, use marijuana once or twice a week, use cocaine, use LSD, and/or use heroin once or twice a week. Risk perceptions of cocaine, LSD, and heroin use were the only illicit drugs (other than marijuana) queried in the NSDUH. Response choices are (1) no risk, (2) slight risk, (3) moderate risk, and (4) great risk. We collapsed responses for

moderate, slight, and no risk to dichotomize responses in order to measure great risk for harm versus all others. We combined the perceived risk scores for cocaine, LSD, and heroin into one illicit drugs (other than marijuana) score by averaging the risk score across the three substances; then if the average score was 3.5 or more, the respondent was coded as perceiving great risk for harm.

We controlled for participants' sex, race/ethnicity, age, annual family income, and the population density of the county in which the respondent resided. Population density was classified into large metropolitan areas (population ≥ 1 million), small metropolitan areas (population < 1 million), and non-metropolitan areas (outside a standard metropolitan statistical area).

Statistical Analysis

The prevalence of substance use disorders (alcohol, marijuana, other illicit drugs) and belief that regular use of substances was not of great risk was compared among the tobacco user types (non-user (reference), alternative products only, cigarettes only, cigarettes plus alternative products) using chi square tests of independence. $P < .05$ was considered statistically significant.

Logistic regression models were used to examine the association between type of tobacco user with each type of substance use disorder (alcohol, marijuana, other illicit drugs), adjusting for social and demographic variables described above and year. We first assessed the substance use disorders as defined by DSM-IV criteria, then used the DSM-5 criteria described above. Model results were nearly identical for participants with a DSM-IV substance use disorder diagnosis versus a DSM-5 substance use disorder diagnosis; therefore, we present results on the DSM-5 diagnoses only for brevity. Next we assessed the associations between type of tobacco user (non-user as the reference) with the perception that use of each substance was *not* of great risk, adjusting for the same social and demographic variables described above and survey year. All models were additionally run, excluding non-tobacco users and using cigarette users only as the reference group. To account for the potential impact of users of blunts (cigars with marijuana in them) on the associations between type of tobacco user and marijuana use disorder or marijuana risk perceptions, we also ran these models excluding current (past 30 day) blunt users. Odds ratios and 95% confidence intervals are presented.

The NSDUH uses a complex sampling design employing a 50-state design with an independent multistage area, deeply stratified, probability sample for each of the 50 states and the District of Columbia. Sample weights are provided to obtain unbiased estimates for survey outcomes [32]. The sample design must be incorporated into the analysis because it affects estimation of standard errors [33]. Thus, all analyses were performed using SAS-callable SUDAAN version 11.0.0, a software program that uses Taylor series linearization to adjust for design effects of complex sample surveys and apply survey weights [34].

RESULTS

Most of the participants were non-tobacco users (88.8%, 95% confidence interval [CI] 88.5–89.0%); 2.4% (95% CI 2.3–2.6%) were alternative tobacco users only; 5.6% (95% CI 5.4–5.8%) were conventional cigarette users only; 3.2% (95% CI 3.1–3.4%) were users of conventional cigarettes and alternative tobacco products. Among users of only alternative tobacco products, the most popular products used were cigars only (45.3%, 95% CI 42.6–48.0%), followed by snuff only (22.0%, 95% CI 20.0–24.2%), both chew and snuff (10.8%, 95% CI 9.4–12.4%), and pipe only (6.8%, 95% CI 5.6–8.1%). Among those that used both cigarettes and at least one alternative tobacco product, the most common combinations of other products used were cigars only (53.1%, 95% CI 50.8–55.4%), snuff only (10.3%, 95% CI 9.1–11.7%), chew and snuff (6.0%, 95% CI 5.0–7.3%), and cigars and pipe (6.0%, 95% CI 4.8–7.4%).

Slightly more than half of participants were male, nearly 60% were Caucasian, and roughly 1/3 fell into each of the age groups of 12–13 years, 14–15 years, and 16–17 years (Table 1 contains additional demographic characteristics).

