Published in final edited form as:

Drug Alcohol Depend. 2014 January 1; 0: . doi:10.1016/j.drugalcdep.2013.10.003.

Psychiatric, Psychosocial, and Physical Health Correlates of Co-Occurring Cannabis Use Disorders and Nicotine Dependence

Erica N. Peters^{1,2,*}, Robert P. Schwartz¹, Shuai Wang³, Kevin E. O'Grady⁴, and Carlos Blanco³

¹Friends Research Institute, 1040 Park Avenue, Suite 103, Baltimore, MD 21201 USA

²Yale University School of Medicine, SATU, One Long Wharf Drive, Box 18, New Haven, CT 06511 USA

³Department of Psychiatry, New York State Psychiatric Institute/Columbia University, 1051 Riverside Drive, Unit 69, New York, NY 10032 USA

⁴Department of Psychology, University of Maryland, College Park, 300 Campus Drive, College Park, College Park, MD 20742 USA

Abstract

Background—Several gaps in the literature on individuals with co-occurring cannabis and tobacco use exist, including the extent of psychiatric, psychosocial, and physical health problems. We examine these gaps in an epidemiological study, the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), of a large, nationally representative sample.

Methods—The sample was drawn from Wave 2 NESARC respondents ($N = 34,653$). Adults with current cannabis use disorders and nicotine dependence (CUD + ND) ($n = 74$), CUD only ($n = 100$), and ND only ($n = 3424$) were compared on psychiatric disorders, psychosocial correlates (e.g., binge drinking; partner violence), and physical health correlates (e.g., medical conditions).

Results—Relative to those with CUD only, respondents with CUD + ND were significantly more likely to meet criteria for bipolar disorder, Clusters A and B personality disorders, and narcissistic personality disorder, and reported engaging in a significantly higher number of antisocial behaviors. Relative to those with ND only, respondents with CUD + ND were significantly more likely to meet criteria for bipolar disorder, anxiety disorders, and paranoid, schizotypal, narcissistic, and borderline personality disorders; were significantly more likely to report driving under the influence of alcohol and being involved in partner violence; and reported engaging in a significantly higher number of antisocial behaviors. CUD + ND was not associated with physical health correlates.

© 2013 Elsevier Ireland Ltd. All rights reserved.

*Corresponding Author: Erica N. Peters, Assistant Research Scientist, Friends Research Institute, 1040 Park Avenue, Suite 103, Baltimore, MD 21201 USA, P: (410) 837-3977 x272, F: (410) 752-4218, epeters@friendsresearch.org.

Contributors

Drs. Peters, Schwartz, O'Grady, and Blanco developed the concept for the study. Dr. Peters conducted the literature review and wrote the initial draft of the manuscript. Dr. Wang undertook the statistical analysis. All authors contributed to and have approved the final manuscript.

Conflict of Interest

No conflict declared.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Conclusions—Poor treatment outcomes for adults with co-occurring cannabis use disorders and nicotine dependence may be explained in part by differences in psychiatric and psychosocial problems.

Keywords

cannabis; marijuana; tobacco; nicotine dependence; smoking; co-occurring disorders

1. INTRODUCTION

Concurrent use of cannabis and tobacco (i.e., across the lifespan or in a given time period) has become a prevalent phenomenon worldwide. Between 41% and 94% of adults who use cannabis, and half of adults seeking treatment for cannabis use, smoke tobacco at some point in their lives (Agrawal and Lynskey, 2009; Australian Institute of Health and Welfare, 2011; Budney et al., 2000, 2006; Clough et al., 2004; Kadden et al., 2007; Martin et al., 1992; Richter et al., 2005; Rigotti et al., 2000; Tullis et al., 2003). Cannabis use is also high among individuals who smoke tobacco, with 25–52% of tobacco smokers using cannabis (Leatherdale et al., 2006, 2007; SAMHSA, 2005). Several mechanisms may explain the strong relationship of cannabis and tobacco, such as involvement of the endocannabinoid system in addiction to both (Castañe et al., 2005; Le Foll et al., 2008; Maldonado et al., 2006), shared genetic liability underlying the risk for use of both (Agrawal et al., 2010; Chen et al., 2008; Neale et al., 2006; Xian et al., 2008; Young et al., 2006; Anney et al., 2007; Agrawal et al., 2008), similar environmental and/or temperamental influences (Brook et al., 2010; Creemers et al., 2009; Golub et al., 2005; Kelly, 2005), similar behavioral cues due to common route of administration (Agrawal and Lynskey, 2009), and enhanced subjective responses to cannabis via tobacco smoking (Penetar et al., 2005; cf. Cooper and Haney, 2009).

Co-occurring (i.e., concurrent or simultaneous) cannabis and tobacco use may have important treatment implications (Agrawal et al., 2012; Peters et al., 2012; Ramo et al., 2012). Studies have consistently demonstrated that individuals who use both cannabis and tobacco report more severe cannabis use than individuals who use cannabis only (Agrawal and Lynskey, 2009; Agrawal et al., 2009; Caldeira et al., 2008; Coffey et al., 2003; Degenhardt et al., 2001; Heffner et al., 2008; Patton et al., 2006; Swift et al., 2008; Timberlake, 2009), although studies have been less consistent on whether individuals who use both have more severe tobacco use than those who smoke tobacco only (Agrawal et al., 2008b; Degenhardt et al., 2010; Patton et al., 2005; Timberlake et al., 2007; Timberlake, 2009). Use of tobacco in addition to cannabis negatively affects cannabis treatment outcomes (de Dios et al., 2009; Gray et al., 2011; Haney et al., 2012; Moore and Budney, 2001) and may have a negative impact on tobacco treatment outcomes (Abrantes et al., 2009; Ford et al., 2002; Gourlay et al., 1994; Haskins et al., 2010; Hendricks et al., 2012; Metrik et al., 2011; Patton et al., 2005; Stapleton et al., 2009). Tobacco may substitute for reduced cannabis consumption, potentially creating further substance-related problems (Allsop et al., 2012).

As evidence on the significance of co-occurring use of cannabis and tobacco accumulates, several critical gaps in the literature have yet to be addressed. Although some studies have found differences in symptoms of anxiety and negative affect in individuals who use both cannabis and tobacco relative to individuals who use cannabis or tobacco only (Bonn-Miller et al., 2010; Georgiades and Boyle, 2007; Moore and Budney, 2001; Suris et al., 2007), no studies have examined the prevalence of psychiatric *disorders* among individuals who use both. This is surprising, given that identifying psychiatric disorders among individuals with co-occurring cannabis and tobacco use is an important first step for their treatment as well as

for indicating how future interventions for this population need to be tailored to also address psychiatric disorders.

Relatedly, the psychosocial problems that have been examined among individuals with co-occurring cannabis and tobacco use have been of a limited nature. Symptoms of depression and anxiety, and quantity of alcohol consumption (i.e., not diagnoses of depression, anxiety, and alcohol use disorders) have been studied, but psychosocial problems that could have significant public health ramifications, such as binge drinking, driving under the influence of alcohol or drugs, and partner violence, have yet to be described among individuals with co-occurring cannabis and tobacco use disorders. Knowledge on a wider variety of psychosocial problems would attest to not only the treatment relevance, but the public health relevance, of co-occurring cannabis and tobacco use.

