



Published in final edited form as:

J Clin Psychiatry. 2016 October ; 77(10): 1404–1412. doi:10.4088/JCP.15m10114.

The Epidemiology of DSM-5 Nicotine Use Disorder: Results from the National Epidemiologic Survey on Alcohol and Related Conditions-III

S. Patricia Chou, Ph.D.¹, Risë B. Goldstein, Ph.D., M.P.H.¹, Sharon M. Smith, Ph.D.¹, Boji Huang, M.D., Ph.D.¹, W. June Ruan, M.A.¹, Haitao Zhang, Ph.D.¹, Jeusun Jung, Ph.D.¹, Tulshi D. Saha, Ph.D.¹, Roger P. Pickering, M.S.¹, Bridget F. Grant, Ph.D., Ph.D.¹

¹Laboratory of Epidemiology and Biometry, Division of Intramural Clinical and Biological Research, National Institute on Alcohol Abuse and Alcoholism, National Institutes of Health, Bethesda, MD 20892

Abstract

Objective—To present nationally representative information on the prevalence, correlates, psychiatric comorbidity and treatment of DSM-5 nicotine use disorder (NUD), and burden of U.S. cigarettes consumption among adults with NUD and other psychiatric disorders.

Method—Using data from the 2012–2013 National Epidemiologic Survey on Alcohol and Related Conditions – III (NESARC-III, n=36,309), we conducted weighted cross-tabulations and multivariate logistic regression analyses to estimate prevalences and examine comorbidity of NUD.

Results—Prevalences of 12-month and lifetime DSM-5 NUD were 20.0% and 27.9%. NUD was more frequent among men, non-Hispanic Whites, younger individuals, the previously married, those with less education and lower incomes and those residing in urban areas. Adjusting for sociodemographic characteristics and additional psychiatric comorbidity, 12-month and lifetime NUD were significantly associated with other substance use and antisocial personality disorders (ORs = 1.5–5.1, 12-month; 1.5–5.6, lifetime). Twelve-month severe NUD was generally associated with major depressive, bipolar I, bipolar II, panic, generalized anxiety, posttraumatic stress, and schizotypal, borderline and antisocial personality disorders (ORs = 1.3–2.5). Individuals with current NUD with at least one psychiatric disorder comprised 11.1% of U.S. adults but smoked 53.6% of total cigarettes consumed. Treatment was utilized by 20.3% of respondents with 12-month and 18.8% with lifetime NUD.

Corresponding Author: S. Patricia Chou, Ph.D., Laboratory of Epidemiology and Biometry, Division of Intramural Clinical and Biological Research, National Institute on Alcohol Abuse and Alcoholism, National Institutes of Health, 5635 Fishers Ln., Room 3073, Bethesda, MD 20892, Tel. 301-443-5013, Fax. 301-443-1400, Patricia.Chou@nih.gov.

There was no previous presentation

Conflict of Interest Disclosures: No conflicts of interest declared by any author.

Disclaimer: The views and opinions expressed in this report are those of the authors and should not be construed to represent the views of any of the sponsoring organizations or agencies or the US government.

Conclusions—Findings underscore the need to address nicotine use in clinical settings. Recognition of psychiatrically vulnerable subpopulations may inform etiologic research, prevention, and treatment of NUD.

Keywords

nicotine use disorders; prevalence; psychiatric comorbidity; cigarette smoking; treatment utilization

Tobacco use is the largest and most preventable cause of mortality and morbidity worldwide (1–5). Globally, tobacco use has been linked to 6 million deaths each year and is projected to kill 8 million people annually by 2030. This growing epidemic, especially in the developing world, has prompted urgent calls for action by World Health Organization (1–3). In the United States, half a million deaths annually are caused by tobacco, including those from cardiovascular and respiratory diseases, cancer, gastrointestinal ulcers and diabetes (6–9). Tobacco use adds \$130 billion yearly to health care costs, plus indirect costs of \$150 billion due to lost productivity (5, 6, 10, 11).

High rates of tobacco use have been observed among psychiatric patients (12–15). Recent national surveys also found higher rates of tobacco use among adults with psychiatric disorders or serious psychological distress compared to those without these disorders (10, 16, 17). However, few studies have examined the prevalence and psychiatric comorbidity of rigorously diagnosed *Diagnostic and Statistical Manual of Mental Disorders* (DSM) defined nicotine dependence (ND) among representative samples of the U.S. general population. In the 2001–2002 of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), 12-month and lifetime DSM-IV ND prevalences were 12.8% (18) and 17.7% (Chou, unpublished data). Elevated odds of comorbid mood, anxiety, other substance use (SUD), and personality disorders (PDs) were observed among individuals with 12-month ND (18, 19). Twelve-month and lifetime rates of DSM-IV ND in the National Comorbidity Survey Replication were 4.0% and 8.3% (20); past-month prevalence of ND estimated in the National Survey on Drug Use and Health among adults 18 years and older in 2012 was 13.6% (21).

Previous national estimates of ND were all based on DSM-IV criteria. However, DSM-5 (22) made major changes to the ND definition. In the DSM-5, the new definition of nicotine use disorder (NUD) was aligned with other SUDs through the addition of craving, inclusion of DSM-IV abuse criteria other than legal problems, establishment of a diagnostic threshold of 2 criteria, and creation of a severity metric based on criteria counts (23). Because of the seriousness of NUD, the lack of current epidemiological data from a single, reliable uniform source represents a critical knowledge gap for prevention and intervention. We, therefore, present national data on the prevalence, correlates, comorbidity and treatment of DSM-5 NUD from the 2012–2013 NESARC-III (24). We also assessed DSM-IV criteria for ND to examine changes in prevalences since 2001–2002. As is well known, the majority of nicotine consumption in the U.S. is in the form of cigarettes, and thus, the public health burden of nicotine use occurs almost entirely through cigarette smoking (18). To gain an understanding of the contribution of NUD and psychiatric disorders to this public health

burden, we determined the percentage of all cigarettes in the United States that were consumed by individuals with NUD and psychiatric disorders

METHODS

Sample

The target population of the 2012–2013 NESARC-III comprised the civilian, noninstitutionalized U.S. population, 18 years and older, of households and selected group quarters (24). Respondents were selected through multistage probability sampling. Primary sampling units were counties or groups of contiguous counties, secondary sampling units (SSUs) comprised groups of Census-defined blocks, and tertiary sampling units were households within sampled SSUs, within which eligible adult respondents were selected. Hispanic, Black, and Asian individuals were assigned higher selection probabilities than nonminority household members. In households with 4 or more eligible minority individuals (n=1661), 2 respondents were selected. The sample size was 36,309: household response rate was 72%; person-level response rate, 84%; and overall response rate, 60.1%, comparable to other current U.S. national surveys (25, 26).

Data were adjusted for nonresponse, then weighted to represent the U.S. civilian population based on the 2012 American Community Survey (27). Weighting adjustments compensated adequately for nonresponse (24). Respondents did not differ from the total eligible sample, including nonrespondents, in percent Hispanic, Black, or Asian, population density, vacancy rate, proportion of population in group quarters or proportion of renters at the segment level. There were no differences between respondents and the total eligible sample on Hispanic ethnicity. Respondents included a slightly higher percentages of men (48.1% versus 46.2%), and individuals aged 60–69 years (13.7% versus 12.6%), and smaller percentages aged 40–49 (18.1% versus 18.3%) and 30–39 (16.7% versus 17.4%), than the eligible sample.

Interviewer field methods, detailed elsewhere (24), involved initial structured home study, in-person training, ongoing supervision, and random respondent callbacks to verify data. Respondents gave informed consent and received \$90.00 for survey participation. Protocols were approved by National Institutes of Health and Westat Institutional Review Boards.

Assessments

The diagnostic interview was the NIAAA Alcohol Use Disorder and Associated Disabilities Interview Schedule – 5 (AUDADIS-5) (28, 29), designed to measure DSM-5 NUD, alcohol use disorder (AUD), specific drug use disorders (DUDs) and selected mood, anxiety, trauma-related, eating, and personality disorder diagnoses. The AUDADIS-5 also assessed DSM-IV ND criteria to enable comparisons of current NESARC-III findings with those from the previous 2001–2002 NESARC survey.