Type of tobacco user and substance use disorders

Approximately 5.5% (95% CI 5.3–5.7%) of participants exhibited 2 symptoms for an alcohol use disorder; 4.6% (95% CI 4.4–4.8%) exhibited 2 symptoms for a marijuana use disorder; 2.3% (95% CI 2.1–2.4%) exhibited 2 symptoms for other illicit drug use disorders. Of the 9.5% (95% CI 9.2–9.7%) of youth who had one or more substance use disorder, over half (57.0%, 95% CI 55.7–58.3%) were current tobacco users. Of youth with alcohol disorder, over half (58.5%, 95% CI 56.9–60.1%) used some type of tobacco. Of those with marijuana use disorder, 71.2% (95% CI 69.4–73.0%) used tobacco. Of those with drug use disorder other than marijuana, 54.2% (95% CI 51.0–57.3%) used tobacco. The prevalence of substance use disorders was highest among users of cigarettes and alternative tobacco products, followed by users of cigarettes only, alternative tobacco products only, and non-tobacco users (alcohol use disorder Wald $F=608.0$, $p<.001$; marijuana use disorder Wald $F=603.7$, $p<.001$; other drug use disorder Wald $F=153.0$, $p<.001$) (Figure 1).

In the multivariable logistic regression models (Table 2), compared to non-tobacco users (lowest risk group), users of alternative tobacco products only were much more likely than non-tobacco users to have a substance use disorder (alcohol use disorder adjusted odds ratio [aOR] 8.1, 95% CI 6.7–9.6; marijuana use disorder aOR 9.2, 95% CI 7.5–11.4; other drug use disorder aOR 3.2, 95% CI 2.4–4.3). The odds of substance use disorders were even higher among cigarette smokers (only) compared to non-tobacco users (alcohol use disorder aOR 9.6, 95% CI 8.8–10.6; marijuana use disorder aOR 20.4, 95% CI 18.1–23.0; other drug use disorder aOR 9.4, 95% CI 7.8–11.4). Furthermore, users who combined cigarettes with alternative tobacco products had the greatest odds of substance use disorders (alcohol use disorder aOR 18.3, 95% CI 16.2–20.6; marijuana use disorder aOR 37.2, 95% CI 32.5–42.7; other drug use disorder aOR 18.4, 95% CI 15.4–21.8). For marijuana and other drug use disorders, the non-overlapping confidence intervals for the odds ratios associated with the different types of tobacco users indicated that risks were highest among users of cigarettes and alternative tobacco products, followed by cigarettes only, and users of alternative

tobacco products only. For alcohol use disorders, the odds associated with users of cigarettes and alternative products was significantly greater than users of cigarettes only and users of alternative products only (indicated by non-overlapping confidence intervals).

Compared to users of cigarettes only, users of alternative tobacco products only had significantly lower odds of substance use disorders (aOR 0.8, 95% confidence interval (CI) 0.7–0.98; marijuana aOR 0.5, 95% CI 0.4–0.6; other drugs aOR 0.3, 95% CI 0.2–0.5). Conversely, users of cigarettes plus alternative tobacco products had approximately twice the odds of substance use disorders than cigarette users only (alcohol aOR 1.9, 95% CI 1.7–2.2; marijuana aOR 1.9, 95% CI 1.6–2.2; other drugs aOR 2.0, 95% CI 1.6–2.4).