Finally, few studies have provided information on physical health indices associated with co-occurring cannabis and tobacco use. Tobacco use is a causative factor in a variety of adverse health outcomes (US Department of Health and Human Services, 2010), although the extent of adverse health outcomes associated with cannabis use is less clear. Some studies have reported that cannabis use is related to mutations in lung cells, respiratory problems (e.g., bronchitis, chronic cough/wheeze), and other health-related problems (Aldington et al., 2007; Aldington et al., 2008; Cho et al., 2005; Hall and Degenhardt, 2009; Hashibe et al., 2005; Moore et al., 2005; Pacifici et al., 2003; Tetrault et al., 2007), although other studies have not uncovered similar findings (Hashibe et al., 2006; Pletcher et al., 2012; Taylor et al., 2002). Inconsistency in the association of cannabis use with poor health may be attributed to methodological factors, including lack of statistical control for tobacco use, failure to include individuals who use cannabis frequently, and failure to include individuals who have used cannabis heavily for extended periods of time. In a recent study that overcame some of these limitations, adults who used both cannabis and tobacco had poorer smoking-specific health problems (e.g., emphysema; wheeze/cough) and poorer general health problems relative to adults who used cannabis only (Rooke et al., 2013). However, this study examined a small, convenience sample of individuals who used cannabis, and it is unknown how these findings generalize to more representative cannabis- and tobacco-using samples.

The purpose of the present paper is to extend the characterization of psychiatric, psychosocial, and physical health correlates of co-occurring cannabis and tobacco use in a large, nationally-representative epidemiologic study, the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). We hypothesized that psychiatric disorders, psychosocial problems that have public health relevance, and physical health problems would be more prevalent or severe in adults with co-occurring cannabis use disorders and nicotine dependence relative to adults with cannabis use disorders only, and relative to adults with nicotine dependence only.

2. METHODS

2.1 Sample

The NESARC target population at baseline (Wave 1: 2001–2002) was the civilian non-institutionalized population 18 years and older residing in households and group quarters (Grant et al., 2004, 2009). The final sample included 43,093 respondents drawn from individual households and group quarters. Blacks, Hispanics, and adults 18–24 were oversampled, with data adjusted for oversampling, household, and person-level non-response. The survey response rate was 81%. Data were adjusted using the 2000 Decennial Census, to be representative of the US civilian population for a variety of sociodemographic variables. Experienced lay interviewers were trained and conducted interviews under close

supervision (Grant et al., 2004, 2009). All procedures, including informed consent, received full human subjects review and approval from the US Census Bureau and US Office of Management and Budget.

The Wave 2 interview was conducted approximately 3 years later (2004 – 2005). The mean time interval between Wave 1 and Wave 2 interviews was 36.6 months. Excluding ineligible respondents (e.g., deceased), the Wave 2 response rate was 86.7% ($N = 34,653$; Grant et al., 2009). Wave 2 weights include a component that adjusts for non-response, demographic factors and psychiatric diagnoses, to ensure that the Wave 2 sample approximated the target population, that is, the original sample minus attrition between the two Waves. Adjustment for non-response was successful, as the Wave 2 respondents and the original target population did not differ on age, race/ethnicity, sex, socioeconomic status, or the presence of any substance, mood, anxiety, or personality disorder (Grant et al., 2009). The current sample was drawn from Wave 2 respondents.

2.2 Measures

Sociodemographic measures included gender, race/ethnicity, age, education, employment status, and marital status. Substance use measures (with response options in italics) included: number of cannabis joints or joint equivalents per day on days in which cannabis was used in the past 12 months; frequency of cigarette use in the past 12 months (*every day, 5–6 days/week, 3–4 days/week, 1–2 days/week, 2–3 days/month, once a month or less*); number of cigarettes per day in the past 12 months; age started smoking cigarettes; and use of at least 50 cigars, use of a pipe at least 50 times, use of snuff at least 20 times, and use of chewing tobacco at least 20 times (*yes, no*) since the Wave 1 interview. Mixing of tobacco with cannabis was not assessed. Utilization of treatment for drugs or alcohol was defined as seeking professional or non-traditional treatment in the past 12 months. Professional treatment included outpatient visits to a physician, psychologist, or any other professional; inpatient treatment in a drug detoxification or rehabilitation unit, or hospital ward; and treatment in an emergency department. Non-traditional treatment was defined as treatment provided by human service professionals (e.g., members of the clergy, self-help groups). Utilization of treatment for tobacco was not assessed.

Psychiatric diagnostic measures were gathered from the Alcohol Use Disorder and Associated Disabilities Interview Schedule–DSM-IV Version (AUDADIS-IV) (Grant et al., 2001, 2004). The high reliability and validity of the AUDADIS substance use disorder diagnoses are well documented (e.g., Hasin et al., 1997). Psychiatric disorders included DSM-IV [American Psychiatric Association (APA), 2000] (a) cannabis use disorders (CUD; i.e., cannabis abuse and dependence); (b) nicotine dependence (ND); (c) major depression; (d) bipolar disorder (i.e., bipolar I and II); (e) anxiety disorders (i.e., panic disorder, social anxiety disorder, specific phobias, generalized anxiety disorder, posttraumatic stress disorder); (f) personality disorders; and (g) attention-deficit/hyperactivity disorder. Antisocial personality disorder is common among individuals with substance use disorders (Compton et al., 2005), and because the presence of it could have inflated prevalence estimates of any personality disorder and Cluster B personality disorders, we examined this disorder separately.

Psychosocial measures included: (a) binge drinking in the past 12 months (for females, drinking four or more drinks in a single day and for males, five or more; *every day, nearly every day, 3–4 times/week, 2 times/week, 1 time/week, 2–3 times/month, 1 time/month, 7–11 times in the last year, 3–6 times in the last year, 1–2 times in the last year, never in the last year*); (b) driving under the influence of alcohol in the past 12 months (*yes, no*); (c) driving under the influence of drugs in the past 12 months (*yes, no*); (d) partner violence in the past 12 months (either attacker or victim; *yes, no*); (e) incarceration history (been in a

jail, prison, or correctional facility since the age of 18; *yes, no*); and (f) total number of 30 self-reported antisocial behaviors since the Wave 1 interview (e.g., have driver's license suspended or revoked; destroy, break, or vandalize someone else's property).

Physical health measures included: (a) general self-rated health (*excellent, very good, good, fair, poor*); (b) computed body mass index based on self-reported height and weight; (c) total number of 17 medical conditions (i.e., hardening of the arteries or arteriosclerosis; high blood pressure or hypertension; diabetes or sugar diabetes; cirrhosis of the liver; any other form of liver disease; chest pain or angina pectoris; rapid heart beat or tachycardia; heart attack or myocardial infarction; high cholesterol; any other form of heart disease; stomach ulcer; HIV; AIDS; any other sexually transmitted diseases or venereal diseases; gastritis; arthritis; stroke) in the past 12 months; and (d) hardening of the arteries or arteriosclerosis, chest pain or angina pectoris, heart attack or myocardial infarction, and stroke in the past 12 months (*yes, no*).