Nicotine Use Disorders

Consistent with DSM-5, lifetime NUD diagnoses required 2 of the 11 criteria in the 12 months before interview or previously. Prior-to-the-last-12-months diagnoses required clustering of 2 criteria in a single year. DSM-5 NUD diagnoses were classified as mild (2–

3 criteria), moderate (4–5 criteria) or severe (6 criteria). DSM-IV lifetime ND required 3 criteria in the past year or previously. Prior-to-the-past-year DSM-IV diagnoses also required clustering of criteria within a single year. Concordances between 12-month and lifetime DSM-IV ND and DSM-5 NUD were high ($\kappa=0.79, 0.84$; Goldstein, unpublished data). In the present study, NUD and ND disorders were assessed for any tobacco product including cigarettes, cigars, pipes, chewing tobacco, snuff and e-cigarettes/e-liquid.

Reliability of DSM-5 NUD diagnoses ($\kappa=0.50–0.87$) and associated dimensional scales [intra-class correlation coefficient (ICC)= $0.83–0.84$] were fair to excellent in a large general population sample (29). Procedural validity was assessed by clinical reappraisal using the semistructured, clinician-administered Psychiatric Research Interview for Substance and Mental Disorders, DSM-5 version (PRISM-5) (30), in a large general population sample. Concordances between AUDADIS-5 and PRISM-5 NUD diagnoses were fair to good ($\kappa=0.54–0.68$), whereas concordances between the criteria scales were excellent (ICC= $0.80–0.84$) (31). Test-retest reliability of 12-month and lifetime DSM-IV ND diagnoses and symptom scales, and convergent validity of diagnoses, were fair to excellent in the general population (18).

Other Psychiatric Disorders

Current and lifetime DSM-5 AUD and DUD diagnoses were derived similarly to those for NUD. Drug-specific DUDs included sedative/tranquilizer, cannabis, amphetamine, cocaine, non-heroin opioid, heroin, hallucinogen, and solvent/inhalant use disorders. These diagnoses were aggregated to yield a diagnosis of any DUD. Test-retest reliabilities were good ($\kappa=0.60–0.62$) for AUD, fair for DUD ($\kappa=0.40–0.54$) diagnoses, and higher for their criteria scales (ICC= $0.83–0.85$ for AUD, $0.45–0.84$ for DUD) (29). Concordances between AUDADIS-5 and PRISM-5 diagnoses and dimensional scales for AUD and DUDs were fair to good ($\kappa=0.35–0.62$; ICCs >0.68 , except for past-year sedatives and stimulants [$0.38, 0.44$]) (31).

DSM-5 Mood disorders included major depressive (MDD), dysthymia, bipolar I and bipolar II disorders. Anxiety disorders included DSM-5 panic, agoraphobia, social and specific phobias and generalized anxiety disorder (GAD). Consistent with DSM-5, primary mood and anxiety diagnoses excluded substance- and medical illness-induced disorders. In addition to mood and anxiety disorders, posttraumatic stress disorder (PTSD), anorexia nervosa, bulimia nervosa, binge-eating disorder, and schizotypal, borderline and antisocial PDs were assessed. Details on the psychometric properties of these diagnoses are reported elsewhere (29, 32).

Current Cigarette Smokers and Number of Cigarettes Smoked

Among lifetime smokers of 100 cigarettes, current use consisted of any smoking during the year before interview. Among current smokers, the number of cigarettes smoked in the past year was the product of answers to the questions: “On the days that you smoked in the past year, about how many cigarettes did you usually smoke?” and “About how often did

you usually smoke in the past year?" (e.g., daily, 5 to 6 days per week). Test-retest reliabilities of these measures were excellent (ICC=0.74–0.84) (33).

Statistical Analysis

Weighted cross-tabulations estimated prevalences of NUD for the total sample and by sociodemographic characteristics. Multivariable logistic regression analyses estimated associations of NUD and sociodemographic variables controlling for all others. Logistic regressions of psychiatric comorbidity of NUD adjusted for: (1) only sociodemographic characteristics; and (2) sociodemographic characteristics and all other psychiatric and substance use disorders. Eating disorders were too rare to assess comorbid associations with NUD but were included as covariates in comorbidity analyses of NUD with other disorders.

We multiplied the total number of cigarettes smoked in the past year by the weighted number of persons in the following 4 groups to arrive at the percentage of all cigarettes consumed in the past year in each group: (1) cigarette smokers with NUD and a comorbid psychiatric disorder; (2) cigarette smokers with NUD but without a comorbid psychiatric disorder; (3) cigarette smokers without NUD but with a psychiatric disorder; and (4) cigarette smokers without NUD or a psychiatric disorder. All analyses utilized SUDAAN, version 11.0 (34), which accounts for the NESARC-III's complex sample design.

RESULTS

Current and Lifetime Nicotine/Cigarette Use

Prevalences of 12-month (27.2%) and lifetime (45.8%) any nicotine use observed in the NESARC-III were similar to those reported in the 2001–2002 NESARC (28.4% and 46.9%). Similarly, prevalences of 12-month and lifetime cigarette use in the NESARC-III (23.5%; 42.0%) remained virtually identical to rates reported in the 2001–2002 NESARC (24.9%; 43.7%).

Prevalence and Sociodemographic Characteristics of DSM-5 NUD

As shown in Table 1, prevalences of 12-month and lifetime DSM-5 NUD were 20.0% and 27.9%, respectively. Prevalences of 12-month mild, moderate and severe NUD were 6.6%, 6.5% and 6.9%, respectively. Rates of 12-month and lifetime DSM-IV ND in the NESARC-III were 14.0% and 22.0%, somewhat higher than those in the 2001–2002 NESARC (12.8% and 17.7%). Table 2 shows the adjusted odds ratios of DSM-5 NUD by sociodemographic characteristics. Odds of 12-month and lifetime DSM-5 NUD were consistently greater among men, the three youngest age groups, among individuals who were widowed/separated/divorced and those with lower education and lower incomes across all severity levels. The odds of 12-month NUD were generally lower among individuals who resided in urban areas, a result that generalized to respondents with any lifetime NUD and lifetime mild NUD. Odds of 12-month and lifetime mild NUD were greater in the South relative to the West.

Comorbidity of NUD

Associations between 12-month and lifetime NUD and psychiatric disorders are shown in Tables 3 and 4. When only sociodemographic variables were controlled, 12-month and lifetime any, moderate, severe NUD were associated with virtually all other psychiatric disorders assessed in the NESARC-III, while mild NUD was positively associated with other SUDs, panic disorder, and schizotypal and antisocial PDs.

After adjustment for sociodemographic characteristics and other psychiatric comorbidity, other SUDs and antisocial PD were significantly and positively associated with 12-month NUD across severity levels. Further, MDD, panic disorder, and borderline PD were positively associated with any, moderate, and severe NUD whereas bipolar I, GAD, and PTSD, were positively associated with any and severe NUD. Schizotypal PD was negatively associated with mild and moderate NUD, but positively associated with severe NUD. Bipolar II disorder was negatively associated with mild, but positively associated with severe NUD.

Lifetime comorbidity results generally mirrored those found among 12-month disorders. However, unlike 12-month comorbidity findings, agoraphobia was positively associated with any and severe NUD, specific phobia was associated with any moderate and severe NUD, and PTSD was associated with moderate NUD. Schizotypal PD and GAD were no longer related to lifetime severe NUD.

Burden of Current U.S. Cigarette Consumption

Individuals with current NUD accounted for 20.0% of all U.S. adults, but consumed 89.6% of all cigarettes. Adults with a current psychiatric disorder (with and without NUD) comprised 36.4% of U.S. adults but consumed 56.4% of all cigarettes. Those with current NUD and at least one current psychiatric disorder constituted only 11.1% of U.S. adults but smoked 53.6% of total cigarettes consumed.

Individuals without any NUD-psychiatric disorder comorbidity accounted for lower percentages of cigarettes smoked: those with current NUD but no psychiatric disorder smoked 36.0% of all cigarettes; those with a current psychiatric disorder but no NUD smoked 2.7% of total cigarettes; and individuals with neither NUD nor a current psychiatric disorder smoked 7.7% of all cigarettes.

Treatment Utilization for NUD

As shown in Table 5, overall treatment rates were 20.3% and 18.8% for 12-month and lifetime NUD, respectively. Treatment was positively associated with NUD severity, ranging from 9.4% to 29.1% for current and 6.7% to 27.8% for lifetime NUD.

Among specific treatments, prescribed medications (e.g., varenicline, bupropion) and nicotine replacements were used most commonly. Support groups, Internet chat rooms, and acupuncture or meditation were among the least utilized modalities.