Type of tobacco user and risk perceptions

Approximately half of respondents (50.2%, 95% CI 49.7–50.7%) believed that using marijuana once or twice a week does *not* have great risk of physical or other harm. Approximately one-third of respondents believed that people do not risk great physical and other harm when they smoke one or more packs of cigarettes per day (32.9%, 95% CI 32.5–33.4%) or drink 4–5 alcoholic drinks per day (35.0%, 95% CI 34.5–35.4%). Fewer believed that people do not risk great harm from using other illicit drugs (cocaine, LSD and/or heroin) once or twice a week (22.0%, 95% CI 21.5–22.4%). The prevalence of believing regular cigarette, alcohol, and marijuana use does not have great risk was highest among users of cigarettes plus alternative tobacco products and lowest among non-tobacco users (cigarettes Wald F=284.3, $p<.001$; alcohol Wald F=316.6, $p<.001$; marijuana Wald F=681.4, $p<.001$) (Figure 2). Although statistically significant (Wald F=7.2, $p<.001$), percentage of youth believing that using other illicit drugs once or twice a week does not pose great risk for harm was relatively similar across tobacco user groups (Figure 2).

Results of multivariable logistic regression models predicting the belief that the substances do *not* present great risk is shown in Table 3. Compared to non-tobacco users, cigarette smokers (only) and users who combined cigarettes with alternative tobacco products had two to three times the odds of believing that regular use of cigarettes (cigarettes only aOR 2.2, 95% CI 2.0–2.3; cigarettes and alternative products aOR 2.5, 95% CI 2.3–2.8) and alcohol (cigarettes only aOR 2.4, 95% CI 2.2–2.6; cigarettes and alternative products aOR 3.1, 95% CI 2.8–3.4) is not of great risk for harm, and approximately five times the odds of believing regular marijuana use does not pose great risk (cigarettes only aOR 4.7, 95% CI 4.3–5.2; cigarettes and alternative products aOR 5.6, 95% CI 4.8–6.7). Although the odds of believing frequent illicit drug use (other than marijuana) does not pose great harm was significantly higher among these tobacco user groups (compared to non-tobacco users), the magnitude of the increased risk was lower than that for the other substances (cigarettes only aOR 1.2, 95% CI 1.1–1.4; cigarettes and alternative products aOR 1.4, 95% CI 1.2–1.6). Users of only alternative tobacco products had 1.5 to 3 times the odds of believing that regular cigarette (aOR 1.5, 95% CI 1.3–1.6), alcohol (aOR 2.2, 95% CI 2.0–2.5), and marijuana use (aOR 2.8, 95% CI 2.4–3.2) is not of great risk for harm versus non-tobacco users. Their perceptions of risk of regular illicit drug use (other than marijuana) did not differ significantly from non-tobacco users (aOR 1.0, 95% CI 0.9–1.3).

Compared to cigarette users only, users of alternative tobacco products had lower odds of believing that regular use of cigarettes and marijuana was not of great risk (cigarettes aOR 0.7, 95% CI 0.6–0.8, marijuana aOR 0.6, 95% CI 0.5–0.7); differences in beliefs that regular use of alcohol and other drugs was not of great risk did not reach statistical significance (aOR 0.9, 95% CI 0.8–1.01, and aOR 0.8, 95% CI 0.6–1.04, respectively). However, users of cigarettes plus alternative tobacco products had slightly greater odds than cigarette users to believe that regular use of cigarettes, alcohol and marijuana was not of great risk (cigarettes aOR 1.2, 95% CI 1.03–1.4, alcohol aOR 1.2, 95% CI 1.1–1.4, marijuana aOR 1.2, 95% CI 1.03–1.5). They did not differ from cigarette users in their perception of risk of regular other illicit drug use (aOR 1.1, 95% CI 0.9–1.3).

A “blunt” is a popular term for marijuana rolled with the tobacco-leaf “wrapper” from a cigar. Many blunt users do not consider themselves a tobacco or cigar user but most blunt users do consider themselves to be marijuana users [35–37]. To examine whether use of blunts by tobacco users had any impact on results of models predicting marijuana use disorder or perceptions of risk from marijuana use, we further examined blunt use among our sample. Approximately 4.1% (95% CI 3.9–4.2%) had used a blunt in the past 30 days, and most (92.7%, 95% CI 91.2–93.7%) indicated they had used marijuana in the past 30 days. Approximately 37.4% (95% CI 35.4–39.5%) of users of cigarettes and other tobacco products used blunts, followed by 24.3% (95% CI 23.0–25.6%) of users of cigarettes only, 17.4% (95% CI 15.0–20.0%) of users of alternative tobacco products only, and 1.3% (95% CI 1.1–1.4%) of non-tobacco users (Wald $F=741.8$, $p<.001$). When excluding blunt users from the models predicting marijuana use disorder and perceptions of risk from marijuana use, results were similar but with effect sizes slightly smaller than those when using the full sample (data not shown).

