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# Psychiatric, psychosocial, and physical health correlates of co-occurring cannabis use disorders and nicotine dependence

Erica N. Peters[a,b,*], Robert P. Schwartz[a], Shuai Wang[c], Kevin E. O'Grady[d], Carlos Blanco[c]

[a] Friends Research Institute, 1040 Park Avenue, Suite 103, Baltimore, MD 21201, USA
[b] Yale University School of Medicine, SATU, One Long Wharf Drive, Box 18, New Haven, CT 06511, USA
[c] Department of Psychiatry, New York State Psychiatric Institute/Columbia University, 1051 Riverside Drive, Unit 69, New York, NY 10032, USA
[d] Department of Psychology, University of Maryland, 300 Campus Drive, College Park, MD 20742, USA

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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.
*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.


## 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., 2008a), 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 and Hall, 2001; Heffner et al., 2008; Patton et al., 2006; Swift et al.,

* Corresponding author at: Friends Research Institute, 1040 Park Avenue, Suite 103, Baltimore, MD 21201, USA. Tel.: +1 410 837 3977x272; fax: +1 410 752 4218.
*E-mail addresses:* epeters@friendsresearch.org, erica.peters@yale.edu (E.N. Peters).

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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., 2013; 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, 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