DISCUSSION

In the NESARC-III, 12-month and lifetime prevalences of nicotine use (27.2%; 45.8%) remained virtually unchanged since 2001–2002 (28.4%; 46.9%). A similar trend was found for 12-month (23.5% versus 24.9%) and lifetime (42.0% versus 43.7%) cigarette use.

Prevalences of 12-month and lifetime DSM-5 NUD in the NESARC-III were 20.0% and 27.9%, respectively, representing 47,147,599 and 65,599,467 American adults. Corresponding DSM-IV rates in the NESARC-III were 14.0% and 22.0% which were somewhat higher than those observed in the 2001–2002 NESARC (12.8%; 17.7%). While DSM-IV is no longer the current nomenclature, increases in disorder absent increases in use may still warrant investigation into possible contributors, including PTSD related to the September 11, 2001, attacks, and the impacts of 2 long wars in Afghanistan and Iraq, as well as severe economic downturn (35–38).

Consistent with findings for current nicotine use (39) and other SUDs (40–42), rates of NUD were higher among men. NUD was inversely related to age, particularly 12-month moderate and severe disorders. Future prospective research is needed to identify mechanisms underlying these relationships. Nevertheless, together with findings on early onset of nicotine use (43), these results reinforce the need for continued and expanded prevention targeting preadolescents and adolescents and intervention activities appropriate across the lifespan.

Findings on race or ethnicity identify lower risks among Blacks, Asians/Pacific Islanders, and Hispanics, than non-Hispanic Whites. Nevertheless, lower rates among these minority groups do not negate the importance of prevention of both nicotine use and NUD, nor of intervening appropriately when these occur. Future research should characterize biologic and sociocultural risk factors among Whites and protective factors among Blacks, Asians/Pacific Islanders, and Hispanics. This information will further understanding of NUD etiology and inform appropriate prevention and intervention programs.

After adjustment for sociodemographics and additional comorbidity, we observed significant, positive associations of 12-month and lifetime DSM-5 NUD with other DSM-5 SUDs, MDD, bipolar I, panic, GAD, PTSD, and borderline and antisocial PDs. GAD was associated with severe 12-month NUD whereas agoraphobia and specific phobia were only associated with severe lifetime NUD. Twelve-month mild NUD was also negatively associated with bipolar II disorder, and twelve-month mild, and moderate and lifetime moderate NUD were negatively associated with schizotypal PD. Stronger associations with adjustment only for sociodemographic characteristics suggest that factors common to NUD and comorbid disorders partly explain the associations. However, the persistence of these relationships after adjustment for additional comorbidity suggests important, unique underlying neurobiologic or psychosocial factors. The present findings, along with genetic studies (44), call for further study of correlates, predictors, and mechanisms of NUD comorbidity, including differing directions of association by NUD severity with bipolar II and schizotypal PD.

The burden of U.S. cigarette consumption among psychiatrically comorbid individuals with NUD appears even greater than that among individuals with ND in our previous study (18). Individuals with NUD smoked a greater percentage of cigarettes in the present study compared to those without NUD (89.6% versus 57.5%), especially those with comorbid psychopathology (53.6% versus 34.6%), relative to their respective representations in the U.S. general population (20.0% and 11.1% versus 12.8% and 7.1%) (18). Increasing evidence demonstrates that tobacco industry marketing segments smokers by sociodemographic and psychological vulnerability factors. Reflecting both sociodemographic disadvantage and psychiatric comorbidity, smokers with NUD bear disproportionate economic and public health burdens and have limited access to treatment, longer duration of smoking and higher rates of failed cessation attempts (44–47). The present results echo the call by Apollonio and colleagues (45) for countermeasures to curb smoking among these vulnerable individuals, and further identify this segment of the population as an important disparity group for tobacco control programs (48).

Rates of help seeking were low (20.3% and 18.8%) for both 12-month and lifetime DSM-5 NUD. The most frequently utilized treatments (prescribed medications and nicotine replacement), however, included modalities with strongest empirical support (49–51). With some modifications, standard pharmacologic and psychosocial treatments can be used effectively and safely in smokers with comorbid psychopathology, including SUDs (51). Nevertheless, better integration of NUD services into health care settings including mental health and other SUD treatment is clearly needed (51, 52). Research examining perceived needs for and barriers to NUD treatment among psychiatrically comorbid and noncomorbid smokers is also warranted.

Study limitations include its cross-sectional design, which precludes causal interpretation of results. Since the NESARC-III sample excluded active military personnel, and most homeless and institutionalized individuals, estimates presented here may underestimate the true prevalence of NUD. Respondents' self-reports of socially disvalued behaviors, including nicotine use and NUD symptoms may have also led to underestimation of the true prevalence of these conditions (53). The lack of biochemical verification of smoking status is also a study limitation.

Despite these limitations, the present study is the first to report nationally representative U.S. data on the epidemiology of DSM-5 NUD among U.S. adults. It extends previous examinations of psychiatric comorbidity of NUD, including a lifetime perspective as well as investigation of unique associations independent of other disorders. Our findings of substantial comorbidity of NUD and low rates of treatment underscore the importance of identification and intervention with every tobacco-using patient at every primary care or specialty mental health visit (54, 55). Of note, tobacco users' satisfaction with medical care is positively associated with physician attention to smoking cessation (56). Beyond these considerations, recognition of psychiatrically vulnerable population subgroups may inform future research on genetic and environmental determinants of NUD and its psychiatric comorbidities, as well as improved prevention and treatment for these burdensome conditions.

Acknowledgments

Sources of financial and material support: The NESARC-III was sponsored by the National Institute on Alcohol Abuse and Alcoholism (NIAAA), with supplemental support from the National Institute on Drug Abuse. Sponsors and funders of the NESARC-III had no role in the design and conducted of the study; collection, management analysis, and interrelation of the data; and preparation, review and approval of the manuscript.

References

1. World Health Organization. Tobacco Fact Sheet No. 339. Geneva, Switzerland: The Organization; 2014.
2. World Health Organization. Report on the Global Tobacco Epidemic. Geneva, Switzerland: The Organization; 2013.
3. World Health Organization. Report on the Global Tobacco Epidemic. Geneva, Switzerland: The Organization; 2011.
4. Centers for Disease Control and Prevention, National Health Interview Survey. Adult Cigarette Smoking in the United States: Current Estimate. http://www.cdc.gov/tobacco/data_statistics/fact_sheets/adult_data/cig_smoking/
5. Centers for Disease Control and Prevention. Current Cigarette Smoking Among Adults—United States, 2005–2013. Morbidity and Mortality Weekly Report. 2014; 63(47):1108–12. [PubMed: 25426653]
6. U.S. Department of Health and Human Services. The health consequences of smoking - 50 years of progress. A report of the Surgeon General. 2014. Available from <http://www.surgeongeneral.gov/library/reports/50-years-of-progress/index.html>
7. Chu KM, Cho CH, Shin VY. Nicotine and gastrointestinal disorders: its role in ulceration and cancer development. *Curr Pharm Des.* 2013; 19(1):5–10. [PubMed: 22950507]
8. Forouhi NG, Wareham NJ. Epidemiology of diabetes. *Medicine.* 2014; 42(12):698–702. [PubMed: 25568613]
9. Li LF, Chan RL, Lu L, et al. Cigarette smoking and gastrointestinal diseases: the causal relationship and underlying molecular mechanisms. *Int J Mol Med.* 2014; 34(2):372–380. [PubMed: 24859303]
10. Centers for Disease Control and Prevention. Cigarette smoking amount adults - United States, 2007. *MMWR Morb Mortal Wkly Rep.* 2008; 57(45):1221–1226. [PubMed: 19008790]
11. Centers for Disease Control and Prevention. Smoking-attributable mortality, years of potential life lost, and productivity losses - United States, 2000–2004. *MMWR Morb Mortal Wkly Rep.* 2008; 57(45):1226–1228. [PubMed: 19008791]
12. Kalman G, Morrisette SB, George TP. Comorbidity of smoking in patients with psychiatric and substance use disorder. *Am J Addict.* 2005; 14(2):106–123. [PubMed: 16019961]
13. Moeller-Saxone K. Cigarette smoking and interest in quitting among consumers at a psychiatric disability rehabilitation and support services. *Aust N Z J Pub Health.* 2008; 32(5):479–481. [PubMed: 18959554]
14. Lucksted A, McGuire C, Postrado L, Kreyenbuhl J, Dixon LB. Specifying cigarette smoking and quitting among people with serious mental illness. *Am J Addict.* 2004; 13(2):128–138. [PubMed: 15204664]
15. Waxmonsky JA, Thomas MR, Miklowitz DJ, et al. Prevalence and correlates of tobacco use in bipolar disorder: Data from the first 2000 participants in the systematic treatment enhancement program. *Gen Hosp Psychiatry.* 2005; 27(5):321–328. [PubMed: 16168792]
16. Glasheen C, Hedden SL, Forman-Hoffman VL, Colpe LJ. Cigarette smoking behaviors among adults with serious mental illness in a nationally representative sample. *Ann Epidemiol.* 2014; 24(10):776–780. [PubMed: 25169683]
17. McClave AK, McKnight-Eily LR, Davis SP, Dube SR. Smoking characteristics of adults with Selected lifetime mental illnesses: results from the 2007 National Health Interview Survey. *Am J Public Health.* 2010; 100(12):2464–2472. [PubMed: 20966369]

