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Higher smoking prevalence among United States adults with co-occurring affective and drug use diagnoses

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Abstract

Introduction: Individuals with drug use disorders or affective disorders have higher cigarette smoking prevalence and smoking intensity and are less likely to quit than the general population. We sought to estimate the prevalence of cigarette smoking by drug use and psychiatric diagnoses and to explore to what extent a co-occurring diagnosis was associated with current smoking.

Methods: Data were derived from the most recent National Epidemiologic Survey on Alcohol and Related Conditions-III (NESARC-III, 2012-2013; n=36,309). Cigarette smoking status was examined among those with any past-year or lifetime drug use disorders (i.e., alcohol, cannabis, opioid, cocaine) or affective disorders (i.e., mood, anxiety). Diagnoses were assessed using the Diagnostic and Statistical Manual of Mental Disorders criteria (DSM-5).

Results: Adjusting for sociodemographic characteristics, those with drug use disorders (past-year AOR=3.3, 95% CI: 3.0, 3.6; lifetime AOR=3.2, 95% CI: 3.0, 3.5) and those with affective disorders (past-year AOR=1.7; 95% CI: 1.5, 1.8, lifetime AOR=1.3, 95% CI: 1.2; 1.4), had higher odds of current cigarette smoking compared to individuals with no diagnosis. The odds of current cigarette smoking was significantly higher in individuals with both drug use disorders and affective disorders compared to those with either a drug use or affective disorder or no disorder (past-year AOR=5.1; 95% CI: 4.3, 5.9, lifetime AOR=4.3; 95% CI: 3.8, 4.7).

Conclusions: Approximately 30% of the population had a past-year drug use or affective disorder, 17% of whom report both. The combination of both diagnoses produced a 1.5 to 3-fold higher correlation with smoking than either alone.

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Contributors

Authors Parker and Villanti designed the study. Author Parker conducted the statistical analysis. All authors conducted literature searches, wrote manuscript drafts, contributed to, and have approved the final manuscript.

Conflict of Interest

The authors declare that they have no conflicts of interest to disclose.

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Keywords

cigarettes; epidemiology; smoking; depression; anxiety; psychiatric disorders

1 Introduction

While there have been declines in the prevalence of cigarette smoking for the general population (United States Department of Health and Human Services, 2014), these decreases have not affected the most vulnerable populations such as those with psychiatric disorders. US adults with psychiatric diagnoses (i.e., mental health and drug use disorders) smoke cigarettes at higher rates and with greater intensity, and are less likely to quit smoking than the general population (Lasser et al., 2000; Smith, Mazure, & McKee, 2014). Importantly, individuals with affective (i.e., mood/anxiety) disorders often present with additional vulnerabilities that may further increase their risk for smoking and related adverse consequences. For example, comorbid drug use is independently associated with increased prevalence of smoking and poorer cessation outcomes (Blanco et al., 2012; Weinberger, Funk, & Goodwin, 2016).

Smokers with co-occurring mental health and/or drug use disorders have been identified as a group with greater tobacco use than the general population (Williams, Steinberg, Griffiths, & Cooperman, 2013). Previous epidemiological data show a consistent strong association between affective disorders as well as drug use disorders and cigarette use (Goodwin, Zvolensky, Keyes, & Hasin, 2012; Smith et al., 2014). At the population-level, about 40% individuals with depression or anxiety smoked cigarettes in the past year and estimates for those with a past-year drug use disorder were about 1.5 times higher (Smith et al., 2014). Furthermore, comorbid drug disorders are almost 11 times more likely to have a tobacco use disorder than those with no co-occurring disorders (Chou et al., 2016). Recently, smoking prevalence has been estimated for a range of psychiatric disorders (Chou et al., 2016; Smith et al., 2018), but there still remains little information on the prevalence of smoking among people with specific drug use disorders.

In addition, few studies have focused on co-occurring affective and drug use disorders. Prevalence estimates among smokers with dual diagnoses are limited. Previous studies show that while only a small number of individuals with affective disorders have comorbid drug use disorders, smoking rates are highest for those with both (Lawrence, Mitrou, & Zubrick, 2009). A more recent study reported an elevated prevalence of dual disorder (i.e., drug use disorder with mood/anxiety disorder) among past-year cigarette smokers and a high prevalence of lifetime, past-year, and daily smoking (Smith et al., 2018).