2.3 Statistical analyses

To ensure that differences in psychiatric, psychosocial, and physical health correlates were not confounded by extraneous influences since remission of CUD or ND, respondents who met DSM-IV criteria for past CUD or ND were excluded. Furthermore, to ensure that differences in psychiatric, psychosocial, and physical health correlates were not confounded by disorders that commonly overlap with CUD or ND, respondents who met DSM-IV criteria for current alcohol or non-cannabis substance use disorders were excluded. Percentages and means, weighted to be representative of the US adult population, were computed to compare sociodemographic and substance use characteristics, psychiatric disorders, and psychosocial and physical health correlates in respondents with current (i.e., past 12-month) co-occurring DSM-IV CUD and ND (CUD + ND) vs. current CUD only vs. current ND only. Sociodemographic characteristics were compared using chi-square tests of independence and analysis of variance for categorical and continuous variables, respectively. Although tests of sociodemographic characteristics also included the comparison of CUD only vs. ND only groups, results from this comparison are provided for descriptive purposes only. Substance use characteristics, psychiatric disorders, and psychosocial and physical health correlates were outcome variables in logistic and linear regression models, with the 3-group CUD/ND variable (i.e., current CUD + ND vs. CUD only vs. ND only) as the explanatory variable. Models were adjusted for age, gender, race, and education. Logistic and linear regression analyses yielded adjusted odds ratios (AORs) and adjusted unstandardized partial regression coefficients (*b* weights), respectively. Standard errors for all estimates were adjusted for NESARC design characteristics using SUDAAN (SURvey DATA ANalysis).

3. RESULTS

3.1 Sample Description

Wave 2 NESARC respondents ($N = 34,653$) were 47.9% male and 70.9% Caucasian, with a mean age of 48.2 (standard error (*SE*) = 0.2) years. To aid in contextualizing results, we refer readers to Grant et al., 2009 for a fuller description of the sample, including prevalence of current psychiatric disorders. After excluding respondents who met DSM-IV criteria for current alcohol or non-cannabis substance use disorders, the sample was composed of 74 respondents meeting criteria for current CUD + ND, 100 respondents meeting criteria for current CUD only, and 3,424 respondents meeting criteria for current ND only. Table 1 shows sociodemographic characteristics of respondents. Of current CUD + ND respondents, 60.3% were male, 73.4% were Caucasian, 79.0% had a high school education or greater, 74.3% were employed at least part-time, and 39.3% had never been married; on average,

they were 33.1 years old [standard error (*SE*) = 1.7]. Relative to respondents with ND only, respondents with CUD + ND were significantly younger and more likely to have never been married. Respondents with CUD + ND did not differ in sociodemographic characteristics from respondents with CUD only.

In adjusted analyses, relative to respondents with ND only, respondents with CUD + ND were significantly more likely to use the tobacco product of pipes [*AOR* = 9.73, 95% confidence interval (*CI*) = 1.69–55.90] and were significantly less likely to use the tobacco product of snuff (*AOR* = 0.08, 95% *CI* = 0.01–0.59). Respondents with CUD + ND did not differ in number of cannabis joints or joint equivalents smoked per cannabis use day from respondents with CUD only, and respondents with CUD + ND did not differ in number of cigarettes smoked per day from respondents with ND only.

3.2 Psychiatric Disorders

Table 2 shows adjusted prevalence rates of psychiatric disorders among respondents. Relative to those with CUD only, respondents with CUD + ND were significantly more likely to meet criteria for bipolar disorder, Clusters A and B personality disorders, and narcissistic personality disorder. Relative to those with ND only, respondents with CUD + ND were significantly more likely to meet criteria for bipolar disorder, anxiety disorders, any personality disorder, Clusters A and B personality disorders, and paranoid, schizotypal, narcissistic, and borderline personality disorders. The prevalence of antisocial personality disorder did not differ in CUD + ND respondents relative to CUD only or ND only respondents. Although dependent personality disorder was significantly more prevalent in the CUD + ND respondents than in CUD only and ND only respondents, the 95% confidence intervals surrounding the estimates were wide, suggesting imprecise estimates.

3.3 Psychosocial and Physical Health Correlates

Table 3 shows adjusted prevalence rates and adjusted mean scores of psychosocial and physical health correlates among respondents. Relative to those with CUD only, respondents with CUD + ND reported engaging in a significantly higher number of antisocial behaviors but did not differ in any other psychosocial correlate and did not differ in any physical health correlate. Relative to those with ND only, respondents with CUD + ND were significantly more likely to report driving under the influence of alcohol and being involved in partner violence, and reported engaging in a significantly higher number of antisocial behaviors; they did not differ in any physical health correlate.

4. DISCUSSION

This analysis of a large, nationally-representative epidemiologic sample indicates that relative to adults with current cannabis use disorders only, adults with co-occurring cannabis use disorders and nicotine dependence were significantly more likely to report several current psychiatric disorders and reported engaging in a significantly higher number of antisocial behaviors but did not differ in physical health correlates. Relative to adults with current nicotine dependence only, adults with co-occurring cannabis use disorders and nicotine dependence were significantly more likely to report several psychiatric disorders plus several psychosocial problems but did not differ in physical health correlates.

Co-occurring cannabis use disorders and nicotine dependence, relative to cannabis use disorders only, were associated with a higher prevalence of bipolar disorder, Clusters A and B personality disorders, and narcissistic personality disorder, while, relative to nicotine dependence only, they were associated with a higher prevalence of bipolar disorder, anxiety disorders, and several personality disorders. The association of co-occurring cannabis use

disorders and nicotine dependence with a higher prevalence of several psychiatric disorders is consistent with findings of systematic reviews that have reported an association of co-occurring cannabis and tobacco use with more severe clinical problems (Agrawal et al., 2012; Peters et al., 2012; Ramo et al., 2012) and may have immediate treatment implications. Individuals with co-occurring cannabis and tobacco use have demonstrated poorer cannabis treatment outcomes than do individuals who use cannabis only (de Dios et al., 2009; Gray et al., 2011; Moore and Budney, 2001), although evidence is less consistent on whether they demonstrate poorer tobacco treatment outcomes than individuals who use tobacco only (Abrantes et al., 2009; Ford et al., 2002; Gourlay et al., 1994; Haskins et al., 2010; Hendricks et al., 2012; Metrik et al., 2011; Patton et al., 2005; Stapleton et al., 2009). The high prevalence of psychiatric disorders found in this study may serve as a potential explanation of the trend towards poor treatment outcomes for adults with co-occurring cannabis use disorders and nicotine dependence. Psychiatric disorders signify impaired functioning in multiple domains of functioning (e.g., interpersonal relationships, cognition), and these impairments may interfere with the provision of treatment to individuals with co-occurring cannabis and tobacco use. For example, maladaptive personality functioning could interfere with the provision of substance abuse treatment through its contribution to premature drop-out (Ball et al., 2006). Future studies with individuals with co-occurring cannabis use disorders and nicotine dependence can investigate how the presence of psychiatric disorders interacts with treatment to affect outcomes.

Co-occurring cannabis use disorders and nicotine dependence was associated with several psychosocial problems with public health relevance. Relative to adults with nicotine dependence only, adults with co-occurring cannabis use disorders and nicotine dependence were almost twice as likely to drive under the influence of alcohol and three times as likely to be involved in partner violence. Relative to both those with nicotine dependence only and those with cannabis use disorders only, adults with co-occurring cannabis use disorders and nicotine dependence engaged in almost twice as many antisocial behaviors. Thus, co-occurring cannabis use disorders and nicotine dependence are associated with risky and harmful behaviors that could have an untoward impact on others. However, because individuals with co-occurring cannabis and tobacco use are more likely to meet diagnostic criteria for cannabis use disorders and nicotine dependence (Peters et al., 2012), it is possible that the associations with risky behaviors may be due to the greater severity of each disorder, not the comorbidity of the disorders *per se*. Although the current study cannot tease apart these relationships, results speak to the need to implement interventions for this specific population as a way of potentially decreasing the burden on public health. Such targeted interventions would involve monitoring and intervening with risky alcohol use and criminal behaviors, assessing violent acts between partners, and emphasizing safe interpersonal relationships.

