

Increasing Depression and Substance Use Among Former Smokers in the United States, 2002–2016



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Introduction: Mental health and substance use problems are associated with smoking relapse among former smokers. Yet, little is known about the prevalence of mental health and substance use among former smokers in the U.S. In addition, it is unknown whether the prevalence of these conditions has changed over time as former U.S. smokers have grown to outnumber current U.S. smokers. This study, which was conducted in 2018 and 2019, examined the prevalence and trends over time in depression (2005–2016), marijuana use (2002–2016), and alcohol use problems (2002–2016) among former U.S. smokers.

Methods: The National Survey on Drug Use and Health is an annual, nationally representative, cross-sectional study. Data from U.S. individuals who were aged ≥ 18 years in 2002–2016 were included. Former smokers were defined as having smoked ≥ 100 lifetime cigarettes and no past-year cigarettes.

Results: From 2005 to 2016, the prevalence of major depression increased from 4.88% to 6.04% (AOR=1.01, 95% CI=1.00, 1.03, $p=0.04$). From 2002 to 2016, past-year marijuana use rose from 5.35% to 10.09% (AOR=1.08, 95% CI=1.07, 1.09, $p<0.001$) among former smokers. Past-month binge alcohol use also increased from 17.22% to 22.33% (AOR=1.03, 95% CI=1.02, 1.04, $p<0.001$), although the prevalence of past-year alcohol abuse or dependence did not change.

Conclusions: Depression and substance use, which are factors associated with increased risk for cigarette use relapse, appear to be increasing over time among former U.S. smokers. Increased awareness of these trends may be important for clinical and public health efforts to direct attention to conditions potentially threatening sustained abstinence among former smokers.

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INTRODUCTION

Since 2002, the number of former cigarette smokers has grown substantially and continuously in the U.S. such that former smokers currently outnumber current cigarette smokers.¹ The major health consequences of current smoking and health benefits of quitting smoking are undisputed and well documented.² The risk that former smokers will return to smoking is an ongoing concern because most smokers report multiple attempts at quitting before achieving long-term success,^{3–5} and the risk for relapse remains even after decades of abstinence.⁵ Understanding the risk factors for relapse to cigarette smoking, especially those that are modifiable, is critical to developing both clinical and

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public health efforts to help people who have stopped smoking cigarettes remain abstinent in the long run.

Prior studies have shown that the prevalence of mental health problems (e.g., depression) and alcohol and substance use and abuse (e.g., marijuana use, alcohol misuse) among current smokers are substantially higher than among never-smokers,^{6–13} and both of these factors have been observed to increase the risk for smoking relapse.^{9,14–16} Robust evidence¹⁷ suggests reduced depression in individuals from healthy or clinical populations after smoking cessation. Evidence regarding cessation of cigarette smoking and the use of alternative substances is more mixed. Although alcohol use severity¹⁸ and binge drinking¹⁹ decreased in the year after smoking cessation, in a cross-sectional survey of Canadian medical marijuana users, 12% reported substituting marijuana for tobacco and nicotine.²⁰

It is conceivable that the prevalence of depression and substance use problems may shift over time among former smokers. If people who stop smoking cigarettes substitute other forms of substance use, the overall health benefits of cigarette cessation may be decreased owing to the negative consequences of use of these drugs as well as consequent relapse to smoking cigarettes.

Former smokers comprise an increasing percentage of the U.S. population relative to current smokers and face a continuing risk for relapse to cigarette use. Depression and substance use have been shown to increase risk for relapse to smoking; however, little is known about the prevalence of these variables among former smokers or whether these variables are increasing or decreasing among former smokers over time. The aims of this study were to (1) investigate trends in major depression among former smokers in the U.S. from 2005 to 2016, and (2) examine trends in the use and misuse of alcohol and marijuana among former smokers in the U.S. from 2002 to 2016.

METHODS

Study Population

Data were drawn from the public use data files from the National Survey on Drug Use and Health (NSDUH) for 2002–2016. NSDUH provides cross-sectional national data, collected annually, on the use of tobacco, other substances, and mental health in the U.S. civilian, non-institutionalized population aged ≥ 12 years, as described elsewhere.²¹ For this study, analyses were conducted among former smokers, defined as respondents who reported lifetime use of ≥ 100 cigarettes, but no cigarette use in the 12 months before the survey. Analyses were further restricted to include only adult respondents (aged ≥ 18 years) because of the low prevalence ($< 1\%$) of former smokers among people aged ≤ 18 years. This resulted in a total study population of 67,035.