DISCUSSION

This study found a clear, stepwise association between youth tobacco use and substance use disorders. Use of alternative tobacco products combined with conventional cigarettes was associated with the highest probability of clinically diagnosable involvement in alcohol, marijuana, and other illicit drug use in a dose-response pattern versus non-users of tobacco and conventional cigarette users only. Furthermore, poly-tobacco users had two times the odds of substance use disorder than users of conventional cigarettes only. Youth users of alternative tobacco products also had consistently higher odds of clinically diagnosable substance use disorders (nearly 10 times higher for alcohol and marijuana use disorders) versus non-tobacco users; however, odds were lower than youth who smoked conventional cigarettes only.

Past research has found users of alternative tobacco products to be less established tobacco users (i.e., less nicotine dependent) than conventional cigarette users [38]. We extend this study by demonstrating that youth alternative tobacco product users are less frequently diagnosed with substance use disorders versus youth who smoke conventional cigarettes. To help explain this association our secondary analysis indicated a stepwise effect across tobacco user type when measuring perceived risk for cigarettes, alcohol, and other illicit drugs. It is probable that non-tobacco users and youth who use alternative tobacco products

are more conscientious of their cigarette, alcohol, and/or other drug use behaviors and are consequently less inclined to use all of these substances in comparison to smokers of conventional cigarettes. Prevention efforts are therefore encouraged to focus efforts on increasing youths' awareness of the harms associated with use of different tobacco products and substance use, in general.

Some of the increased risk for tobacco use combined with heavy use of other substance use could be due to environmental and social risk influences. For instance, youth who endorse heavy co-occurring substance use patterns are more likely to be exposed to a deviant peer group that engages in heavy substance use behaviors and has more approving views towards substance use [39–41]. In addition, the associations may be due to genetic vulnerability to heavy use of different substances that is overlapping [42–44]. The present study underscores the need for future studies to extend such investigations to understanding the strong interrelationship between youth tobacco use and substance use disorders.

Limitations of the NSDUH are that it is cross-sectional and causation cannot be determined. The substance use behaviors of youth are a sensitive topic and it is possible that socially desirable responding may be an issue. Youth were not queried on their perceptions of risk for harm that is associated with alternative tobacco product use and such information could be useful for making comparisons of tobacco risk perceptions across different types of youth tobacco users. We contrasted our results using NDSUH DSM-IV diagnostic measures for substance use disorders with our own DSM-5 diagnostic substance use disorder categories and found similar results; nevertheless, we note that the DSM-5 craving symptom was not included in the NSDUH assessment and was therefore excluded from the DSM-5 substance use disorder diagnoses that were used in our analyses.

These limitations notwithstanding, findings from this study have relevant implications for prevention and intervention efforts. This study demonstrates a significant clustering of substance use disorders among youth tobacco users. Specifically, tobacco use clearly distinguished youth at risk for substance use disorders across alcohol, marijuana, and other illicit drugs. This risk is remarkably high for all tobacco users and especially high for poly-tobacco users. This is concerning given the number of new and emerging tobacco products now on the market and the high number of youth tobacco users who experiment with multiple forms of tobacco.