Among individuals with affective and drug use disorders, motivation for quitting is similar to the general population (Hall & Prochaska, 2009) and quitting smoking may have a positive impact on drug use outcomes (Baca & Yahne, 2009; Gulliver, Kamholz, & Helstrom, 2006; McKelvey, Thrul, & Ramo, 2017; Prochaska, Delucchi, & Hall, 2004). Pharmacotherapies and counseling can increase smoking abstinence for populations with psychiatric conditions (Ranney, Melvin, Lux, McClain, & Lohr, 2006), though pharmacotherapy effects may be modest in those with drug use disorders (e.g., Miller & Sigmon, 2015). Important system-

wide efforts include consistent screening for tobacco use, comprehensive insurance coverage, education and training for mental health and substance abuse clinicians, and evidence-based prevention and cessation services (Baca & Yahne, 2009; Hall & Prochaska, 2009). However, to accomplish this, we first need smoking estimates for the priority population of individuals with co-occurring diagnoses.

Here, we use the most recent National Epidemiologic Survey on Alcohol and Related Conditions nationally representative data to: 1) provide new smoking estimates for affective disorders and specific drug use disorders, and 2) investigate the extent to which concomitant affective and drug use disorders may place individuals at disproportionate burden for smoking-related harm.

2 Methods

The NESARC-III was designed to include US non-institutionalized civilians aged 18 years or older using multistage probability sampling. This cross-sectional survey included 36,309 adults resulting in a nationally representative sample. Computer assisted interviews were completed between 2012-2013 following Institutional review board approved protocols. Detailed methodology has been published elsewhere (Grant et al., 2014).

Affective disorders included mood disorders and anxiety diagnoses. Mood disorders included primary major depressive disorder, dysthymia, bipolar I, and bipolar II. Anxiety disorders included panic, agoraphobia, social and specific phobias, and generalized anxiety disorder. Drug use disorders included alcohol, cannabis, opioid, and cocaine. Both were assessed for the past year and for the lifetime using the National Institute on Alcohol Abuse and Alcoholism Alcohol Use Disorder and Associated Disabilities Interview Schedule-5 (AUDADIS-5), which was designed to measure disorders with the current Diagnostic and Statistical Manual of Mental Disorders (*DSM-5* Grant et al., 2015). To assess co-occurring or comorbid disorders, we created a new variable which combined any drug use disorder and any affective disorder.

Participants were categorized as past-year smokers (≥ 100 lifetime cigarettes and smoked in the past year), former smokers (≥ 100 lifetime cigarettes and no smoking in the past year), or never smokers. Never smokers did not meet the 100 lifetime cigarette criterion and did not smoke in the past year. Age, race/ethnicity, sex, education, family income, marital status, and urbanicity were all self-reported.

Weighted prevalences of past-year and former cigarette smoking were first estimated for affective disorders and for specific drug use disorder diagnoses (e.g., alcohol, cannabis, opioid, cocaine), for affective disorders and for drug use disorders, and then for any affective disorder and any drug use disorder combined (co-occurring disorders). Then, odds ratios (OR) were estimated from multivariable logistic regressions to estimate the correlation between specific psychiatric diagnoses (binary variables) and smoking status (e.g., past-year smoker, former smoker). Models adjusted for age (continuous), race/ethnicity, sex, education, family income, marital status, and urbanicity.

Next, these models were repeated for past-year smoking using a categorical variable comprised of four mutually exclusive groups: 1) no disorders, 2) affective disorder only, 3) drug use disorder only, 4) both disorders. Data were analyzed using SVY commands in Stata, version 14 to account for the complex sampling design of NESARC-III (Stata Corp, 2015).

3 Results

The prevalence of any affective disorder alone was 15.8% (95% CI: 15.3%, 16.3%), past-year drug use disorder alone was 10.2% (95% CI: 9.8%, 10.7%), and co-occurring affective and drug use disorder was 5.2% (95% CI: 4.9%, 5.6%). Overall past-year cigarette smoking prevalence was 27.2% (95% CI: 26.3%, 28.1%), with the lowest estimate for individuals with no psychiatric diagnosis at 17.6% (95% CI: 16.7%, 18.6%). Past-year cigarette smoking prevalence for individuals with a past-year affective disorder was 37.9% (95% CI: 36.2%, 39.6%), for those individuals with a past-year drug use disorder was 52.9% (95% CI: 51.1%, 54.7%), and in those individuals with co-occurring past-year affective and drug use disorders was 59.8% (95% CI: 56.6%, 62.9%; Table 1). Past-year smoking was higher for past-year diagnoses than for lifetime diagnoses. In addition, past-year smoking was higher in those individuals with a drug use disorder versus an affective disorder (Table 1).