Measures

As described previously, respondents had to have smoked ≥ 100 cigarettes in their lifetime and abstained from smoking cigarettes for ≥ 1 year before the survey interview to meet the definition of former smoker. Former smokers were further classified as having recently quit if they reported last smoking cigarettes > 12 months but < 3 years ago, compared with those who reported last smoking cigarettes > 3 years ago. This time frame was based on the categorization of responses in the NSDUH public use data files⁵ and relapse risks that remained $> 30\%$. Respondents were classified as having ever smoked daily if they responded affirmatively to the question: *Has there ever been a period in your life when you smoked cigarettes every day for at least 30 days?*

Dichotomous indicators were created for past-12 month use of marijuana and problem alcohol use (i.e., alcohol abuse or dependence, binge alcohol drinking). Respondents were considered positive for past-year marijuana use if they reported having last used marijuana within the past 12 months.

Alcohol dependence and abuse occurring within the past year were assessed among NSDUH respondents based on the DSM-IV criteria,²² because this was the diagnostic paradigm on which the NSDUH survey questions were based. Respondents were defined as having alcohol dependence if they reported a positive response to ≥ 3 of the 7 dependence criteria. They were defined as having alcohol abuse if they reported a positive response to ≥ 1 of the 4 abuse criteria and were determined not to be dependent on the substance of interest. For this study, a dichotomous indicator for alcohol abuse or dependence in the past year was created to approximate the single diagnosis of alcohol use disorder (AUD) under the DSM-5.²³

For 2002–2014, past-month binge alcohol drinking was defined in the NSDUH as positive for respondents who reported drinking ≥ 5 drinks at the same time or within a couple of hours of each other on ≥ 1 day in the past 30 days.^{24,25} In 2015, the threshold for binge alcohol use for female respondents was lowered to consumption of ≥ 4 drinks within a couple of hours of each other in the past 30 days.

Past-year major depressive episode (MDE) was assessed using DSM-IV criteria²² for 2005–2016; details on the modules and definitions for depression classifications are available.²⁶ Briefly, the modules were adapted from the depression section of the National Comorbidity Survey Replication. Respondents were classified as having had a lifetime MDE based on reporting ≥ 5 of 9 symptoms for MDE ever occurring during the same 2-week period. In addition, at least 1 of the symptoms must have been a depressed mood or loss of interest or pleasure in daily activities. Respondents with a lifetime MDE were classified as having past-year MDE if, during the past 12 months, they felt depressed or lost interest or pleasure in daily activities for 2 weeks or longer while also having ≥ 3 other symptoms of MDE. No exclusions were made for MDE caused by medical illness, bereavement, or substance use disorders. Owing to questionnaire changes in 2008, adjusted versions of past-year MDE variables for adults were developed to allow comparisons across 2005–2008 and later years. Details are available²⁷ on the method used for adjusting these variables, which was based on a model including terms for the survey version, demographic characteristics, and interactions.

Demographic covariates selected a priori to address potential confounding of time trends by changes in population characteristics and to explore heterogeneity in time trends included sex,

age, level of education, marital status, household income, and race/ethnicity (Table 1).²⁸

Statistical Analysis

Analyses were conducted in 2018 and 2019. Demographic characteristics of former smokers in 2016 versus 2002 were compared using chi-squared tests. Among former smokers, the annual prevalence of depression and substance use described earlier was calculated for each year. For MDE, only 2005–2016 were included owing to the availability of data for these items.

To assess overall time trends in prevalence of depression and substance use over the study period, separate logistic regression models were fit for each outcome using a continuous term for calendar year. Thus, an OR >1.0 estimated from the coefficient for the linear year term indicated an increase in prevalence of the corresponding outcome over the study period. Time was modeled using a linear term because the question of interest was whether overall changes in examined outcomes had occurred over the study period, not necessarily during any single year. Models were

adjusted for demographic covariates. Because of the skewed age distribution of the former smoking population in the analytic sample and age differences in relapse to smoking,^{29,30} the annual prevalence was also computed stratified by age category (18–49, 50–64, and ≥65 years). Age category and calendar year product terms were added to logistic regression models to estimate stratum-specific time trends, with the variation in time trends by age category assessed using *F*-tests (2 degrees of freedom). Similar stratified and regression analyses were conducted by sex to examine potential heterogeneity of trends in male versus female respondents.