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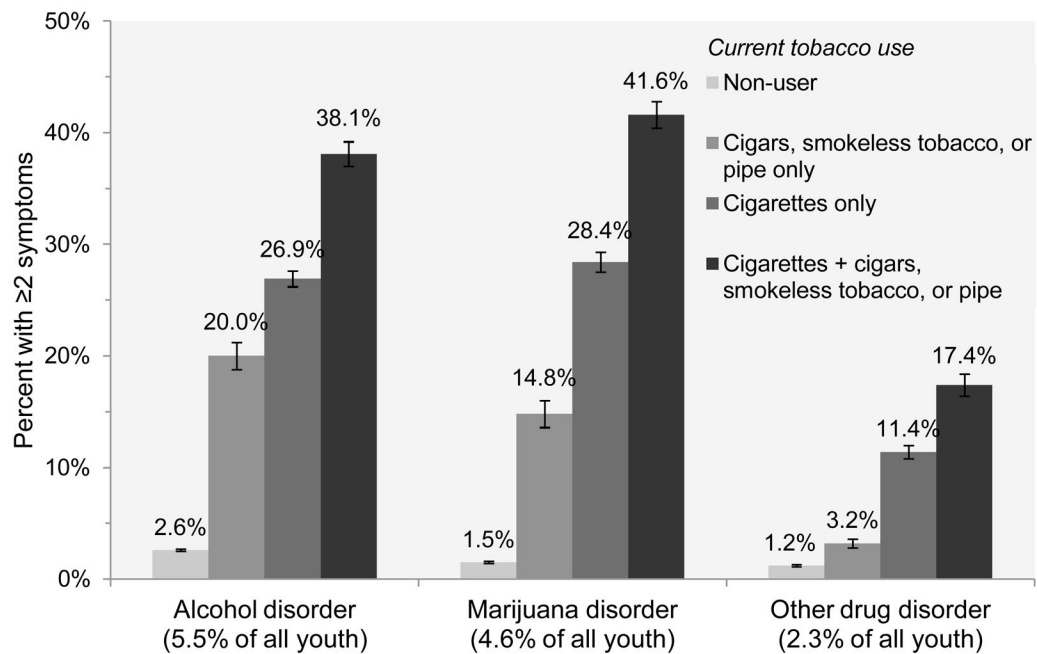


Figure 1.

Percent of DSM-5 substance use disorders, by type of tobacco user among youth age 12–17 years, NSDUH 2007–2011. Percentages \pm standard errors are shown.

95% confidence intervals are as follows. Alcohol use disorder: non-users 2.4–2.7%, cigars, smokeless tobacco or pipe only 17.7–22.5%, cigarettes only 25.4–28.4%, cigarettes plus other products 36.0–40.3%. Marijuana use disorder: non-users 1.4–1.6%, cigars, smokeless tobacco or pipe only 12.7–17.3%, cigarettes only 26.6–30.1%, cigarettes plus other products 39.3–44.1%. Other drug use disorder: non-users 1.1–1.3%, cigars, smokeless tobacco or pipe only 2.5–4.2%, cigarettes only 10.1–12.7%, cigarettes plus other products 15.5–19.5%.

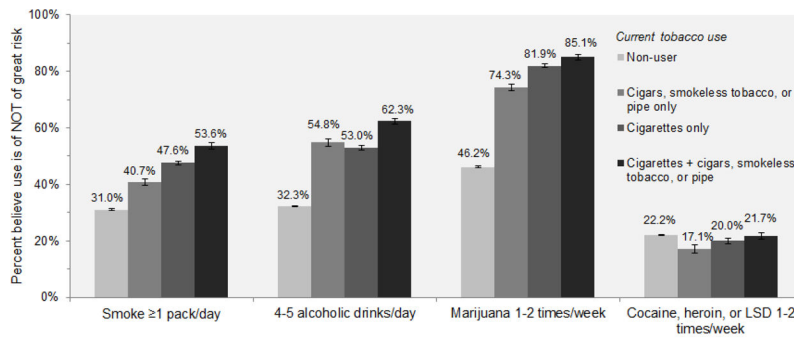


Figure 2.

Percent who believe regular substance use is NOT of great risk for harm, by type of tobacco user among youth age 12–17 years, NSDUH 2007–2011. Percentages +/- standard errors are shown.