The prevalence of former smoking was 18.7% (95% CI: 18.0%, 19.4%), with the lowest estimate for those with a past-year cocaine use disorder (2.7%; 95% CI: 1.1%, 6.6%) and the highest for those with a lifetime anxiety disorder (20.8%; 95% CI: 19.4%, 22.3%). Former smoking prevalence was substantially lower than past-year smoking prevalence although for the general population (i.e., those with no diagnoses), past-year and former smoking prevalence were comparable (17.6% versus 17.4%, respectively; Table 1).

In multivariable logistic regression models, individuals with any past-year or lifetime diagnoses were more likely to be past-year cigarette smokers (AOR range: 1.2 to 3.4) than those who did not have those disorders. Individuals without any disorders were also less likely to be past-year smokers than those with any disorder (AOR = 0.4). In contrast, persons with either a past-year or a lifetime co-occurring diagnoses were three to four times more likely to be past-year smokers than individuals with one or no disorder (AOR= 3.8 and 3.0, respectively; Table 1).

In categorizing people by mutually exclusive groups of diagnoses, past-year cigarette smoking for those with a past-year affective disorder only was 30.7% (95% CI: 28.8%, 32.6%), and 49.4% (95% CI: 47.4%, 51.4%) for those with a past-year drug use disorder. Individuals with affective disorders (past-year AOR=1.7; 95% CI: 1.5, 1.8, lifetime AOR=1.3, 95% CI: 1.2; 1.4), and those with drug use disorders (past-year AOR=3.3, 95% CI: 3.0, 3.6; lifetime AOR=3.2, 95% CI: 3.0, 3.5) had higher odds of past-year cigarette smoking compared to individuals with no diagnosis after adjusting for sociodemographic characteristics (Figure 1). Odds of past-year cigarette smoking was significantly higher in individuals with both affective and drug use disorders compared to those with an affective disorder, a drug use disorder, or no disorder (past-year AOR=5.1; 95% CI: 4.3, 5.9, lifetime AOR=4.3; 95% CI: 3.8, 4.7; Figure 1).

4 Discussion

Approximately 30% of US adults had a past-year affective or drug use disorder, 17% of whom report both. The combination of both affective and drug use diagnoses had a 1.5 to 3 fold higher odds of past-year smoking than either alone. For this population of individuals with co-occurring diagnoses, not only was the past-year smoking prevalence highest at 60%, but the odds of being a past-year smoker was five times that of the general population. The magnitude of this estimate was higher than for persons with no disorders, affective disorders only, and drug use disorders only. This is consistent with cigarette smoking estimates using the same nationally representative dataset (Smith et al., 2018), though the present study provides the more comprehensive information on the prevalence of cigarette smoking among persons with specific drug use disorders.

The magnitude of the odds ratios between affective and drug use disorders and smoking prevalence suggest a synergistic relationship. Other population-level data implies that co-occurring risk factors for current cigarette smoking are independent of one another and therefore, summative (Higgins et al., 2016). Our findings support a multiplicative model, meaning that for smoking, there is an interaction between affective and drug use disorders. In other words, co-occurring mental health diagnoses are associated with a greater likelihood of smoking than a single diagnosis.

There are several limitations of this study that should be acknowledged. Although the most current and comprehensive dataset to address our aims, the cross-sectional and observational nature of the NESARC-III does not support temporal or causal inferences. This survey also excludes active military as well as most homeless and institutionalized persons, which may lead to underestimation of smoking and psychiatric disorder prevalence. In addition, the data was not designed to differentiate between differing levels of psychiatric disorder severity. Finally, this study focuses on cigarettes and no other tobacco products. It also does not separate daily versus non-daily smokers. These may be important future directions especially for persons with co-occurring psychiatric diagnoses. Still, our findings contribute important new knowledge for a particularly vulnerable population by extending previous examinations of smoking and psychiatric comorbidity.

These data highlight the elevated smoking prevalence among individuals with co-occurring affective and drug use disorders and the critical need for targeted interventions to concurrently address tobacco use in the larger context of mental health and drug treatment services (Marynak et al., 2018; Weinberger et al., 2017). There have been numerous and persistent calls for aiming cessation services at this priority population, especially those with both an affective disorder and a drug use disorder. While data suggest that intensive smoking cessation interventions can promote smoking abstinence among patients receiving treatment for drug use disorder (e.g., Sigmon et al., 2016), many individuals with drug use and psychiatric disorders do not receive treatment for their disorder (Saloner & Karthikeyan, 2015; Smith et al., 2014). Policies that aim to increase tax revenue distribution to support smoking cessation efforts may help offset tobacco-related burden (Cohn, Elmasry, & Niaura, 2017). Findings from the present study provide further support that clinician efforts and

public health interventions require renewed attention on reducing smoking behavior in people with co-occurring mental health disorders.