Surprisingly, co-occurring cannabis use disorders and nicotine dependence were not significantly associated with any physical health problem. The lack of significant findings related to physical health may be due to the relatively young age of individuals who used both cannabis and tobacco. Survey respondents with co-occurring cannabis use disorders and nicotine dependence were, on average, in their early to mid-30s and may not have been old enough to have developed significant health problems. Supporting this argument is a study that did detect physical health problems in adults with co-occurring cannabis and tobacco use, all of whom were at least 40 years old (Rooke et al., 2013). Alternatively, the lack of significant findings may be due to the relatively serious nature of the physical health problems assessed in the NESARC.

An important strength of this study is that it focused on adults with current cannabis use disorders and nicotine dependence, in contrast to several studies that have examined

individuals with past diagnoses of cannabis use disorders or nicotine dependence or who reported as few as one occasion of lifetime cannabis or tobacco use. The inclusion of individuals with current diagnoses provides confidence that results may have immediate relevance for individuals seeking treatment for cannabis and tobacco. Other strengths are the use of a nationally-representative sample; statistical adjustment for potential confounders of the association of co-occurring cannabis use disorders and nicotine dependence with correlates of interest, and examination of a wide variety of correlates that have implications for substance abuse treatment and public health.

One potential limitation of this study is the exclusion of individuals with current alcohol or other substance use disorders. Although these individuals were excluded in order to minimize possible confounding influences and create a “pure” sample of individuals with co-occurring current cannabis use disorders and nicotine dependence, resulting sample sizes were relatively small, and the confidence intervals surrounding some estimates were wide; thus, our estimates are conservative. The inclusion of respondents with current alcohol or non-cannabis substance use disorders was considered, but the resulting sample sizes of 231 in the CUD + ND group, 260 in the CUD only group, and 4281 in the ND only group would not have resolved the imbalance in sample size between groups. Moreover, although the inclusion of such individuals might increase the generalizability of findings, it would do so at the expense of our ability to explain the differences between groups. Another limitation is that the cannabis use item on the NESARC assessed “joints and joint equivalents” but did not directly assess other methods of cannabis use. Because the NESARC did not assess the mixing of tobacco with cannabis, it is possible that some participants within the CUD only group could have some degree of nicotine dependence and be unaware of this. Potential areas of future research are an analysis of how psychiatric diagnoses mediate the association of co-occurring cannabis use disorders and nicotine dependence with treatment outcomes; an analysis of how alcohol and non-cannabis substance use disorders moderate the association of co-occurring cannabis use disorders and nicotine dependence with the correlates investigated herein; inclusion of individuals who engage in the increasingly popular practice of simultaneous use of cannabis and tobacco (i.e., “blunt” smoking, “chasing;” Akre et al., 2010; Barrett et al., 2006; Golub et al., 2005; Kelly, 2005; Soldz et al., 2003); a longitudinal analysis of whether co-occurring cannabis and tobacco use precedes psychiatric and psychosocial problems or vice versa; and replication of findings among individuals who meet DSM-5 (APA, 2013) criteria for cannabis and tobacco use disorders.

Among a representative sample of US adults with co-occurring cannabis use disorders and nicotine dependence, psychiatric diagnoses and psychosocial problems were highly prevalent. Results attest to the public health significance of co-occurring cannabis use disorders and nicotine dependence and the need for increased research on effective treatments for this population.

Acknowledgments

Role of Funding Source

The National Epidemiologic Survey on Alcohol and Related Conditions was funded by the National Institute on Alcohol Abuse and Alcoholism with supplemental support from the National Institute on Drug Abuse. This study was supported in part by NIH grants DA019606, DA023200, and DA023973 (Dr. Blanco); NIH grant R01DA015842 (Dr. Schwartz), and the New York State Psychiatric Institute (Dr. Blanco). The sponsors had no further role in study design; in the collection, analysis and interpretation of data; in the writing of the report; or in the decision to submit the paper for publication.

References

- Abrantes AM, Lee CS, MacPherson L, Strong DR, Borrelli B, Brown RA. Health risk behaviors in relation to making a smoking quit attempt among adolescents. *J Behav Med.* 2009; 32:142–149. [PubMed: 19003525]
- Agrawal A, Budney AJ, Lynskey MT. The co-occurring use and misuse of cannabis and tobacco: a review. *Addiction.* 2012; 107:1221–1233. [PubMed: 22300456]
- Agrawal A, Lynskey MT. Tobacco and cannabis co-occurrence: does route of administration matter? *Drug Alcohol Depend.* 2009; 99:240–247. [PubMed: 18926646]
- Agrawal A, Lynskey MT, Madden PAF, Pergadia ML, Bucholz KK, Heath AC. Simultaneous cannabis and tobacco use and cannabis-related outcomes in young women. *Drug Alcohol Depend.* 2009; 101:8–12. [PubMed: 19081202]
- Agrawal A, Lynskey MT, Pergadia ML, Bucholz KK, Heath AC, Martin NG, Madden PA. Early cannabis use and DSM-IV nicotine dependence: a twin study. *Addiction.* 2008a; 103:1896–1904. [PubMed: 19032539]
- Agrawal A, Madden PAF, Bucholz KK, Heath AC, Lynskey MT. Transitions to regular smoking and to nicotine dependence in women using cannabis. *Drug Alcohol Depend.* 2008b; 95:107–114. [PubMed: 18325694]
- Agrawal A, Silberg JL, Lynskey MT, Maes HH, Eaves LJ. Mechanisms underlying the lifetime co-occurrence of tobacco and cannabis use in adolescent and young adult twins. *Drug Alcohol Depend.* 2010; 108:49–55. [PubMed: 20047801]
- Akre C, Michaud PA, Berchtold A, Suris JC. Cannabis and tobacco use: where are the boundaries? A qualitative study on cannabis consumption modes among adolescents. *Health Educ Res.* 2010; 25:74–82. [PubMed: 19515745]
- Aldington S, Harwood M, Cox B, Weatherall M, Beckert L, Hansell A, Pritchard A, Robinson G, Beasley R. Cannabis and Respiratory Disease Research Group. Cannabis use and risk of lung cancer: a case–control study. *Eur Respir J.* 2008; 31:280–286. [PubMed: 18238947]
- Aldington S, Williams M, Nowitz M, Weatherall M, Pritchard A, McNaughton A, Robinson G, Beasley R. Effects of cannabis on pulmonary structure, function and symptoms. *Thorax.* 2007; 62:1058–1063. [PubMed: 17666437]
- Allsop DJ, Copeland J, Norberg MM, Fu S, Molnar A, Lewis J, Budney AJ. Quantifying the clinical significance of cannabis withdrawal. *PLoS One.* 2012; 7:e44864. [PubMed: 23049760]
- American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4. American Psychiatric Association; Washington, DC: 2000. Text Revision
- American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5. American Psychiatric Publishing; Arlington, VA: 2013.
- Anney RJL, Lotfi-Miri M, Olsson CA, Reid SC, Hemphill SA, Patton GC. Variation in the gene coding for the M5 Muscarinic receptor (CHRM5) influences cigarette dose but is not associated with dependence to drugs of addiction: evidence from a prospective population based cohort study of young adults. *BMC Genet.* 2007; 8:46–54. [PubMed: 17608938]
- Australian Institute of Health and Welfare. National Drug Strategy Household Survey Report. Australian Institute of Health and Welfare; Canberra: 2011.
- Ball SA, Carroll KM, Canning-Ball M, Rounsaville BJ. Reasons for dropout from drug abuse treatment: symptoms, personality, and motivation. *Addict Behav.* 2006; 31:320–330. [PubMed: 15964152]
- Barrett SP, Darredeau C, Pihl RO. Patterns of simultaneous polysubstance use in drug using university students. *Hum Psychopharmacol.* 2006; 21:255–263. [PubMed: 16783813]
- Bonn-Miller MO, Zvolensky MJ, Johnson KA. Uni-morbid and co-occurring marijuana and tobacco use: examination of concurrent associations with negative mood states. *J Addict Dis.* 2010; 29:68–77. [PubMed: 20390700]
- Brook JS, Lee JY, Finch SJ, Brown EN. Course of comorbidity of tobacco and marijuana use: psychosocial risk factors. *Nicotine Tob Res.* 2010; 12:474–482. [PubMed: 20231241]