Increases in alcohol misuse prevalence could have occurred because of a change in the definition of past-month binge drinking for women beginning with the 2015 survey that would consider more women positive for binge drinking (as described previously). To confirm that observed trends were not artifacts of this change in definition, the study (1) examined trends for binge drinking from 2002 to 2016 stratified by sex, and (2) examined trends for binge drinking from 2002 to 2014 for all former smokers (men and women).

Table 1. Characteristics of Former Cigarette Smokers Aged ≥18 Years, NSDUH 2002–2016

Characteristics	All years, 2002–2016, % (SE)	2002, % (SE)	2016, % (SE)	χ^2 <i>p</i> -value
Total sample, n	67,035	4,318	5,543	
Sex				0.21
Male	54.8 (0.3)	55.4 (1.0)	53.6 (1.0)	
Female	45.2 (0.3)	44.6 (1.0)	46.4 (1.0)	
Age, years				<0.001
18–25	2.2 (0.0)	2.6 (0.2)	2.1 (0.2)	
26–34	7.8 (0.1)	7.8 (0.5)	8.7 (0.4)	
35–49	22.5 (0.2)	26.0 (1.0)	20.7 (0.7)	
50–64	33.6 (0.3)	33.4 (1.0)	31.0 (0.8)	
≥65	33.9 (0.3)	30.2 (1.2)	37.5 (0.9)	
Marital status				<0.001
Married	67.2 (0.3)	69.2 (0.9)	65.1 (0.8)	
Previously married	23.2 (0.3)	22.7 (0.8)	23.1 (0.8)	
Never married	9.6 (0.1)	8.1 (0.5)	11.8 (0.6)	
Education				<0.001
Less than high school	13.1 (0.2)	15.5 (0.9)	10.2 (0.6)	
High school graduate	30.7 (0.3)	32.2 (0.9)	25.3 (0.8)	
Some college	26.6 (0.2)	23.7 (0.9)	33.2 (1.1)	
College graduate	29.6 (0.3)	28.6 (1.0)	31.2 (1.0)	
Income				<0.001
<\$20,000	12.9 (0.2)	14.5 (0.8)	11.7 (0.6)	
\$20,000–\$49,999	33.1 (0.3)	38.2 (1.0)	29.4 (0.9)	
\$50,000–\$74,999	19.5 (0.2)	19.4 (0.9)	18.0 (0.8)	
≥\$75,000	34.5 (0.3)	28.0 (0.9)	40.9 (1.0)	
Race/ethnicity				0.004
Non-Hispanic white	80.7 (0.3)	83.0 (0.8)	79.2 (0.8)	
Non-Hispanic black	7.0 (0.2)	6.8 (0.7)	7.2 (0.6)	
Hispanic	8.3 (0.2)	6.8 (0.5)	9.2 (0.6)	
Non-Hispanic other	4.0 (0.1)	3.4 (0.3)	4.4 (0.3)	

Note: Boldface indicates statistical significance ($p < 0.05$).
NSDUH, National Survey on Drug Use and Health.

All analyses were conducted using SUDAAN, version 11.0.1, to incorporate survey weights and account for the NSDUH complex sampling design. All results, other than raw counts, were adjusted for sampling weights.

RESULTS

From 2002 to 2016, former smokers comprised approximately one fifth of the U.S. adult population, with the proportion decreasing from 20.5% in 2002 to 18.7% in 2016 (unadjusted test for trend, $p < 0.001$). Meanwhile, among U.S. adults who were ever-smokers, an increasing percentage was classified as former smokers (44.4% in 2002 to 49.7% in 2016; unadjusted test for trend, $p < 0.001$).

Demographic characteristics of former smokers over this time period are shown in Table 1. From 2002 to 2016, former smokers were slightly more likely to be male than female, were predominantly of non-Hispanic white race and ethnicity, and were married. More than half of former smokers had completed at least some college; one third had annual incomes $> \$75,000$, with only 13% earning $< \$20,000$. Their ages were distributed such that roughly one third were aged 18–49 years, another third were aged 50–64 years, and the remaining third were aged ≥ 65 years. Compared with former smokers in 2002, those in 2016 were more likely to be aged ≥ 65 years, never married, have at least some college education, have incomes $> \$75,000$ /year, and not be non-Hispanic white. With regard to smoking history, most former smokers in 2016 reported that they had smoked daily at some point in their lifetime (85.2%) and that they quit smoking ≥ 3 years ago (88.9%).