18. Grant BF, Hasin DS, Chou SP, Stinson FS, Dawson DA. Nicotine dependence and psychiatric disorders in the U.S.: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Arch Gen Psychiatry*. 2004; 61(11):1107–1115. [PubMed: 15520358]
19. Goodwin RD, Zvolensky MJ, Keyes KM, Hasin DS. Mental disorders and cigarette use among adults in the United States. *Am J Addict*. 2012; 21(5):416–423. [PubMed: 22882392]
20. Cogle JR, Zvolensky MJ, Fitch KE, Sachs-Ericsson N. The role of comorbidity in explaining the associations between anxiety disorders and smoking. *Nicotine Tob Res*. 2010; 12(4):355–364. [PubMed: 20156885]
21. Substance Abuse and Mental Health Services Administration. Results from the 2012 National Survey on Drug Use and Health: Detailed Tables. Available from <http://www.samhsa.gov/data/sites/default/files/NSDUH-DetTabs2012/NSDUH-DetTabs2012/PDFW/NSDUH-DetTabsSect6peTabs33to37-2012.pdf>; Table 6.34B
22. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 5. Arlington, VA: American Psychiatric Press; 2013. (DSM-5)
23. Hasin DS, O'Brien C, Auriacombe M, et al. DSM-5 criteria for substance use disorders: recommendations and rationale. *Am J Psychiatry*. 2013; 170(8):834–851. [PubMed: 23903334]
24. Grant, BF, Amsbary, M, Chu, A. , et al. Source and Accuracy Statement: National Epidemiologic Survey on Alcohol and Related Conditions-III (NESARC-III). Rockville, MD: National Institute on Alcohol Abuse and Alcoholism; 2014.
25. Substance Abuse and Mental Health Services Administration. Results from the 2012 National Survey on Drug Use and Health: summary of national findings, Appendix B: Statistical Methods and Measurement. Available from <http://www.samhsa.gov/data/nsduh/2012summnatfinddetables/nationalfindings/nsduhresults2012.htm#AppB>
26. Centers for Disease Control and Prevention. Summary health statistics for US adults: National Health Interview Survey. 2012. Available from http://www.cdc.gov/nchs/data/series/sr_10/sr10_260.pdf
27. Bureau of the Census. *American Community Survey, 2012*. Suitland, MD: The Bureau; 2013.
28. Grant, BF, Goldstein, RB, Chou, SP. , et al. The Alcohol Use Disorder and Associated Disabilities Interview Schedule – Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition Version (AUDADIS-5). Rockville, MD: National Institute on Alcohol Abuse and Alcoholism; 2011.
29. Grant BF, Goldstein RB, Smith SM, et al. The Alcohol Use Disorder and Associated Disabilities Interview Schedule-5 (AUDADIS-5): reliability of substance use and psychiatric disorder modules in a general population sample. *Drug Alcohol Depend*. 2015; 148:27–33. [PubMed: 25595052]
30. Hasin, DS, Aivadyan, C, Greenstein, E, Grant, BF. Psychiatric Research Interview for Substance Use and Mental Disorders, Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (PRISM-5) Version. New York, NY: Columbia University, Department of Psychiatry; 2011.
31. Hasin DS, Greenstein E, Aivadyan C, et al. The Alcohol Use Disorder and Associated Disabilities Interview Schedule-5 (AUDADIS-5): procedural validity of substance disorders modules through clinical re-appraisal in a general population sample. *Drug Alcohol Depend*. 2015 Mar 1.148:40–46. [PubMed: 25604321]
32. Hasin DS, Shmulewitz D, Stohl M, et al. Procedural validity of the AUDADIS-5 depression, anxiety and posttraumatic stress disorder modules in substance abusers and non-abusers in a general population sample. *Drug Alcohol Depend*. 2015; 152(1):246–256. [PubMed: 25939727]
33. Grant BF, Dawson DA, Stinson FS, Chou PS, Kay W, Pickering R. The Alcohol Use Disorder and Associated Disabilities Interview Schedule-IV (AUDADIS-IV): reliability of alcohol consumption, tobacco use, family history of depression and psychiatric diagnostic modules in a general population sample. *Drug Alcohol Depend*. 2003; 71(1):7–16. [PubMed: 12821201]
34. Research Triangle Institute. SUDAAN Language Manual, Release 11.0. Research Triangle Park, NC: The Institute; 2012.
35. Cooper B. Economic recession and mental health: an overview. *Neuropsychiatr*. 2011; 25(3):113–117. [PubMed: 21968374]
36. Fu SS, McFall M, Saxon AJ, et al. Post-traumatic stress disorder and smoking: a systematic review. *Nicotine Tob Res*. 2007; 9(11):1071–1084. [PubMed: 17978982]

37. Galea S, Resnick H, Ahern J, et al. Posttraumatic stress disorder in Manhattan, New York City, after the September 11th terrorist attacks. *J Urban Health*. 2002; 79(3):340–353. [PubMed: 12200503]
38. Compton WM, Gfroerer J, Conway KP, Finger MS. Unemployment and substance outcomes in the United States 2002–2010. *Drug Alcohol Depend*. 2014; 142(1):350–353. [PubMed: 25042761]
39. King BA, Dube SR, Tynan MA. Current tobacco use among adults in the United States: findings from the National Adult Tobacco Survey. *Am J Public Health*. 2012; 102(11):93–100.
40. Grant BF, Goldstein RB, Saha TD, et al. Epidemiology of DSM-5 Alcohol Use Disorder: Results From the National Epidemiologic Survey on Alcohol and Related Conditions III. *JAMA Psychiatry*. 2015 Aug 1; 72(8):757–766. [PubMed: 26039070]
41. Hasin DS, Stinson FS, Ogburn E, Grant BF. Prevalence, correlates, disability and comorbidity of DSM-IV alcohol abuse and dependence in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Arch Gen Psychiatry*. 2007; 64(7):830–842. [PubMed: 17606817]
42. Compton WM, Thomas YF, Stinson FS, Grant BF. Prevalence, correlates, disability, and comorbidity of DSM-IV drug abuse and dependence in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Arch Gen Psychiatry*. 2007; 64(5):566–576. [PubMed: 17485608]
43. U.S. Department of Health and Human Services. Preventing Tobacco Use Among Youth and Young Adults: A Report of the Surgeon General. 2012. Available from <http://www.surgeongeneral.gov/library/reports/preventing-youth-tobacco-use/>
44. Agrawal A, Lynskey MT. Are there genetic influences on addiction: evidence from family, adoption and twin studies. *Addiction*. 2008; 103(7):1069–1081. [PubMed: 18494843]
45. Apollonio DE, Malone RE. Marketing to the marginalized: tobacco industry targeting of the homeless and mentally ill. *Tob Control*. 2005; 14(6):409–415. [PubMed: 16319365]
46. Kahler CW, Daughters SB, Leventhal AM, et al. Personality, psychiatric disorders, and smoking in middle-aged adults. *Nicotine Tob Res*. 2009; 11(7):833–841. [PubMed: 19470795]
47. Le Cook B, Wayne GF, Keithly L, Connolly G. One size does not fit all: how the tobacco industry has altered cigarette design to target consumer groups with specific psychosocial needs. *Addiction*. 2003; 98(11):1547–1561. [PubMed: 14616181]
48. Williams JM, Steinberg ML, Griffiths KG, Cooperman N. Smokers with behavioral health comorbidity should be designated a tobacco use disparity group. *Amer J Public Health*. 2013; 103(9):1549–1555. [PubMed: 23865661]
49. Cox LS, Okuyemi K, Choi WS, Ahluwalia JS. A review of tobacco use treatments in U.S. ethnic minority populations. *Am J Health Promot*. 2011; 25(5 suppl):S11–30. [PubMed: 21510783]
50. Herman AI, Sofuoglu M. Comparison of available treatments for tobacco addiction. *Curr Psychiatry Rep*. 2010; 12(5):433–440. [PubMed: 20623259]
51. Mackowick KM, Lynch MJ, Weinberger AH, George TP. Treatment of tobacco dependence in people with mental health and addictive disorders. *Curr Psychiatry Rep*. 2012; 14(5):478–485. [PubMed: 22821177]
52. Rigotti NA. Integrating comprehensive tobacco treatment into the evolving US health care system: it's time to act. *Arch Intern Med*. 2011; 171(1):53–55.
53. Tourangeau R, Yan T. Sensitive questions in surveys. *Psychol Bull*. 2007; 133(5):859–883. [PubMed: 17723033]
54. Clair C, Rigotti NA, Pomeala B, et al. Association of smoking cessation and weight change with cardiovascular disease among adults with and without diabetes. *JAMA*. 2013; 390(10):1014–1021.
55. Cole HM, Fiore MC. The war against tobacco: 50 years and counting. *JAMA*. 2014; 311(2):131–132. [PubMed: 24399546]
56. Conroy MB, Majchrzak NE, Regan S, Silverman CB, Schneider LI, Rigotti NA. The association between patient-reported receipt of tobacco intervention at a primary care visit and smokers' satisfaction with their health care. *Nicotine Tob Res*. 2005; (Suppl 1):S29–S34. [PubMed: 16036267]