- Budney AJ, Higgins ST, Radonovich KJ, Novy PL. Adding voucher-based incentives to coping skills and motivational enhancement improves outcomes during treatment for marijuana dependence. *J Consult Clin Psychol*. 2000; 68:1051–1061. [PubMed: 11142539]
- Budney AJ, Moore BA, Rocha HL, Higgins ST. Clinical trial of abstinence-based vouchers and cognitive-behavioral therapy for cannabis dependence. *J Consult Clin Psychol*. 2006; 74:307–316. [PubMed: 16649875]
- Caldeira KM, Arria AM, O'Grady KE, Vincent KB, Wish ED. The occurrence of cannabis use disorders and other cannabis-related problems among first-year college students. *Addict Behav*. 2008; 33:397–411. [PubMed: 18031940]
- Castañe A, Berrendero F, Maldonado R. The role of the cannabinoid system in nicotine addiction. *Pharmacol Biochem Behav*. 2005; 81:381–386. [PubMed: 15925402]
- Chen X, Williamson VS, An SS, Hettema JM, Aggen SH, Neale MC, Kendler KS. Cannabinoid receptor 1 gene association with nicotine dependence. *Arch Gen Psychiatr*. 2008; 65:816–824. [PubMed: 18606954]
- Cho CM, Hirsch R, Johnstone S. General and oral health implications of cannabis use. *Aust Dent J*. 2005; 50:70–74. [PubMed: 16050084]
- Clough AR, D'Abbs P, Cairney S, Gray D, Maruff P, Parker R, et al. Emerging patterns of cannabis and other substance use in Aboriginal communities in Arnhem Land, Northern Territory: a study of two communities. *Drug Alcohol Rev*. 2004; 23:381–390. [PubMed: 15763742]
- Coffey C, Carlin JB, Lynskey M, Li N, Patton GC. Adolescent precursors of cannabis dependence: findings from the Victorian Adolescent Health Cohort Study. *Br J Psychiatry*. 2003; 182:330–336. [PubMed: 12668409]
- Compton WM, Conway KP, Stinson FS, Colliver JD, Grant BF. Prevalence, correlates, and comorbidity of DSM-IV antisocial personality syndromes and alcohol and specific drug use disorders in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *J Clin Psychiatry*. 2005; 66:677–685. [PubMed: 15960559]
- Cooper ZD, Haney M. Comparison of subjective, pharmacokinetic, and physiological effects of marijuana smoked as joints and blunts. *Drug Alcohol Depend*. 2009; 103:107–113. [PubMed: 19443132]
- Creemers HE, Korhonen T, Kaprio J, Vollebergh WAM, Ormel J, Verhulst FC, Hulzink AC. The role of temperament in the relationship between early onset of tobacco and cannabis use: the TRAILS study. *Drug Alcohol Depend*. 2009; 104:113–118. [PubMed: 19482444]
- de Dios MA, Vaughan EL, Stanton CA, Niaura R. Adolescent tobacco use and substance abuse treatment outcomes. *J Subst Abuse Treat*. 2009; 37:17–24. [PubMed: 19004603]
- Degenhardt L, Coffey C, Carlin JB, Swift W, Moore E, Patton GC. Outcomes of occasional cannabis use in adolescence: 10-year follow-up study in Victoria, Australia. *Br J Psychiatry*. 2010; 196:290–295. [PubMed: 20357305]
- Degenhardt L, Hall W. The relationship between tobacco use, substance use disorders and mental health: results from the National Survey of Mental Health and Well-being. *Nicotine Tob Res*. 2001; 3:225–234. [PubMed: 11506766]
- Ford DE, Vu HT, Anthony JC. Marijuana use and cessation of tobacco smoking in adults from a community sample. *Drug Alcohol Depend*. 2002; 67:242–248.
- Georgiades K, Boyle MH. Adolescent tobacco and cannabis use: young adult outcomes from the Ontario Child Health Study. *J Child Psychol Psych*. 2007; 48:724–731.
- Golub A, Johnson BD, Dunlap E. The growth in marijuana use among American youths during the 1990s and the extent of blunt smoking. *J Ethn Subst Abuse*. 2005; 4:1–21. [PubMed: 16537326]
- Gourlay SG, Forbes A, Marriner T, Pethica D, McNeil JJ. Prospective study of factors predicting outcome of transdermal nicotine treatment in smoking cessation. *BMJ*. 1994; 309:842–846. [PubMed: 7950614]
- Grant, B.; Dawson, D.; Hasin, D. The Alcohol Use Disorders and Associated Disabilities Interview Schedule–Version DSM-IV (AUDADIS-IV). National Institute on Alcohol Abuse and Alcoholism; Bethesda, MD: 2001.
- Grant BF, Goldstein RB, Chou SP, Huang B, Stinson FS, Dawson DA, Saha TD, Smith SM, Pulay AJ, Pickering RP, Ruan WJ, Compton WM. Sociodemographic and psychopathologic predictors of