Over the study period, the prevalence of past-year MDE increased from 4.88% in 2005 to 6.04% in 2016 (AOR=1.01, 95% CI=1.00, 1.03, $p=0.04$), and past-year marijuana use nearly doubled from 5.35% in 2002 to 10.09% in 2016 among former smokers (AOR=1.08, 95% CI=1.07, 1.09, $p < 0.001$). Past-month binge alcohol drinking increased from 17.22% in 2002 to 22.33% in 2016 (AOR=1.03, 95% CI=1.02, 1.04, $p < 0.001$). This increase was also evident when examining men only from 2002 to 2016 (AOR for trend=1.02, 95% CI=1.01, 1.03, $p < 0.001$) and when examining men and women from 2002 to 2014 (AOR=1.03, 95% CI=1.02, 1.03, $p < 0.001$). By contrast, the prevalence of past-year alcohol abuse or dependence did not change from 2002 to 2016 ($p=0.43$) (Table 2).

Time trends in MDE, marijuana use, and alcohol use problems were further examined by age category (Table 3) and sex (Table 4). The trend in prevalence of past-year MDE did not differ significantly by age category ($p=0.25$) or sex ($p=0.81$). Past-year marijuana use significantly

increased over time ($p < 0.001$) among all age categories and among both men and women. Although age was inversely related to the prevalence of marijuana use in 2016 (17.94% among those aged 18–49 years vs 3.70% among those aged ≥ 65 years), the rate of increase was significantly more rapid among former smokers aged ≥ 65 years (AOR=1.24, 95% CI=1.16, 1.33) compared with those aged 18–49 years (AOR=1.04, 95% CI=1.03, 1.06). Similarly, past-year marijuana use was more prevalent among men (10.94%) than women (9.11%) in 2016, but increased more rapidly among women than men from 2002 to 2016 ($p=0.01$).

The increasing trend in prevalence of past-month binge alcohol drinking did not differ by age category ($p=0.27$) or by sex ($p=0.22$) from 2002 to 2014, although binge drinking was more prevalent in younger age groups and among men. Past-year alcohol abuse and dependence declined significantly from 2002 to 2016 among former smokers aged 18–49 years (AOR=0.98, 95% CI=0.97, 1.00, $p=0.01$), whereas past-year alcohol abuse and dependence among former smokers aged ≥ 50 years (both 50–64 and ≥ 65 years age groups) did not significantly change over time. Results by sex were reported for 2002–2014 only because of the change in the definition of binge drinking for women after 2014. The test for trend among men yielded identical results when 2015 and 2016 were included (data not shown).

DISCUSSION

The current investigation is the first U.S. study focusing on the prevalence and time trends of depression, marijuana use, and problematic alcohol use among former smokers. Major depression increased from 2005 to 2016, and marijuana use and alcohol misuse increased from 2002 to 2016 among former smokers in the U.S.

What seems of potential interest here from a tobacco control perspective is that recent data suggest that depression, marijuana use, and alcohol misuse among former smokers are associated with significantly increased risk for relapse to cigarette use.^{14,31} Although the relationship among depression, substance use, and quitting smoking among current smokers has been studied extensively in clinical and community samples, little work has examined these variables in relation to relapse to smoking among former smokers. In longitudinal epidemiologic studies, major depression has been associated with increased risk for relapse to cigarette use up to 10 years later.³² Thus, an increase in depression among former smokers may have implications beyond those related to mental health (e.g., for risk for relapse to smoking). Similarly, the finding that marijuana use increased significantly among former

Table 2. Substance Use and Mental Health Among Former Cigarette Smokers Aged ≥18 Years Over Time, NSDUH 2002–2016

