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Self-medication of mood and anxiety disorders with marijuana: Higher in states with medical marijuana laws

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Abstract

Background—Self-medication with drugs or alcohol is commonly reported among adults with mood or anxiety disorders, and increases the risk of developing substance use disorders. Medical marijuana laws (MML) may be associated with greater acceptance of the therapeutic value of marijuana, leading individuals to self-medicate.

Methods—The study utilized data from Wave 2 of the National Epidemiologic Survey on Alcohol and Related Conditions (2004–2005). Participants were sampled from households in the general population and included adults with a mood or anxiety disorder in the past 12 months

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Conflicts of Interest

There are no conflicts of interest declared by any author

Contributors

Mr. Sarvet and Dr. Wall had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. All authors participated in preparation and final approval of the manuscript.

(n=7418), and the subset of those who used marijuana and no other drug (n=314). Weighted logistic regression models predicted the prevalence of self-medication with drugs in U.S. states with and without MML, adjusting for individual and state-level covariates. As a negative control, analyses were repeated for self-medication with alcohol.

Results—Overall, self-medication with drugs was 3.73 percentage points higher (95% confidence interval [CI]: 0.93–6.53) among those living in MML states (p=0.01). For the subpopulation that only used marijuana, self-medication with drugs was 21.22 percentage points higher (95% CI: 3.91–38.53) among those living in MML states (p=0.02). In contrast, self-medication with alcohol had nearly identical prevalence in MML and non-MML states, overall and for drinkers.

Conclusions—Among adults with mood or anxiety disorders, living in a medical marijuana law state is associated with self-medication with marijuana. While additional research is needed to determine the reasons for this association, clinical screening for self-medication with marijuana may be particularly important in states with medical marijuana laws.

Keywords

General population; mood and anxiety disorders; self-medication; laws; medical marijuana; NESARC

1. Introduction

Self-medication of psychiatric symptoms with drugs or alcohol is common in the general population (Bolton et al., 2009; Crum et al., 2013a; Crum et al., 2013b; Lazareck et al., 2012; Robinson, J. et al., 2009; Robinson et al., 2011), with lifetime prevalence of 24.1% among individuals with any mood disorder (Bolton et al., 2009), and 13.1% among individuals with any anxiety disorder (Robinson, J. et al., 2009). Individuals who self-medicate tend to have poorer functioning (Robinson, J.A. et al., 2009). For example, individuals with any anxiety disorder who self-medicated with alcohol or with drugs had lower mental-health related quality of life than comparable individuals who did not self-medicate (Robinson, J.A. et al., 2009). In addition, individuals who self-medicate are at increased risk of comorbid addictions; because many cannabis withdrawal criteria are depression/anxiety symptoms (American Psychiatric Association, 2013), regular users may use cannabis to obtain short-term symptom relief, unaware that this could perpetuate a longer-term withdrawal problem. In a nationally representative sample, self-reported self-medication of mood and anxiety disorders with drugs or alcohol predicted subsequent incident occurrence of DSM-IV alcohol and drug dependence (Crum et al., 2013a; Crum et al., 2013b; Lazareck et al., 2012; Robinson et al., 2011), after controlling for initial quantity and frequency of use (Crum et al., 2013a; Crum et al., 2013b). These results are consistent with evidence that individuals who drink alcohol in order to cope with negative mood are consistently more likely to develop alcohol problems and dependence (Carpenter and Hasin, 1998; Holahan et al., 2003; Kuntsche et al., 2005), which has also been replicated for marijuana, including marijuana use disorders that adhere to DSM-5 criteria (Blevins et al., 2016; Buckner, 2013; Fox et al., 2011; Lee et al., 2007; Moitra et al., 2015; Simons et al., 2005). Finally, observational studies suggest that individuals with some psychiatric disorders

(bipolar disorder, depression, anxiety disorders, PTSD, psychotic disorders) who use marijuana have a more severe course and worse symptoms (Bahorik et al., 2017; Wilkinson et al., 2015), although these studies did not examine marijuana specifically used for self-medication.