- first incidence of DSM-IV substance use, mood and anxiety disorders: results from the Wave 2 National Epidemiologic Survey on Alcohol and Related Conditions. *Mol Psychiatry*. 2009; 14:1051–1066. [PubMed: 18427559]
- Grant BF, Stinson FS, Dawson DA, Chou SP, Ruan WJ, Pickering RP. Co-occurrence of 12-month alcohol and drug use disorders and personality disorders in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Arch Gen Psychiatry*. 2004; 61:361–368. [PubMed: 15066894]
- Gray KM, Riggs PD, Min SJ, Mikulich-Gilbertson SK, Bandyopadhyay D, Winhausen T. Cigarette and cannabis use trajectories among adolescents in treatment for attention-deficit/hyperactivity disorder and substance use disorders. *Drug Alcohol Depend*. 2011; 117:242–247. [PubMed: 21411243]
- Hall W, Degenhardt L. Adverse health effects of medical cannabis use. *Lancet*. 2009; 374:1383–1391. [PubMed: 19837255]
- Haney M, Bedi G, Cooper ZD, Glass A, Vosburg SK, Comer SD, Foltin RW. Predictors of marijuana relapse in the human laboratory: robust impact of tobacco cigarette smoking status. *Biol Psychiatry*. 2013; 73:242–248. [PubMed: 22939992]
- Hashibe M, Morgenstern H, Cui Y, Tashkin DP, Zhang Z, Cozen W, Mack TM, Greenland S. Marijuana use and the risk of lung cancer and upper aerodigestive tract cancers: results of a population-based case-control study. *Cancer Epidemiol Biomarkers Prev*. 2006; 15:1829–1834. [PubMed: 17035389]
- Hashibe M, Straif K, Tashkin DP, Morgenstern H, Greenland S, Zhang Z. Epidemiologic review of marijuana use and cancer risk. *Alcohol*. 2005; 35:265–275. [PubMed: 16054989]
- Hasin D, Carpenter KM, McCloud S, Smith M, Grant BF. The Alcohol Use Disorder and Associated Disabilities Interview Schedule (AUDADIS): reliability of alcohol and drug modules in a clinical sample. *Drug Alcohol Depend*. 1997; 44:133–141. [PubMed: 9088785]
- Haskins A, Bertone-Johnson E, Pekow P, Carbone E, Chasan-Taber L. Correlates of smoking cessation at pregnancy onset among Hispanic women in Massachusetts. *Am J Health Promot*. 2010; 25:100–108. [PubMed: 21039290]
- Heffner JL, DelBello MP, Fleck DE, Anthenelli RM, Strakowski SM. Cigarette smoking in the early course of bipolar disorder: associations with ages-at-onset of alcohol and marijuana use. *Bipolar Disord*. 2008; 10:838–845. [PubMed: 19032716]
- Hendricks PS, Delucchi KL, Humfleet GL, Hall SM. Alcohol and marijuana use in the context of tobacco dependence treatment: impact on outcome and mediation of effect. *Nicotine Tob Res*. 2012; 14:942–951. [PubMed: 22259148]
- Kadden RM, Litt MD, Kabela-Cormier E, Petry NM. Abstinence rates following behavioral treatments for marijuana dependence. *Addict Behav*. 2007; 32:1220–1236. [PubMed: 16996224]
- Kelly BC. Bongs and blunts: notes from a suburban marijuana subculture. *J Ethn Subst Abuse*. 2005; 4:81–97. [PubMed: 16537329]
- Leatherdale ST, Ahmed R, Kaiserman M. Marijuana use by tobacco smokers and nonsmokers: who is smoking what? *CMAJ*. 2006; 174:1399. [PubMed: 16682703]
- Leatherdale ST, Hammond DG, Kaiserman M, Ahmed R. Marijuana and tobacco use among young adults in Canada: are they smoking what we think they are smoking? *CCC*. 2007; 18:391–397. [PubMed: 17235494]
- Le Foll B, Forget B, Aubin HJ, Goldberg SR. Blocking cannabinoid CB₁ receptors for the treatment of nicotine dependence: insights from pre-clinical and clinical studies. *Addict Biol*. 2008; 13:239–252. [PubMed: 18482433]
- Maldonado R, Valverde O, Berrendero F. Involvement of the endocannabinoid system in drug addiction. *Trends Neurosci*. 2006; 29:225–232. [PubMed: 16483675]
- Martin CS, Clifford PR, Clapper RL. Patterns and predictors of simultaneous and concurrent use of alcohol, tobacco, marijuana, and hallucinogens in first-year college students. *J Subst Abuse*. 1992; 4:319–326. [PubMed: 1458048]
- Metrik J, Spillane NS, Leventhal AM, Kahler CW. Marijuana use and tobacco smoking cessation among heavy alcohol drinkers. *Drug Alcohol Depend*. 2011; 119:194–200. [PubMed: 21724341]

- Moore BA, Augustson EM, Moser RP, Budney AJ. Respiratory effects of marijuana and tobacco use in a U.S. sample. *J Gen Intern Med*. 2005; 20:33–37. [PubMed: 15693925]
- Moore BA, Budney AJ. Tobacco smoking in marijuana-dependent outpatients. *J Subst Abuse*. 2001; 13:583–596. [PubMed: 11775084]
- Neale MC, Harvey E, Maes HHM, Sullivan PF, Kendler KS. Extensions to the modeling of initiation and progression: applications to substance use and abuse. *Behav Genet*. 2006; 36:507–524. [PubMed: 16770695]
- Pacifici R, Zuccaro P, Pichini S, Roset PN, Poudevida S, Farré M, Segura J, De la Torre R. Modulation of the immune system in cannabisusers. *JAMA*. 2003; 289:1929–1931. [PubMed: 12697794]
- Patton GC, Coffey C, Carlin JB, Sawyer SM, Lynskey M. Reverse gateways? Frequent cannabis use as a predictor of tobacco initiation and nicotine dependence. *Addiction*. 2005; 100:1518–1525. [PubMed: 16185213]
- Patton GC, Coffey C, Carlin JB, Sawyer SM, Wakefield M. Teen smokers reach their mid twenties. *J Adolesc Health*. 2006; 39:214–220. [PubMed: 16857533]
- Penetar DM, Kouri EM, Gross MM, McCarthy EM, Rhee CK, Peters EN, Lukas SE. Transdermal nicotine alters some of marihuana's effects in male and female volunteers. *Drug Alcohol Depend*. 2005; 79:211–223. [PubMed: 16002030]
- Peters EN, Budney AJ, Carroll KM. Clinical correlates of co-occurring cannabis and tobacco use: a systematic review. *Addiction*. 2012; 107:1404–1417. [PubMed: 22340422]
- Pletcher MJ, Vittinghoff E, Kalhan R, Richman J, Safford M, Sidney S, Lin F, Kertesz S. Association between marijuana exposure and pulmonary function over 20 years. *JAMA*. 2012; 307:173–181. [PubMed: 22235088]
- Ramo DE, Liu H, Prochaska JJ. Tobacco and marijuana use among adolescents and young adults: asystematic review of their co-use. *Clin Psychol Rev*. 2012; 32:105–121. [PubMed: 22245559]
- Richter KP, Kaur H, Resnicow K, Nazir N, Mosier MC, Ahluwalia JS. Cigarette smoking among marijuana users in the United States. *Subst Abuse*. 2005; 25:35–43.
- Rigotti NA, Lee JE, Wechsler H. US college students' use of tobacco products: results of a national survey. *JAMA*. 2000; 284:699–705. [PubMed: 10927777]
- Rooke SE, Norberg MM, Copeland J, Swift W. Health outcomes associated with long-term regular cannabis and tobacco smoking. *Addict Behav*. 2013; 38:2207–2213. [PubMed: 23501136]
- Soldz S, Huyser DJ, Dorsey E. The cigar as a drug delivery device: youth use of blunts. *Addiction*. 2003; 98:1379–1386. [PubMed: 14519174]
- Stapleton JA, Keaney F, Sutherland G. Illicit drug use as a predictor of smoking cessation treatment outcome. *Nicotine Tob Res*. 2009; 11:685–689. [PubMed: 19395684]
- Substance Abuse and Mental Health Services Administration. Results from the 2004 National Survey on Drug Use and Health: National Findings. Rockville, MD: 2005. NSDUH Series H-28. DHHS Pub. No. (SMA) 05-4062
- Suris JC, Akre C, Berchtold A, Jeannin A, Michaud PA. Some go without a cigarette: characteristics of cannabis users who have never smoked tobacco. *Arch Pediatric Adolesc Med*. 2007; 161:1042–1047.
- Swift W, Coffey C, Carlin JB, Degenhardt L, Patton GC. Adolescent cannabis users at 24 years: trajectories to regular weekly use and dependence in young adulthood. *Addiction*. 2008; 103:1361–1370. [PubMed: 18855826]
- Taylor DR, Fergusson DM, Milne BJ, Horwood LJ, Moffitt TE, Sears MR, Poulton R. A longitudinal study of the effects of tobacco and cannabis exposure on lung function in young adults. *Addiction*. 2002; 97:1055–1061. [PubMed: 12144608]
- Tetrault JM, Crothers K, Moore BA, Mehra R, Concato J, Fiellin DA. Effects of marijuana smoking on pulmonary function and respiratory complications. *Arch Intern Med*. 2007; 167:221–228. [PubMed: 17296876]
- Timberlake DS. A comparison of drug use and dependence between blunt smokers and other cannabis users. *Subst Use Misuse*. 2009; 44:401–415. [PubMed: 19212929]