Clinical Points

- The prevalence of DSM-5 nicotine use disorder (NUD) in the U.S. is 20.0%.
- NUD was highly comorbid with other psychiatric disorders and largely goes untreated.
- Individuals with NUD and psychiatric comorbidity bear the greater public health burden of U.S. cigarette consumption, warranting greater prevention/intervention efforts.
- Integration of NUD services into primary care, mental health and substance abuse treatment settings is warranted.

Table 1 Prevalences of 12-Month and Lifetime DSM-5 Nicotine Use Disorder by Sociodemographic Characteristics.

Sociodemographic Characteristics	Nicotine Use Disorder (NUD)													
	12-Month						Lifetime							
	Mild % (SE)	Moderate % (SE)	Severe % (SE)	Any NUD % (SE)	Mild % (SE)	Moderate % (SE)	Severe % (SE)	Any NUD % (SE)	Mild % (SE)	Moderate % (SE)	Severe % (SE)	Any NUD % (SE)		
Total	6.59 (0.18)	6.54 (0.20)	6.90 (0.22)	20.03 (0.41)	6.56 (0.16)	8.40 (0.24)	12.91 (0.33)	27.87 (0.52)	7.72 (0.30)	7.69 (0.25)	7.86 (0.32)	23.27 (0.54)	14.64 (0.51)	32.13 (0.70)
Sex														
Men	5.53 (0.19)	5.48 (0.27)	6.01 (0.24)	17.03 (0.43)	5.61 (0.20)	7.01 (0.26)	11.30 (0.33)	23.92 (0.52)	7.27 (0.40)	8.05 (0.40)	8.45 (0.48)	23.76 (0.69)	11.79 (0.58)	26.49 (0.71)
Women	7.40 (0.35)	7.70 (0.39)	8.30 (0.38)	23.40 (0.68)	6.68 (0.31)	9.22 (0.41)	14.15 (0.48)	30.05 (0.72)	7.19 (0.29)	6.58 (0.32)	7.27 (0.33)	21.05 (0.63)	14.90 (0.57)	30.79 (0.77)
Age														
18-29	3.35 (0.29)	2.91 (0.23)	2.19 (0.19)	8.45 (0.41)	5.23 (0.41)	6.83 (0.41)	8.47 (0.39)	20.53 (0.74)	7.05 (0.25)	7.44 (0.27)	7.82 (0.27)	22.32 (0.53)	15.48 (0.45)	32.38 (0.68)
30-44	7.54 (0.34)	6.27 (0.37)	6.26 (0.44)	20.07 (0.64)	7.55 (0.33)	6.98 (0.40)	9.07 (0.53)	23.60 (0.74)	7.08 (1.39)	9.58 (1.96)	12.92 (1.78)	29.59 (2.95)	21.02 (2.12)	38.43 (2.93)
45-64	5.01 (0.73)	2.82 (0.41)	3.32 (0.49)	11.15 (0.95)	4.69 (0.58)	3.36 (0.54)	5.04 (0.56)	13.09 (1.04)	5.01 (0.73)	2.82 (0.41)	3.32 (0.49)	11.15 (0.95)	5.04 (0.56)	13.09 (1.04)
65 +	4.29 (0.26)	3.86 (0.28)	4.01 (0.33)	12.16 (0.54)	4.25 (0.26)	4.76 (0.28)	6.63 (0.41)	15.64 (0.60)	7.08 (1.39)	9.58 (1.96)	12.92 (1.78)	29.59 (2.95)	21.02 (2.12)	38.43 (2.93)
Race-ethnicity														
White	9.25 (0.48)	8.07 (0.47)	10.63 (0.72)	27.95 (1.01)	8.76 (0.56)	9.28 (0.59)	15.31 (0.87)	33.35 (1.16)	5.01 (0.73)	2.82 (0.41)	3.32 (0.49)	11.15 (0.95)	5.04 (0.56)	13.09 (1.04)
Black	8.29 (0.41)	9.04 (0.43)	8.80 (0.40)	26.13 (0.66)	8.18 (0.41)	10.22 (0.40)	15.45 (0.60)	33.85 (0.84)	4.29 (0.26)	3.86 (0.28)	4.01 (0.33)	12.16 (0.54)	6.63 (0.41)	15.64 (0.60)
Native American	5.30 (0.20)	5.17 (0.21)	5.30 (0.18)	15.77 (0.38)	5.41 (0.18)	7.45 (0.25)	11.32 (0.29)	24.18 (0.46)	9.25 (0.48)	8.07 (0.47)	10.63 (0.72)	27.95 (1.01)	15.31 (0.87)	33.35 (1.16)
Asian/Pacific Islander	5.68 (0.23)	5.57 (0.24)	5.48 (0.25)	16.73 (0.52)	6.00 (0.18)	7.97 (0.29)	11.87 (0.44)	25.84 (0.63)	8.29 (0.41)	9.04 (0.43)	8.80 (0.40)	26.13 (0.66)	15.45 (0.60)	33.85 (0.84)
Hispanic	8.24 (0.32)	8.34 (0.38)	8.61 (0.38)	25.18 (0.62)	8.18 (0.43)	10.04 (0.40)	15.95 (0.50)	34.16 (0.79)	5.30 (0.20)	5.17 (0.21)	5.30 (0.18)	15.77 (0.38)	11.32 (0.29)	24.18 (0.46)
Education														
< High school	7.47 (0.38)	7.47 (0.35)	9.06 (0.47)	24.00 (0.58)	6.59 (0.34)	8.08 (0.43)	12.92 (0.51)	27.58 (0.61)	8.29 (0.41)	9.04 (0.43)	8.80 (0.40)	26.13 (0.66)	15.45 (0.60)	33.85 (0.84)
High school	8.40 (0.37)	8.76 (0.43)	11.35 (0.47)	28.51 (0.73)	8.05 (0.38)	9.52 (0.43)	16.51 (0.53)	34.08 (0.82)	5.30 (0.20)	5.17 (0.21)	5.30 (0.18)	15.77 (0.38)	11.32 (0.29)	24.18 (0.46)
Some college	8.42 (0.41)	7.57 (0.39)	7.31 (0.40)	23.30 (0.67)	7.65 (0.38)	9.18 (0.41)	13.30 (0.53)	30.13 (0.80)	5.68 (0.23)	5.57 (0.24)	5.48 (0.25)	16.73 (0.52)	11.87 (0.44)	25.84 (0.63)
Marital status														
Married/cohabitating	8.24 (0.32)	8.34 (0.38)	8.61 (0.38)	25.18 (0.62)	8.18 (0.43)	10.04 (0.40)	15.95 (0.50)	34.16 (0.79)	7.47 (0.38)	7.47 (0.35)	9.06 (0.47)	24.00 (0.58)	12.92 (0.51)	27.58 (0.61)
Widowed/separated/divorced	7.47 (0.38)	7.47 (0.35)	9.06 (0.47)	24.00 (0.58)	6.59 (0.34)	8.08 (0.43)	12.92 (0.51)	27.58 (0.61)	8.40 (0.37)	8.76 (0.43)	11.35 (0.47)	28.51 (0.73)	16.51 (0.53)	34.08 (0.82)
Never married	8.42 (0.41)	7.57 (0.39)	7.31 (0.40)	23.30 (0.67)	7.65 (0.38)	9.18 (0.41)	13.30 (0.53)	30.13 (0.80)	8.42 (0.41)	7.57 (0.39)	7.31 (0.40)	23.30 (0.67)	13.30 (0.53)	30.13 (0.80)
Income														
\$0-\$19,999	6.57 (0.33)	6.71 (0.30)	6.40 (0.33)	19.69 (0.50)	6.31 (0.30)	8.79 (0.35)	13.13 (0.47)	28.22 (0.64)	8.42 (0.41)	7.57 (0.39)	7.31 (0.40)	23.30 (0.67)	13.30 (0.53)	30.13 (0.80)
\$20,000-\$34,999	4.15 (0.30)	4.14 (0.29)	3.82 (0.27)	12.11 (0.56)	5.02 (0.27)	6.76 (0.34)	9.83 (0.51)	21.62 (0.71)	6.57 (0.33)	6.71 (0.30)	6.40 (0.33)	19.69 (0.50)	13.13 (0.47)	28.22 (0.64)
\$35,000-\$69,999	6.09 (0.19)	6.14 (0.20)	6.40 (0.23)	18.64 (0.42)	6.09 (0.16)	7.89 (0.24)	12.05 (0.35)	26.03 (0.53)	4.15 (0.30)	4.14 (0.29)	3.82 (0.27)	12.11 (0.56)	9.83 (0.51)	21.62 (0.71)
\$70,000 or more	8.41 (0.52)	8.02 (0.44)	8.74 (0.52)	25.17 (1.05)	8.28 (0.39)	10.30 (0.53)	16.06 (0.84)	34.65 (1.19)	6.09 (0.19)	6.14 (0.20)	6.40 (0.23)	18.64 (0.42)	12.05 (0.35)	26.03 (0.53)
Urbanicity														
Urban	8.41 (0.52)	8.02 (0.44)	8.74 (0.52)	25.17 (1.05)	8.28 (0.39)	10.30 (0.53)	16.06 (0.84)	34.65 (1.19)	8.41 (0.52)	8.02 (0.44)	8.74 (0.52)	25.17 (1.05)	16.06 (0.84)	34.65 (1.19)
Rural														