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HIGHLIGHTS

- We provide novel estimates of cigarette smoking by specific drug use disorders.
- People with affective and drug use disorders have high smoking prevalence.
- Those with co-occurring disorders have higher odds of cigarette smoking.
- Findings have important implications for cessation in mental health treatment.

Figure 1.

Adjusted odds of past-year cigarette smoking by mutually exclusive categories of *DSM-5* Affective Disorder and/or Drug Use Disorder.^a Data from the National Epidemiologic Survey on Alcohol and Related Conditions-III (NESARC-III), 2012-2013.

^a Odds ratios adjusted for age, race/ethnicity, sex, education, family income, marital status, urbanicity, and other psychiatric disorders.

Table 1.

Prevalence and adjusted odds ratios of cigarette smoking status by *DSM-5* Affective Disorder and/or Drug Use Disorder. Data from the National Epidemiologic Survey on Alcohol and Related Conditions-III (NESARC-III), 2012-2013.

	Past-year smoker (n=10,039)		Former smoker (n=5,926)	
	% (SE)	AOR (95% CI) ^a	% (SE)	AOR (95% CI) ^a
Total	27.2 (0.4)	--	18.7 (0.4)	--
No diagnoses ^b	17.6 (0.5)	0.4 (0.4, 0.4)	17.4 (0.5)	0.7 (0.6, 0.8)
Past-year affective disorder ^c	37.9 (0.8)	1.8 (1.7, 2.0)	18.0 (0.6)	1.2 (1.1, 1.3)
Mood	41.1 (0.9)	1.5 (1.4, 1.7)	15.8 (0.7)	1.0 (0.9, 1.1)
Anxiety	37.8 (1.0)	1.4 (1.2, 1.5)	19.2 (0.7)	1.2 (1.1, 1.4)
Past-year drug use disorder ^c	52.9 (0.9)	3.4 (3.2, 3.7)	11.8 (0.5)	0.9 (0.8, 1.0)
Alcohol	51.7 (1.0)	2.7 (2.5, 2.9)	11.8 (0.6)	0.9 (0.8, 1.0)
Cannabis	71.1 (1.9)	3.4 (2.8, 4.1)	7.1 (0.9)	0.8 (0.6, 1.1)
Opioid	69.7 (2.9)	2.8 (2.0, 3.8)	10.2 (2.2)	0.6 (0.4, 1.0)
Cocaine	84.7 (3.3)	3.9 (2.1, 7.3)	2.7 (1.2)	0.3 (0.1, 0.7)
Past-year co-occurring disorders ^d	59.8 (1.6)	3.8 (3.2, 4.4)	9.7 (0.7)	0.8 (0.7, 1.0)
Lifetime affective disorder ^c	34.1 (0.7)	1.7 (1.6, 1.8)	19.5 (0.5)	1.2 (1.1, 1.3)
Mood	35.2 (0.7)	1.2 (1.1, 1.3)	18.8 (0.6)	1.0 (0.9, 1.1)
Anxiety	35.8 (1.9)	1.2 (1.1, 1.3)	20.8 (0.7)	1.2 (1.0, 1.3)
Lifetime drug use disorder ^c	46.4 (0.7)	3.4 (3.2, 3.7)	20.4 (0.6)	1.6 (1.4, 1.7)
Alcohol	45.9 (0.7)	2.6 (2.4, 2.8)	20.3 (1.6)	1.4 (1.3, 1.5)
Cannabis	59.6 (1.4)	1.8 (1.6, 2.1)	20.4 (1.0)	1.7 (1.5, 2.0)
Opioid	69.0 (2.1)	2.1 (1.7, 2.7)	13.4 (1.7)	0.7 (0.5, 0.9)
Cocaine	69.6 (1.9)	2.2 (1.8, 2.7)	20.2 (1.7)	0.9 (0.7, 1.2)
Lifetime co-occurring disorders ^d	49.8 (0.9)	3.0 (2.7, 3.3)	19.7 (0.7)	1.4 (1.3, 1.6)

^aAOR=adjusted odds ratio adjusted for age, race/ethnicity, sex, education, family income, marital status, urbanicity, and other psychiatric disorders. Bolding denotes statistical significance at the alpha = 0.05 level. Some confidence intervals may appear to overlap due to precision of the estimates.

^bReference category includes individuals with any lifetime or past-year disorder.

^cReference category is comprised of individuals without this diagnosis.

^dIncluded a combination of a drug use disorder (i.e., alcohol, cannabis, opioid, cocaine) and at least one affective disorder. Reference category includes those with one or no disorders.

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