- Timberlake DS, Haberstick BC, Hopfer CJ, Bricker J, Sakai JT, Lessem JM, Hewitt JK. Progression from marijuana use to daily smoking and nicotine dependence in a national sample of U.S. adolescents. *Drug Alcohol Depend.* 2007; 88:272–281. [PubMed: 17174040]
- Tullis LM, Dupont R, Frost-Pineda K, Gold MS. Marijuana and tobacco: a major connection? *J Addict Dis.* 2003; 22:51–62. [PubMed: 14621344]
- US Department of Health and Human Services. How Tobacco Smoke Causes Disease: The Biology and Behavioral Basis for Smoking-Attributable Disease: A Report of the Surgeon General. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; Atlanta, GA: 2010.
- Xian H, Scherrer JF, Grant JD, Eisen SA, True WR, Jacob T, Bucholz KK. Genetic and environmental contributions to nicotine, alcohol and cannabis dependence in male twins. *Addiction.* 2008; 103:1391–1398. [PubMed: 18855830]
- Young SE, Rhee SH, Stallings MC, Corley RP, Hewitt JK. Genetic and environmental vulnerabilities underlying adolescent substance use and problem use: general or specific? *Behav Genet.* 2006; 36:603–615. [PubMed: 16619135]

Table 1

Sociodemographic and Substance Use Characteristics for NESARC Respondents with Co-Occurring Cannabis Use Disorders and Nicotine Dependence ($n = 74$), Cannabis Use Disorders Only ($n = 100$), and Nicotine Dependence Only ($n = 3424$).

Characteristic	Unadjusted Mean / Percentage (Standard Error)			Statistic	Pairwise Comparison
	CUD + ND ($n = 74$)	CUD only ($n = 100$)	ND only ($n = 3424$)		
Age	33.1 (1.7)	35.1 (1.5)	45.6 (0.3)	$F(2) = 54.69, p < .0001$	bc
Gender (% male)	60.3 (5.8)	73.9 (5.1)	49.5 (1.2)	$\chi^2(2) = 7.74, p = .001$	c
Race (% Caucasian)	73.4 (6.6)	66.7 (5.8)	77.0 (1.2)	$\chi^2(2) = 1.78, p = .18$	
Marital Status (% married)	45.6 (6.6)	37.9 (6.3)	59.2 (1.0)	$\chi^2(2) = 7.07, p = .002$	bc
Education (% high school graduate)	79.0 (9.2)	78.7 (5.9)	81.4 (0.9)	$\chi^2(2) = 0.13, p = .88$	
Employment (% employed)	74.3 (5.6)	71.2 (6.0)	64.2 (1.1)	$\chi^2(2) = 2.04, p = .14$	
AOR (95% Confidence Interval)					
				CUD + ND vs. CUD only	CUD + ND vs. ND only
Daily cigarette use (% yes) [/]	92.1 (4.0)	84.3 (8.2)	94.2 (0.5)	2.05 (0.34–12.49)	0.84 (0.27–2.57)
Daily cigarette use (% yes)	89.8 (4.6)	24.9 (5.5)	87.8 (0.8)	26.79 (7.76–92.48) [*]	1.30 (0.46–3.66)
Use of non-cigarette tobacco (% yes)					
Cigar	2.8 (1.7)	5.9 (2.7)	3.3 (0.4)	0.55 (0.11–2.74)	0.75 (0.22–2.58)
Pipe	3.8 (2.4)	0.0 (0.0)	0.7 (0.2)	N/A	9.73 (1.69–55.90) [*]
Snuff	0.8 (0.9)	2.9 (1.8)	6.1 (0.7)	0.32 (0.03–3.43)	0.08 (0.01–0.59) [*]
Chewing tobacco	1.1 (1.1)	0.0 (0.0)	2.9 (0.4)	N/A	0.43 (0.05–3.43)
Utilized treatment for drugs (% yes)	12.5 (5.9)	18.5 (6.1)	7.1 (1.4)	0.70 (0.18–2.78)	1.93 (0.61–6.14)
Utilized treatment for alcohol (% yes)	6.3 (3.3)	5.4 (2.9)	2.3 (0.3)	1.18 (0.24–5.88)	2.01 (0.60–6.75)
b (95% Confidence Interval)					
				CUD + ND vs. CUD only	CUD + ND vs. ND only
Cannabis joints per day [/]	2.0 (0.2)	2.1 (0.2)	1.5 (0.1)	–0.12 (–0.64 – 0.41)	0.48 (0.12–0.84) [*]
Cannabis joints per day	2.0 (0.2)	2.1 (0.2)	0.1 (0.01)	–0.11 (–0.70–0.47)	1.87 (1.45–2.29) [*]
Age started smoking cigarettes [/]	15.5 (0.5)	16.5 (1.2)	16.8 (0.2)	–1.01 (–3.66–1.63)	–0.69 (–1.78–0.41)
Cigarettes per day [/]	17.7 (1.4)	13.0 (1.7)	17.8 (0.3)	4.43 (0.19–8.66) [*]	0.95 (–1.88–3.77)
Cigarettes per day	17.3 (1.5)	3.8 (0.9)	16.6 (0.3)	13.40 (9.87–16.94) [*]	1.64 (–1.22–4.49)

Notes. CUD = cannabis use disorders; ND = nicotine dependence; AOR = adjusted odds ratio; b = unstandardized partial regression coefficient. a = CUD + ND significantly differs from CUD only; b = CUD + ND significantly differs from ND only; c = CUD only significant differs from ND only. Adjusted odds ratios are presented for variables presented as percentages, and unstandardized partial regression coefficients are presented for variables presented as means. Adjusted odds ratios and unstandardized partial regression coefficients are adjusted for age, gender, race, and education.

¹ Statistics are only for respondents who reported that they used the specified substance. N/A = not applicable because 0 respondents were in at least one cell.

* $p < .05$

Table 2

Results from Logistic Regressions of Psychiatric Disorder Correlates for NESARC Respondents with Co-Occurring Cannabis Use Disorders and Nicotine Dependence ($n = 74$), Cannabis Use Disorders Only ($n = 100$), and Nicotine Dependence Only ($n = 3424$).