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Sociodemographic Characteristics		Nicotine Use Disorder (NUD)											
		12-Month					Lifetime						
		Mild % (SE)	Moderate % (SE)	Severe % (SE)	Any NUD % (SE)	Mild % (SE)	Moderate % (SE)	Severe % (SE)	Any NUD % (SE)				
Region													
	Northeast	5.97 (0.36)	6.33 (0.51)	6.23 (0.43)	18.54 (0.71)	6.08 (0.31)	8.99 (0.65)	12.63 (0.68)	27.70 (1.21)				
	Midwest	7.38 (0.45)	7.49 (0.25)	7.83 (0.60)	22.70 (0.74)	7.50 (0.38)	8.95 (0.30)	14.94 (0.86)	31.39 (0.99)				
	South	7.43 (0.32)	6.81 (0.41)	7.31 (0.39)	21.54 (0.83)	7.26 (0.29)	8.62 (0.41)	12.45 (0.61)	28.33 (0.97)				
	West	4.99 (0.34)	5.40 (0.35)	5.91 (0.30)	16.31 (0.77)	4.95 (0.22)	7.07 (0.51)	11.97 (0.48)	23.99 (0.97)				

Table 2

Adjusted Odds Ratios of 12-Month and Lifetime DSM-5 Nicotine Use Disorder by Sociodemographic Characteristics^a.

Sociodemographic Characteristics	Nicotine Use Disorder (NUD)									
	12-Month					Lifetime				
	Mild OR (95% CI)	Moderate OR (95% CI)	Severe OR (95% CI)	Any NUD OR (95% CI)	Mild OR (95% CI)	Moderate OR (95% CI)	Severe OR (95% CI)	Any NUD OR (95% CI)		
Sex										
Men	1.61 (1.44–1.80)	1.62 (1.45–1.81)	1.51 (1.35–1.68)	1.58 (1.47–1.69)	1.63 (1.47–1.80)	1.70 (1.55–1.86)	1.56 (1.42–1.71)	1.62 (1.51–1.73)		
Women	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	
Age										
18–29	3.88 (2.94–5.10)	5.54 (4.54–6.76)	6.93 (5.46–8.79)	5.21 (4.46–6.09)	1.86 (1.44–2.38)	2.03 (1.69–2.46)	2.19 (1.87–2.58)	2.05 (1.81–2.33)		
30–44	4.49 (3.55–5.67)	5.79 (4.64–7.22)	8.74 (7.10–10.76)	6.01 (5.21–6.94)	2.25 (1.82–2.78)	2.44 (2.05–2.90)	3.16 (2.75–3.63)	2.68 (2.41–2.99)		
45–64	3.61 (2.94–4.43)	3.90 (3.21–4.76)	6.06 (4.99–7.37)	4.34 (3.81–4.95)	2.14 (1.76–2.60)	1.93 (1.63–2.28)	2.81 (2.47–3.20)	2.34 (2.11–2.60)		
65	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	
Race-ethnicity										
White	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	
Black	0.71 (0.62–0.82)	0.56 (0.48–0.65)	0.47 (0.39–0.56)	0.57 (0.51–0.64)	0.73 (0.63–0.84)	0.50 (0.43–0.58)	0.39 (0.33–0.46)	0.50 (0.45–0.56)		
Native American	0.87 (0.56–1.36)	1.09 (0.69–1.72)	1.24 (0.87–1.78)	1.09 (0.82–1.44)	0.84 (0.54–1.31)	1.06 (0.70–1.59)	1.16 (0.87–1.55)	1.07 (0.83–1.37)		
Asian/Pacific Islander	0.69 (0.50–0.95)	0.34 (0.25–0.46)	0.37 (0.27–0.50)	0.46 (0.37–0.56)	0.59 (0.45–0.78)	0.27 (0.19–0.39)	0.25 (0.20–0.32)	0.33 (0.27–0.40)		
Hispanic	0.35 (0.29–0.42)	0.28 (0.23–0.34)	0.25 (0.20–0.31)	0.29 (0.26–0.33)	0.37 (0.30–0.44)	0.28 (0.24–0.33)	0.24 (0.20–0.28)	0.28 (0.25–0.31)		
Education										
< high school	2.18 (1.88–2.54)	2.09 (1.79–2.44)	2.55 (2.13–3.06)	2.28 (2.05–2.53)	1.98 (1.67–2.36)	1.67 (1.41–1.96)	1.83 (1.58–2.12)	1.82 (1.64–2.01)		
High school	1.61 (1.38–1.88)	1.87 (1.61–2.17)	1.74 (1.54–1.96)	1.74 (1.58–1.91)	1.60 (1.37–1.88)	1.51 (1.37–1.67)	1.51 (1.36–1.68)	1.53 (1.42–1.66)		
Some college	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	
Married/cohabitating	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	
Marital status										
Widowed/separated/ Divorced	1.61 (1.43–1.82)	1.72 (1.50–1.98)	1.68 (1.47–1.91)	1.67 (1.52–1.83)	1.47 (1.27–1.69)	1.42 (1.26–1.59)	1.44 (1.30–1.60)	1.44 (1.33–1.56)		
Never married	1.06 (0.88–1.26)	0.96 (0.85–1.08)	1.21 (1.06–1.39)	1.08 (0.98–1.18)	0.98 (0.82–1.17)	0.88 (0.77–1.03)	1.02 (0.90–1.14)	0.97 (0.89–1.05)		
Income										
\$0–\$19,999	2.29 (1.83–2.86)	2.45 (2.00–3.01)	3.38 (2.84–4.02)	2.69 (2.36–3.05)	1.80 (1.50–2.15)	1.82 (1.56–2.11)	2.25 (1.95–2.59)	2.00 (1.81–2.21)		
\$20,000–\$34,999	2.30 (1.88–2.81)	2.09 (1.68–2.60)	2.22 (1.82–2.69)	2.21 (1.91–2.55)	1.70 (1.41–2.05)	1.67 (1.42–1.96)	1.74 (1.50–2.03)	1.71 (1.52–1.93)		
\$35,000–\$69,999	1.68 (1.40–2.01)	1.70 (1.42–2.04)	1.78 (1.49–2.12)	1.72 (1.54–1.92)	1.34 (1.14–1.58)	1.46 (1.28–1.66)	1.54 (1.34–1.77)	1.47 (1.34–1.61)		
\$70,000 or more	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	