95% confidence intervals are as follows. Smoke 1 pack/day: non-users 30.5–31.5%, cigars, smokeless tobacco or pipe only 38.4–43.1%, cigarettes only 46.1–49.1%, cigarettes plus other products 51.2–55.9%. 4–5 drinks/day: non-users 31.8–32.8%, cigars, smokeless tobacco or pipe only 52.0–57.5%, cigarettes only 51.2–54.7%, cigarettes plus other products 60.2–64.3%. Marijuana 1–2 times/week: non-users 45.7–46.7%, cigars, smokeless tobacco or pipe only 71.8–76.6%, cigarettes only 80.5–83.2%, cigarettes plus other products 83.0–87.0%. Cocaine, heroin, or LSD 1–2 times/week: non-users 21.8–22.7%, cigars, smokeless tobacco or pipe only 14.5–20.1%, cigarettes only 18.2–21.8%, cigarettes plus other products 19.5–24.0%.

Table 1

Characteristics of sample, NSDUH 12–17 year olds, 2007–2011 (N= 91,152)

Variable	N	Weighted % (95% CI)
Tobacco use		
Non-user	80,118	88.8 (88.5–89.0)
Cigars, smokeless tobacco ^a , and/or pipe only	2,345	2.4 (2.3–2.6)
Cigarettes only	5,452	5.6 (5.4–5.8)
Cigarettes + cigars, smokeless tobacco ^a , and/or pipe	3,237	3.2 (3.1–3.4)
Alcohol use disorder symptoms ^b		
0–1 symptoms	83,967	94.5 (94.3–94.7)
2 symptoms	5,161	5.5 (5.3–5.7)
Marijuana use disorder symptoms ^b		
0–1 symptoms	86,032	95.4 (95.3–95.6)
2 symptoms	4,365	4.6 (4.4–4.8)
Other illicit drug use disorder symptoms ^b		
0–1 symptoms for one or more classes of drugs	84,553	97.7 (97.6–97.9)
2 symptoms for one or more classes of drugs	2,016	2.3 (2.1–2.4)
Sex		
Male	46,573	51.1 (50.7–51.5)
Female	44,579	48.9 (48.5–49.3)
Race		
Caucasian	53,808	58.1 (57.4–58.8)
African American	12,529	14.9 (14.5–15.3)
Hispanic	16,110	19.8 (19.2–20.4)
Other	8,705	7.3 (7.0–7.6)
Age		
12–13 years	28,558	31.7 (31.3–32.1)
14–15 years	30,603	33.9 (33.5–34.3)
16–17 years	31,991	34.4 (34.0–34.8)
Income		
<\$20,000	15,595	16.6 (16.2–17.1)
\$20,000 – \$49,999	29,199	31.1 (30.5–31.7)
\$50,000 – \$74,999	17,175	17.8 (17.4–18.1)
\$ 75,000	29,183	34.5 (33.8–35.2)
County metro status		
Large metro	39,732	53.5 (52.7–54.2)
Small metro	31,361	30.4 (29.6–31.3)

Variable	N	Weighted % (95% CI)
Non-metro	20,059	16.1 (15.6–16.6)
Year		
2007	17,727	20.4 (19.9–20.8)
2008	17,842	20.1 (19.6–20.6)
2009	17,705	19.8 (19.4–20.3)
2010	18,614	19.6 (19.1–20.1)
2011	19,264	20.1 (19.7–20.6)

^a Smokeless tobacco products include chewing tobacco or snuff.

^b Missing data not included in frequency calculations. 2,024 (2.2%) missing data for alcohol use disorder symptoms, 755 (0.8%) missing data for marijuana use disorder, 4,583 (5.0%) missing data for other drug use disorder.