Characteristic	Unadjusted Percentage (Standard Error)			AOR (95% Confidence Interval)	
	CUD + ND ($n = 74$)	CUD only ($n = 100$)	ND only ($n = 3424$)	CUD + ND vs. CUD only	CUD + ND vs. ND only
Major Depression	7.3 (3.1)	9.0 (3.4)	8.3 (0.6)	0.69 (0.20–2.37)	0.85 (0.34–2.17)
Bipolar Disorder	23.6 (6.0)	9.6 (3.1)	7.9 (0.5)	2.59 (1.01–6.64)*	2.88 (1.49–5.55)*
Anxiety Disorders	44.8 (6.3)	29.0 (5.9)	25.9 (1.0)	1.73 (0.81–3.71)	2.32 (1.44–3.71)*
Any Personality Disorder (excluding Antisocial)	58.0 (6.3)	43.3 (6.3)	30.9 (1.0)	1.75 (0.89–3.43)	2.55 (1.53–4.24)*
Cluster A Personality Disorders	39.1 (6.0)	18.5 (4.7)	16.2 (0.9)	2.70 (1.21–6.02)*	2.76 (1.71–4.47)*
Paranoid Personality Disorder	17.8 (5.6)	6.4 (2.2)	8.2 (0.6)	2.84 (1.02–7.90)*	1.77 (0.87–3.58)
Schizoid Personality Disorder	13.4 (5.5)	5.1 (2.1)	5.8 (0.5)	2.70 (0.85–8.54)	2.40 (0.98–5.91)
Schizotypal Personality Disorder	21.7 (5.5)	12.8 (3.8)	6.7 (0.5)	1.86 (0.69–4.98)	3.20 (1.60–6.40)*
Cluster B Personality Disorder (excluding Antisocial)	52.1 (6.2)	28.5 (5.5)	18.0 (0.7)	2.71 (1.32–5.59)*	3.97 (2.40–6.57)*
Antisocial Personality Disorder	20.7 (9.1)	14.9 (3.6)	7.9 (0.6)	1.57 (0.45–5.47)	2.16 (0.73–6.37)
Narcissistic Personality Disorder	39.4 (5.5)	12.7 (3.9)	8.8 (0.6)	4.90 (2.08–11.55)*	5.27 (3.25–8.56)*
Borderline Personality Disorder	34.4 (6.8)	23.5 (5.3)	11.7 (0.6)	1.58 (0.68–3.66)	3.43 (1.83–6.45)*
Histrionic Personality Disorder	12.6 (5.6)	4.1 (1.9)	3.2 (0.4)	3.05 (0.74–12.54)	2.58 (0.96–6.95)
Cluster C Personality Disorders	19.4 (5.9)	16.5 (4.3)	13.4 (0.8)	1.14 (0.45–2.85)	1.37 (0.63–2.95)
Avoidant Personality Disorder	10.8 (5.3)	6.0 (2.7)	3.8 (0.4)	1.58 (0.38–6.57)	2.50 (0.87–7.20)
Dependent Personality Disorder	10.0 (5.4)	0.7 (0.7)	1.0 (0.2)	13.66 (1.33–140.54)*	8.15 (2.57–25.87)*
Obsessive-Compulsive Personality Disorder	15.3 (6.1)	12.0 (3.7)	11.5 (0.8)	1.27 (0.42–3.79)	1.24 (0.47–3.25)
Attention-Deficit/Hyperactivity Disorder	10.1 (4.9)	6.8 (2.6)	4.6 (0.4)	1.46 (0.38–5.59)	1.65 (0.57–4.84)

Note. CUD = cannabis use disorders; ND = nicotine dependence; AOR = adjusted odds ratio. Adjusted odds ratios are adjusted for age, gender, race, and education.

* $p < .05$

Table 3

Results from Logistic and Linear Regressions of Psychosocial and Physical Health Correlates for NESARC Respondents with Co-Occurring Cannabis Use Disorders and Nicotine Dependence ($n = 74$), Cannabis Use Disorders Only ($n = 100$), and Nicotine Dependence Only ($n = 3424$).

Characteristic	Unadjusted Mean/Percentage (Standard Error)				AOR (95% Confidence Interval)	
	CUD + ND ($n = 74$)	CUD only ($n = 100$)	ND only ($n = 3424$)	CUD + ND vs. CUD only	CUD + ND vs. ND only	
Binge drinking (% twice a month or more) ^I	20.8 (6.7)	24.2 (5.7)	17.8 (1.0)	0.80 (0.29–2.21)	0.85 (0.39–1.89)	
Binge drinking (% twice a month or more)	18.3 (5.4)	21.8 (5.1)	12.3 (0.7)	0.79 (0.30–2.08)	1.02 (0.49–2.16)	
Driving under the influence of alcohol ^I (% yes)	25.6 (5.9)	30.2 (6.0)	12.3 (0.9)	0.82 (0.35–1.90)	1.96 (1.03–3.75)*	
Driving under the influence of alcohol (% yes)	22.6 (5.7)	27.2 (5.4)	8.5 (0.6)	0.80 (0.35–1.82)	2.30 (1.23–4.33)*	
Driving under the influence of drugs ^I (%yes)	4.0 (2.5)	7.0 (2.8)	2.6 (1.1)	0.52 (0.17–1.63)	1.88 (0.40–8.85)	
Driving under the influence of drugs (%yes)	4.0 (2.5)	7.0 (2.8)	0.2 (0.1)	0.52 (0.17–1.63)	21.72 (3.64–129.59)*	
Partner violence (% yes, either attacker or victim)	29.6 (7.4)	17.1 (4.7)	10.0 (0.7)	1.88 (0.67–5.25)	3.00 (1.36–6.63)*	
Incarceration history (% yes)	35.4 (9.6)	38.8 (6.2)	21.2 (1.0)	0.99 (0.38–2.62)	1.64 (0.71–3.80)	
Self-rated health (% fair or poor)	16.7 (5.1)	10.0 (3.2)	24.7 (0.9)	2.07 (0.66–6.45)	1.02 (0.42–2.43)	
Hardening of the arteries or arteriosclerosis (% yes)	0.0 (0.0)	1.3 (1.2)	2.2 (0.3)	N/A	N/A	
Chest pain or angina pectoris (% yes)	3.7 (2.7)	0.9 (0.7)	6.7 (0.5)	4.36 (0.48–39.48)	0.88 (0.18–4.19)	
Heart attack or myocardial infarction (%yes)	2.3 (2.3)	0.0 (0.0)	1.6 (0.3)	N/A	3.55 (0.40–31.65)	
Stroke (% yes)	0.0 (0.0)	0.0 (0.0)	1.2 (0.2)	N/A	N/A	
b (95% Confidence Interval)						
Total number of antisocial behaviors	2.9 (0.5)	1.8 (0.2)	0.6 (0.03)	1.09 (0.17–2.01)*	1.95 (1.10–2.80)*	
Body mass index	26.7 (0.6)	25.9 (0.7)	27.5 (0.1)	0.89 (–1.03–2.81)	–1.05 (–2.35–0.25)	
Total number of medical conditions	0.8 (0.2)	0.6 (0.1)	1.1 (0.03)	0.32 (–0.07–0.71)	0.22 (–0.10–0.54)	

Note. CUD = cannabis use disorders; ND = nicotine dependence; AOR = adjusted odds ratio; b = unstandardized partial regression coefficient. Adjusted odds ratios are presented for variables presented as percentages, and unstandardized partial regression coefficients are presented for variables presented as means. Adjusted odds ratios and unstandardized partial regression coefficients are adjusted for age, gender, race, and education.

^I Statistics are only for respondents who reported that they used the specified substance. N/A = not applicable because 0 respondents were in at least one cell.

* $p < .05$