Sociodemographic Characteristics	Nicotine Use Disorder (NUD)									
	12-Month					Lifetime				
	Mild	Moderate	Severe	Any NUD	Mild	Moderate	Severe	Any NUD	Severe	Any NUD
Urbanicity	OR (95% CI) 0.79 (0.68–0.92) 1.0 (reference)	OR (95% CI) 0.87 (0.76–1.00) 1.0 (reference)	OR (95% CI) 0.82 (0.71–0.95) 1.0 (reference)	OR (95% CI) 0.83 (0.74–0.92) 1.0 (reference)	OR (95% CI) 0.82 (0.72–0.92) 1.0 (reference)	OR (95% CI) 0.88 (0.76–1.01) 1.0 (reference)	OR (95% CI) 0.88 (0.76–1.01) 1.0 (reference)	OR (95% CI) 0.86 (0.77–0.96) 1.0 (reference)	OR (95% CI) 0.88 (0.76–1.01) 1.0 (reference)	OR (95% CI) 0.86 (0.77–0.96) 1.0 (reference)
Region	1.16 (0.93–1.44)	1.11 (0.89–1.38)	1.01 (0.83–1.23)	1.09 (0.93–1.27)	1.17 (0.99–1.38)	1.18 (0.94–1.50)	0.96 (0.83–1.17)	1.08 (0.92–1.27)	0.96 (0.83–1.17)	1.08 (0.92–1.27)
	1.31 (0.07–1.61)	1.16 (0.98–1.38)	1.13 (0.93–1.36)	1.20 (1.04–1.38)	1.33 (1.14–1.56)	1.06 (0.88–1.27)	1.03 (0.87–1.21)	1.10 (0.96–1.26)	1.03 (0.87–1.21)	1.10 (0.96–1.26)
	1.30 (1.08–1.56)	1.08 (0.89–1.31)	1.05 (0.88–1.26)	1.14 (0.98–1.32)	1.26 (1.10–1.45)	1.06 (0.87–1.28)	0.90 (0.77–1.05)	1.02 (0.89–1.17)	0.90 (0.77–1.05)	1.02 (0.89–1.17)
West	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)	1.0 (reference)

^aSignificant ($P < 0.05$) odds ratios appear in **bold font**.

Table 3.

Adjusted Odds Ratios (aORs) of 12-Month *DSM-5* Nicotine Use Disorder (NUD) and Other Psychiatric Disorders^a

Comorbid Disorder	Controlling for Sociodemographic Characteristics				Controlling for Sociodemographic Characteristics and Additional Comorbid Psychiatric Disorders			
	Mild	Moderate	Severe	Any NUD	Mild	Moderate	Severe	Any NUD
	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)
Any substance use disorder	2.12 (1.88–2.32)	3.57 (3.16–4.03)	5.70 (5.06–6.43)	3.62 (3.32–3.93)	2.09 (1.84–2.38)	3.08 (2.72–3.50)	4.09 (3.60–4.65)	3.02 (2.76–3.31)
Alcohol use disorder	2.04 (1.79–2.42)	3.27 (2.88–3.70)	4.54 (4.01–5.14)	3.20 (2.93–3.49)	1.94 (1.69–2.22)	2.67 (2.33–3.06)	2.88 (2.52–3.29)	2.47 (2.25–2.72)
Any drug use disorder	2.32 (1.79–3.01)	4.49 (3.62–5.58)	10.97 (9.23–13.04)	5.69 (4.98–6.51)	1.88 (1.42–2.48)	2.73 (2.13–3.51)	5.08 (4.19–6.18)	3.29 (2.84–3.82)
Any mood disorder	1.16 (1.00–1.34)	1.91 (1.65–2.22)	3.80 (3.36–4.30)	2.18 (1.99–2.39)	1.04 (0.88–1.23)	1.31 (1.12–1.55)	1.87 (1.61–2.17)	1.41 (1.27–1.57)
Major depressive disorder	1.15 (0.98–1.34)	1.76 (1.49–2.08)	2.78 (2.42–3.19)	1.87 (1.69–2.06)	1.05 (0.89–1.24)	1.32 (1.10–1.57)	1.39 (1.15–1.69)	1.26 (1.12–1.42)
Persistent depression (dysthymia)	1.10 (0.85–1.43)	1.46 (1.11–2.91)	2.46 (2.00–3.04)	1.69 (1.44–1.98)	0.99 (0.74–1.32)	0.93 (0.68–1.26)	0.98 (0.76–1.27)	0.97 (0.81–1.15)
Bipolar I	1.64 (0.99–2.72)	2.58 (1.74–3.84)	7.88 (6.07–10.22)	4.03 (3.19–5.11)	1.40 (0.83–2.37)	1.43 (0.95–2.15)	2.53 (1.87–3.42)	1.93 (1.49–2.50)
Bipolar II	0.31 (0.09–1.03)	0.87 (0.38–1.99)	4.68 (2.78–7.88)	2.02 (1.29–3.18)	0.26 (0.08–0.86)	0.52 (0.24–1.16)	1.85 (1.07–3.21)	1.05 (0.67–1.64)
Any anxiety disorder	1.12 (0.96–1.29)	1.74 (1.53–1.98)	3.31 (2.94–3.73)	1.98 (1.82–2.16)	1.00 (0.84–1.18)	1.17 (1.01–1.36)	1.53 (1.33–1.75)	1.24 (1.13–1.36)
Panic	1.37 (1.06–1.78)	2.23 (1.74–2.84)	4.54 (3.69–5.57)	2.72 (2.34–3.15)	1.22 (0.91–1.64)	1.46 (1.12–1.90)	1.76 (1.39–2.23)	1.53 (1.28–1.82)
Agoraphobia	0.90 (0.53–1.53)	2.24 (1.64–3.05)	3.94 (2.88–5.39)	2.39 (1.83–3.13)	0.77 (0.44–1.35)	1.40 (0.97–2.03)	1.32 (0.91–1.92)	1.22 (0.88–1.69)
Social phobia	0.85 (0.61–1.19)	1.73 (1.30–2.30)	2.65 (2.07–3.38)	1.75 (1.45–2.12)	0.72 (0.51–1.03)	1.11 (0.80–1.54)	0.92 (0.70–1.21)	0.93 (0.76–1.14)
Specific phobia	1.16 (0.89–1.50)	1.39 (1.13–1.70)	2.45 (2.09–2.86)	1.66 (1.47–1.87)	1.06 (0.81–1.40)	0.98 (0.79–1.23)	1.21 (0.99–1.47)	1.09 (0.95–1.25)
Generalized anxiety disorder	1.06 (0.86–1.30)	1.80 (1.49–2.18)	3.59 (3.01–4.15)	2.12 (1.89–2.38)	0.95 (0.75–1.20)	1.11 (0.89–1.39)	1.29 (1.11–1.50)	1.15 (1.01–1.31)
Posttraumatic stress disorder	1.13 (0.86–1.48)	1.97 (1.59–2.44)	4.04 (3.41–4.78)	2.35 (2.03–2.73)	0.98 (0.73–1.32)	1.20 (0.95–1.51)	1.50 (1.27–1.78)	1.27 (1.09–1.49)
Schizotypal personality disorder	0.97 (0.78–1.19)	1.62 (1.34–1.97)	4.73 (4.06–5.50)	2.34 (2.06–2.65)	0.72 (0.58–0.90)	0.79 (0.63–0.99)	1.51 (1.22–1.86)	1.06 (0.90–1.24)
Borderline personality disorder	1.36 (1.11–1.65)	2.46 (2.12–2.85)	5.36 (4.70–6.10)	2.87 (2.58–3.19)	1.25 (0.99–1.58)	1.56 (1.31–1.86)	2.05 (1.75–2.41)	1.64 (1.43–1.88)
Antisocial personality disorder	1.69 (1.32–2.12)	2.82 (2.34–3.39)	5.31 (4.46–6.33)	3.22 (2.87–3.62)	1.52 (1.21–1.91)	1.84 (1.51–2.24)	2.39 (1.93–2.95)	1.96 (1.71–2.25)

^a Significant ($P < .05$) odds ratios appear in bold font.