Characteristics	Year															Test for trend ^a	
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	AOR (95% CI)	p-value
Marijuana use (past year)																	
%	5.35	4.59	4.57	4.48	4.96	4.84	4.30	5.76	6.27	7.16	6.99	7.24	9.39	9.01	10.09	1.08 (1.07, 1.09)	<0.001
SE	0.57	0.30	0.35	0.47	0.38	0.42	0.46	0.50	0.42	0.49	0.55	0.72	0.51	0.51	0.61		
Binge alcohol drinking (past month)																	
%	17.22	19.39	17.69	17.65	18.08	18.04	19.02	21.37	20.64	20.99	20.42	21.15	20.69	24.96	22.33	1.03 (1.02, 1.04)	<0.001
SE	0.75	0.88	0.98	0.80	0.86	0.67	0.99	0.79	0.90	0.89	0.95	0.98	0.74	0.80	0.69		
Alcohol abuse/dependence (past year)																	
%	4.61	4.66	4.97	4.56	4.45	4.90	4.08	4.87	5.37	4.28	4.93	4.94	5.23	4.98	4.42	1.00 (0.99, 1.01)	0.43
SE	0.41	0.41	0.41	0.42	0.41	0.41	0.41	0.47	0.56	0.41	0.35	0.51	0.35	0.37	0.33		
MDE (past year)																	
%	— ^b	—	—	4.88	5.18	6.46	5.28	5.72	5.44	5.81	5.58	5.69	5.99	5.76	6.04	1.01 (1.00, 1.03)	0.04
SE	—	—	—	0.40	0.45	0.46	0.49	0.52	0.46	0.52	0.49	0.42	0.35	0.40	0.41		

Note: Boldface indicates statistical significance ($p < 0.05$).

^aAdjusted for sex, age, marital status, education, income, and race/ethnicity.

^bData not available.

MDE, major depressive episode; NSDUH, National Survey on Drug Use and Health.

Table 3. Substance Use and Mental Health Among Former Cigarette Smokers Aged ≥18 Years by Age Group, NSDUH 2002–2016

Characteristics by age group, years	2002 or 2005, ^a % (SE)	2016, % (SE)	Test for trend, AOR ^b (95% CI)	p-value	p-int year by age ^b (2 df)
Marijuana use (past year)					
18–49	10.76 (0.81)	17.94 (0.88)	1.04 (1.03, 1.06)	<0.001	<0.001
50–64	3.84 (1.18)	9.83 (1.02)	1.10 (1.08, 1.13)	<0.001	
≥65	0.50 (0.50)	3.70 (0.77)	1.24 (1.16, 1.33)	<0.001	
Binge alcohol drinking (past month)					
18–49	25.40 (1.04)	35.87 (1.30)	1.03 (1.02, 1.04)	<0.001	0.27
50–64	15.27 (1.49)	23.15 (1.68)	1.04 (1.02, 1.05)	<0.001	
≥65	9.51 (1.31)	10.27 (10.92)	1.02 (1.00, 1.03)	0.03	
Alcohol abuse/dependence (past year)					
18–49	8.25 (0.68)	7.89 (0.67)	0.98 (0.97, 1.00)	0.01	0.004
50–64	3.47 (0.77)	3.72 (0.57)	1.02 (1.00, 1.04)	0.05	
≥65	1.47 (0.63)	2.09 (0.52)	1.03 (1.00, 1.07)	0.07	
MDE (past year)					
18–49	7.90 (0.84)	9.01 (0.77)	1.01 (1.00, 1.03)	0.11	0.25
50–64	5.50 (0.83)	6.86 (1.10)	1.00 (0.98, 1.03)	0.81	
≥65	1.13 (0.42)	2.85 (0.56)	1.05 (1.00, 1.09)	0.04	

Note: Boldface indicates statistical significance ($p < 0.05$).

^aData for past-year marijuana use, past-month binge alcohol drinking, and past-year alcohol abuse/dependence are from 2002 and 2016. Data for past-year MDE are from 2005 and 2016.

^bAdjusted for sex, age, marital status, education, income, and race/ethnicity.

df, degrees of freedom; MDE, major depressive episode; NSDUH, National Survey on Drug Use and Health.

smokers from 2002 to 2016 is consistent with prior reports of increases over time in marijuana use in the general U.S. population,^{13,33–35} as well as among current smokers.¹³ The increase among former smokers could be related to substitution of marijuana for cigarettes, perception of decreasing risk associated with marijuana use,³⁶ or

changes in use because of increased legalization. The underlying pathways cannot be identified with these data, but unlike the use of cannabis among lifetime noncigarette smokers, the use of cannabis among former cigarette smokers could increase the additional risk of returning to cigarette use.