Table 2

Associations between type of tobacco user and substance use disorder, adjusted for demographic covariates

	Alcohol use disorder: ^a 2 vs 0-1 symptoms aOR (95% CI)	Marijuana use disorder: ^b 2 vs 0-1 symptoms aOR (95% CI)	Other drug use disorder: ^c 2 vs 0-1 symptoms aOR (95% CI)
Tobacco use			
Non-user	Ref.	Ref.	Ref.
Cigars, smokeless tobacco ^d , and/or pipe only	8.1 (6.7, 9.6)	9.2 (7.5, 11.4)	3.2 (2.4, 4.3)
Cigarettes only	9.6 (8.8, 10.6)	20.4 (18.1, 23.0)	9.4 (7.8, 11.4)
Cigarettes + cigars, smokeless tobacco ^d , and/or pipe	18.3 (16.2, 20.6)	37.2 (32.5, 42.7)	18.4 (15.4, 21.8)
Sex			
Female	Ref.	Ref.	Ref.
Male	0.6 (0.56, 0.7)	1.1 (1.0, 1.3)	0.5 (0.48, 0.6)
Race			
Caucasian	Ref.	Ref.	Ref.
African American	0.7 (0.6, 0.8)	1.1 (0.9, 1.3)	0.7 (0.6, 0.9)
Hispanic	1.4 (1.2, 1.5)	1.3 (1.1, 1.5)	1.2 (1.0, 1.4)
Other	0.9 (0.7, 1.1)	1.1 (0.9, 1.3)	1.0 (0.8, 1.2)
Age			
12-13 years	Ref.	Ref.	Ref.
14-15 years	4.1 (3.5, 4.8)	4.7 (3.7, 5.9)	1.6 (1.3, 2.0)
16-17 years	6.4 (5.6, 7.4)	6.2 (4.9, 7.8)	1.5 (1.3, 1.9)
Income			
\$75,000	Ref.	Ref.	Ref.
\$50,000 - \$74,999	0.9 (0.8, 1.04)	1.0 (0.9, 1.2)	1.0 (0.8, 1.2)
\$20,000 - \$49,999	0.9 (0.8, 0.95)	1.3 (1.2, 1.5)	1.1 (0.96, 1.3)
<\$20,000	1.0 (0.8, 1.1)	1.5 (1.2, 1.8)	1.3 (1.1, 1.6)
County metro status			
Non-metro	Ref.	Ref.	Ref.
Large metro	1.1 (0.96, 1.2)	1.8 (1.6, 1.9)	1.2 (1.02, 1.5)
Small metro	1.0 (0.9, 1.1)	1.7 (1.5, 2.0)	1.2 (1.04, 1.5)
Year			

	Alcohol use disorder: ^a 2 vs 0-1 symptoms aOR (95% CI)	Marijuana use disorder: ^b 2 vs 0-1 symptoms aOR (95% CI)	Other drug use disorder: ^c 2 vs 0-1 symptoms aOR (95% CI)
2007	Ref.	Ref.	Ref.
2008	1.0 (0.8, 1.1)	1.3 (1.1, 1.5)	1.0 (0.8, 1.2)
2009	0.8 (0.7, 0.9)	1.1 (0.97, 1.3)	0.9 (0.8, 1.2)
2010	0.8 (0.7, 0.98)	1.4 (1.2, 1.6)	1.1 (0.9, 1.3)
2011	0.7 (0.6, 0.8)	1.5 (1.3, 1.7)	0.9 (0.7, 1.1)

^aModel N=89,128.

^bModel N=90,397.

^cModel N=86,569.

^dSmokeless tobacco products include chewing tobacco and/or snuff.