Table 4

Adjusted Odds Ratios of Lifetime DSM-5 Nicotine Use Disorder (NUD) and other Psychiatric Disorders^a.

Comorbid Disorder	Adjusted Odds Ratios (ORs)									
	Controlling for Sociodemographic Characteristics					Controlling for Sociodemographic Characteristics and Additional Comorbid Psychiatric Disorders				
	Mild	Moderate	Severe	Any NUD	Mild	Moderate	Severe	Any NUD	OR (95% CI)	Any NUD
Any substance use disorder	2.37 (2.10-2.66)	4.75 (4.31-5.23)	8.70 (7.94-9.54)	5.23 (4.91-5.57)	2.39 (2.14-2.67)	4.30 (3.88-4.76)	6.29 (5.68-6.97)	4.34 (4.04-4.66)	OR (95% CI)	OR (95% CI)
Alcohol use disorder	2.22 (1.98-2.49)	4.36 (3.96-4.79)	7.04 (6.42-7.72)	4.62 (4.33-4.94)	2.08 (1.86-2.33)	3.52 (3.17-3.90)	3.96 (3.56-4.40)	3.23 (2.99-3.48)		
Any drug use disorder	2.51 (2.06-3.06)	4.68 (4.01-5.45)	12.62 (11.19-14.23)	7.06 (6.35-7.84)	2.03 (1.67-2.48)	2.82 (2.38-3.34)	5.64 (4.94-6.46)	3.82 (3.39-4.30)		
Any mood disorder	1.07 (0.94-1.21)	1.68 (1.48-1.92)	3.51 (3.24-3.81)	2.19 (2.05-2.35)	0.94 (0.83-1.07)	1.15 (1.00-1.32)	1.70 (1.55-1.88)	1.32 (1.22-1.42)		
Major depressive disorder	1.06 (0.93-1.20)	1.61 (1.40-1.85)	2.62 (2.40-2.86)	1.88 (1.75-2.02)	0.96 (0.84-1.09)	1.22 (1.05-1.42)	1.38 (1.24-1.55)	1.22 (1.12-1.33)		
Persistent depression (dysthymia)	1.19 (0.98-1.45)	1.53 (1.25-1.88)	2.84 (2.48-3.26)	2.04 (1.83-2.27)	1.06 (0.84-1.33)	0.94 (0.74-1.18)	1.13 (0.95-1.34)	1.06 (0.92-1.22)		
Bipolar I	1.41 (0.88-2.27)	2.03 (1.44-2.86)	6.61 (5.41-8.07)	3.91 (3.25-4.71)	1.15 (0.71-1.86)	1.06 (0.73-1.54)	1.93 (1.55-2.40)	1.57 (1.29-1.90)		
Bipolar II	0.73 (0.31-1.72)	1.42 (0.78-2.61)	4.36 (2.74-6.94)	2.61 (1.76-3.87)	0.62 (0.26-1.47)	0.87 (0.48-1.60)	1.57 (0.87-2.84)	1.22 (0.77-1.94)		
Any anxiety disorder	1.13 (0.98-1.30)	1.81 (1.60-2.06)	3.46 (3.14-3.81)	2.29 (2.12-2.48)	1.01 (0.87-1.18)	1.26 (1.09-1.45)	1.57 (1.41-1.75)	1.34 (1.23-1.46)		
Panic	1.10 (0.84-1.45)	2.02 (1.69-2.42)	3.97 (3.50-4.50)	2.66 (2.39-2.96)	0.98 (0.72-1.33)	1.35 (1.10-1.66)	1.60 (1.39-1.86)	1.41 (1.24-1.60)		
Agoraphobia	0.87 (0.52-1.44)	2.21 (1.61-3.03)	4.18 (3.37-5.18)	2.80 (2.31-3.38)	0.76 (0.46-1.26)	1.35 (0.97-1.88)	1.37 (1.06-1.78)	1.27 (1.02-1.58)		
Social phobia	0.83 (0.58-1.18)	1.63 (1.27-2.11)	3.24 (2.76-3.81)	2.17 (1.87-2.51)	0.73 (0.50-1.08)	1.05 (0.81-1.38)	1.21 (0.98-1.49)	1.08 (0.90-1.29)		
Specific phobia	1.11 (0.85-1.44)	1.77 (1.49-2.09)	2.79 (2.41-3.24)	2.06 (1.83-2.32)	1.01 (0.77-1.33)	1.30 (1.08-1.56)	1.37 (1.16-1.62)	1.27 (1.12-1.45)		
Generalized anxiety disorder	1.16 (0.94-1.43)	1.49 (1.24-1.80)	3.21 (2.83-3.65)	2.17 (1.96-2.40)	1.09 (0.89-1.34)	0.92 (0.74-1.13)	1.16 (0.99-1.35)	1.07 (0.96-1.21)		
Posttraumatic stress disorder	1.10 (0.87-1.38)	2.01 (1.71-2.36)	4.32 (3.77-4.96)	2.77 (2.49-3.09)	0.96 (0.73-1.25)	1.23 (1.03-1.47)	1.56 (1.34-1.82)	1.35 (1.19-1.53)		
Schizotypal personality disorder	0.91 (0.71-1.17)	1.58 (1.29-1.92)	4.05 (3.49-4.70)	2.45 (2.16-2.78)	0.71 (0.54-0.92)	0.79 (0.63-0.99)	1.14 (0.96-1.36)	0.96 (0.84-1.10)		
Borderline personality disorder	1.26 (1.02-1.56)	2.30 (2.01-2.63)	5.32 (4.78-5.93)	3.22 (2.94-3.53)	1.07 (0.83-1.38)	1.33 (1.13-1.56)	1.73 (1.50-1.98)	1.47 (1.31-1.65)		
Antisocial personality disorder	1.80 (1.35-2.40)	3.10 (2.54-3.77)	6.69 (5.81-7.69)	4.30 (3.81-4.86)	1.54 (1.16-2.03)	1.87 (1.54-2.27)	2.66 (2.26-3.15)	2.19 (1.92-2.50)		

Significant ($P < 0.05$) odds ratios appear in **bold font**.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 5 Nicotine Treatment Settings among Respondents with 12-Month and Lifetime DSM-5 Nicotine Use Disorders (NUD).

Type of Tobacco/Nicotine Treatment Setting	12-month				Lifetime			
	Mild % (SE)	Moderate % (SE)	Severe % (SE)	Any NUD % (SE)	Mild % (SE)	Moderate % (SE)	Severe % (SE)	Any NUD % (SE)
Any treatment services	9.44 (0.85)	22.08 (1.02)	29.09 (1.18)	20.34 (0.68)	6.67 (0.54)	14.31 (0.85)	27.78 (0.81)	18.75 (0.51)
Counseling, family services and other social Services	1.37 (0.28)	2.90 (0.34)	5.48 (0.52)	3.29 (0.24)	1.15 (0.24)	2.06 (0.29)	4.49 (0.34)	2.97 (0.20)
Support group, internet chat room	0.63 (0.17)	2.44 (0.35)	4.59 (0.55)	2.59 (0.23)	0.43 (0.14)	1.37 (0.24)	3.90 (0.36)	2.32 (0.17)
Medication prescribed by health professionals	7.55 (0.74)	15.85 (0.89)	21.60 (0.98)	15.10 (0.57)	4.98 (0.45)	10.56 (0.69)	19.31 (0.71)	13.30 (0.44)
Nicotine patches, lozenges, or gum	5.50 (0.56)	16.68 (1.03)	22.47 (1.04)	15.00 (0.54)	3.91 (0.41)	9.97 (0.77)	20.69 (0.71)	13.51 (0.39)
E-cigarettes or E-liquid	2.31 (0.43)	5.61 (0.61)	9.32 (0.73)	5.80 (0.42)	1.47 (0.26)	2.78 (0.40)	6.72 (0.48)	4.30 (0.30)
Acupuncture, or meditation	0.68 (0.22)	1.85 (0.29)	5.32 (0.65)	2.66 (0.26)	0.59 (0.21)	0.91 (0.17)	4.57 (0.45)	2.53 (0.22)
Any other methods	2.25 (0.42)	5.23 (0.58)	7.87 (0.74)	5.16 (0.37)	1.39 (0.26)	3.55 (0.35)	8.35 (0.63)	5.26 (0.32)