Table 4. Substance Use and Mental Health Among Former Cigarette Smokers Aged ≥18 Years by Sex, NSDUH 2002–2016

Characteristics	2002 or 2005, ^a % (SE)	2014 or 2016, ^a % (SE)	Test for trend, AOR ^b (95% CI)	p-value	p-int year by sex ^b (1 df)
Marijuana use (past year)					
Male	6.03 (0.76)	10.94 (0.67)	1.07 (1.05, 1.08)	<0.001	0.01
Female	4.51 (0.53)	9.11 (0.81)	1.09 (1.08, 1.11)	<0.001	
Alcohol abuse/dependence (past year)					
Male	5.83 (0.65)	5.42 (0.46)	1.00 (0.99, 1.01)	0.78	0.54
Female	3.09 (0.48)	3.27 (0.45)	1.01 (0.99, 1.03)	0.34	
Binge alcohol drinking (past month)					
Male	23.02 (1.15)	26.23 (1.17)	1.02 (1.01, 1.03)	0.001	0.22
Female	10.02 (0.92)	14.01 (1.07)	1.03 (1.02, 1.05)	<0.001	
MDE (past year)					
Male	3.74 (0.47)	3.91 (0.33)	1.01 (0.99, 1.04)	0.28	0.81
Female	6.23 (0.74)	8.49 (0.81)	1.02 (1.00, 1.04)	0.10	

Note: Boldface indicates statistical significance ($p < 0.05$).

^aTime trends in binge alcohol drinking are shown for 2002–2014 because of the different definition used for females in 2015–2016. Time trends in MDE are shown for 2005–2016. For other categories, time trends are shown for 2002–2016.

^bAdjusted for sex, age, marital status, education, income, and race/ethnicity.

df, degrees of freedom; MDE, major depressive episode; NSDUH, National Survey on Drug Use and Health.

An increase in the prevalence of one or more risk factors for smoking relapse at a population level could threaten progress made in reducing the prevalence of cigarette use. Although risk for cigarette relapse declines substantially with time since cessation, former smokers remain at risk for relapse. For example, even at >30 years since cessation, the risk for relapse remains at 10%.⁵ Addressing risk factors for smoking relapse that are increasing among former smokers may aid them in long-term abstinence and avoidance of relapse to smoking and the consequent harmful consequences of active smoking. Therefore, former smokers should be continually monitored for relapse to smoking as well as for behaviors that are related to smoking relapse. In addition, public health and clinical interventions can target modifiable risk factors and reduce the likelihood of relapse.

Some differences in trends by age group were evident. Specifically, the greatest proportional increase over time for past-year marijuana use occurred among those aged ≥65 years. This outcome is still relatively rare among the respective age groups: 3.7% of former smokers aged ≥65 years in 2016 used marijuana in the past year compared with 17.9% of former smokers aged 18–49 years. Still, clinicians should be aware of these trends and the potential for these exposures to risk factors among former smokers outside the expected age categories.

Limitations

Several limitations should be noted. First, alcohol abuse and dependence were defined using DSM-IV criteria, consistent with the diagnostic paradigm operational during most of the study period and with the questions used on the NSDUH survey. These were combined into 1 outcome for analyses, in accordance with the single diagnosis of AUD under DSM-5.²³ Nonetheless, evidence suggests an increased prevalence of AUD using DSM-5 versus DSM-IV criteria.³⁷ Therefore, the prevalence of DSM-5 AUD may be higher among former smokers than indicated by this study. Second, the current study did not examine trends in the use or misuse of drugs other than alcohol and marijuana among former smokers because of changes in the NSDUH questionnaire over the study period, particularly for the misuse of prescription drugs.³⁸ However, because cigarette smoking is associated with increased onset and persistence of drug use disorders,^{39,40} this may be a topic of concern for future study. Third, this study did not have information about the relative timing of onset of MDE or alcohol and substance misuse and was not able to assess, for example, whether MDE was secondary to substance misuse. Finally, the NSDUH data are obtained through self-report and therefore are subject to recall or reporting error.

CONCLUSIONS

Former smokers comprise an increasing proportion of the U.S. population affected by lifetime cigarette use. Depression and substance use, 2 factors associated with increased risk for returning to cigarette use, appear to be increasing over time among former smokers in the U.S. Increased knowledge of variables linked to relapse among former smokers may help identify areas where clinical and public health efforts can be directed to reduce threats to relapse among individual former smokers, as well as potential barriers to sustained abstinence, and associated health and societal benefits at a population level in the U.S.

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