Table 3

Associations between type of tobacco user and perceptions of risk of regular substance use, adjusted for demographic covariates

	Belief that use of the following substances is NOT of great risk for harm			
	Smoke 1 pack/day ^a aOR (95% CI)	4–5 Alcoholic drinks/day ^b aOR (95% CI)	Marijuana 1–2 times/week ^c aOR (95% CI)	Cocaine/heroin/LSD 1–2 times/week ^d aOR (95% CI)
Tobacco use				
Non-user	Ref.	Ref.	Ref.	Ref.
Cigars, smokeless tobacco ^d , and/or pipe only	1.5 (1.3, 1.6)	2.2 (2.0, 2.5)	2.8 (2.4, 3.2)	1.0 (0.9, 1.3)
Cigarettes only	2.2 (2.0, 2.3)	2.4 (2.2, 2.6)	4.7 (4.3, 5.2)	1.2 (1.1, 1.4)
Cigarettes + cigars, smokeless tobacco ^d , and/or pipe	2.5 (2.3, 2.8)	3.1 (2.8, 3.4)	5.6 (4.8, 6.7)	1.4 (1.2, 1.6)
Sex				
Female	Ref.	Ref.	Ref.	Ref.
Male	1.44 (1.38, 1.49)	1.65 (1.59, 1.71)	1.38 (1.33, 1.43)	1.02 (0.98, 1.07)
Race				
Caucasian	Ref.	Ref.	Ref.	Ref.
African American	1.04 (0.98, 1.11)	0.80 (0.75, 0.84)	1.54 (1.46, 1.62)	1.59 (1.48, 1.70)
Hispanic	0.99 (0.92, 1.06)	0.99 (0.95, 1.04)	1.24 (1.17, 1.32)	1.54 (1.43, 1.65)
Other	0.94 (0.86, 1.03)	0.77 (0.70, 0.84)	0.95 (0.87, 1.03)	1.31 (1.18, 1.46)
Age				
12–13 years	Ref.	Ref.	Ref.	Ref.
14–15 years	0.95 (0.91, 1.00)	1.11 (1.06, 1.17)	1.51 (1.44, 1.59)	0.63 (0.59, 0.67)
16–17 years	0.85 (0.81, 0.90)	1.00 (0.95, 1.05)	2.12 (2.02, 2.23)	0.38 (0.37, 0.40)
Income				
\$75,000	Ref.	Ref.	Ref.	Ref.
\$50,000 – \$74,999	1.09 (1.04, 1.15)	1.12 (1.06, 1.19)	1.03 (0.97, 1.09)	1.11 (1.04, 1.19)
\$20,000 – \$49,999	1.31 (1.24, 1.39)	1.29 (1.22, 1.35)	1.21 (1.16, 1.26)	1.28 (1.20, 1.37)
<\$20,000	1.55 (1.46, 1.64)	1.49 (1.39, 1.59)	1.39 (1.30, 1.49)	1.62 (1.51, 1.75)
County metro status				
Non-metro	Ref.	Ref.	Ref.	Ref.
Large metro	0.92 (0.87, 0.97)	0.78 (0.74, 0.81)	1.35 (1.29, 1.42)	1.02 (0.95, 1.09)
Small metro	0.92 (0.88, 0.97)	0.87 (0.83, 0.91)	1.25 (1.19, 1.32)	1.01 (0.94, 1.08)

Year	Belief that use of the following substances is NOT of great risk for harm			
	Smoke 1 pack/day ^a aOR (95% CI)	4–5 Alcoholic drinks/day ^b aOR (95% CI)	Marijuana 1–2 times/week ^c aOR (95% CI)	Cocaine/heroin/LSD 1–2 times/week ^d aOR (95% CI)
2007	Ref.	Ref.	Ref.	Ref.
2008	0.95 (0.90, 1.00)	0.98 (0.93, 1.04)	1.09 (1.02, 1.17)	1.00 (0.92, 1.08)
2009	1.16 (1.10, 1.23)	1.04 (0.98, 1.10)	1.28 (1.20, 1.37)	1.09 (1.02, 1.17)
2010	1.17 (1.10, 1.25)	1.01 (0.95, 1.07)	1.42 (1.34, 1.50)	1.05 (0.99, 1.12)
2011	1.13 (1.07, 1.19)	1.04 (0.97, 1.11)	1.57 (1.48, 1.66)	1.13 (1.05, 1.22)

^aModel N=90,158.

^bModel N=90,242.

^cModel N=89,851.

^dModel N=85,882.