The prevalence of non-medical marijuana use and marijuana use disorder are higher in states with medical marijuana laws (Bonn-Miller et al., 2012; Cerda et al., 2012; Hasin et al., 2017), which now constitute a majority of US states. Since passage of the first state medical marijuana law in 1996, the proportion of American adults who perceive marijuana use as risky has rapidly declined (Johnston et al., 2014; Pacek et al., 2015), and the prevalence of adult marijuana use (Hasin et al., 2015a) and marijuana use disorders (Bonn-Miller et al., 2012) has increased (Brady and Li, 2014; SAMHSA, 2013). In addition, available evidence suggests that marijuana use and marijuana use disorder increased disproportionately among adults in states that legalized medical marijuana (Hasin et al., 2017; Wen et al., 2015). The limited evidence available supports the efficacy of marijuana as a treatment for only a few medical conditions (Whiting et al., 2015), which is generally reflected by the narrow set of non-psychiatric symptoms and disorders that constitute explicitly approved conditions in states with medical marijuana laws. However, medical marijuana laws might reflect or even lead to beliefs that marijuana has *general* therapeutic indications, including as a treatment for mood or anxiety disorders. Theoretically, engagement in self-medication is driven by the *perceived* effectiveness, social appropriateness, and legal risks (Akers et al., 1979; Armitage and Conner, 2001; Harris and Edlund, 2005; Keyes et al., 2011) of substance use as a medication. The passage of laws legalizing the use of marijuana for medical purposes may represent an important indicator of these drivers (Brooks, 2006; Burstein, 2003; Cerda et al., 2012; Lipperman-Kreda and Grube, 2009; Lipperman-Kreda et al., 2010). If so, then residence in a state with a law legalizing marijuana for medical purposes might be associated with self-medication of mood and anxiety disorders with marijuana.

To examine the relationship of medical marijuana laws to self-medication for mood and anxiety disorders, we used data on individuals with these disorders from Wave 2 of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). The NESARC is a nationally representative survey that included state of residence and extensive information on substance use and is unique among national surveys in its direct measurement of self-medication behavior. We examined whether living in a state with legalized medical marijuana was associated with self-medication with drugs among individuals with mood or anxiety disorders, and whether this association was observed among individuals whose *only* substance use was with marijuana.

2. Methods

2.1 Study design and participants

Data were derived from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), Wave 2. The NESARC Wave 1 (2001–2002) was a nationally representative, face-to-face survey of the US adult civilian population living in households or group quarters. The NESARC Wave 2 was a face-to-face re-interview of these participants (N=34,653) conducted in 2004–2005, with mean duration since the Wave 1

interview of 36.6 months (standard error: 2.62 months; Grant et al., 2009). The cumulative response rate of NESARC Wave 2 sample is 70.2%. Weights for each survey were created to adjust for differential probabilities of participant selection, household and person-level non-response, and population undercoverage, such that weighted sample margins match important population distributions (e.g., those of age, sex, and race) in the US as measured by the 2000 census (Grant et al., 2009). All respondents provided informed consent and were compensated for participation. Interviewer quality assurance procedures included initial structured home study and in-class training, ongoing supervision by trained supervisors, and random respondent callbacks to verify interview data (Grant, B.F. et al., 2003; Grant et al., 2004). The entirety of the study protocol, including consent procedures, was approved by the US Census Bureau and the US Office of Management and Budget. The primary analytic population (described below) included only individuals who met criteria for a DSM-IV mood or anxiety disorder (n=7,418).

2.2 Measures

Substance use, cannabis use disorder, and other mental disorders were measured with the Alcohol Use Disorder and Associated Disabilities Interview Schedule – DSM-IV Version (AUDADIS-IV). The AUDADIS-IV is a fully-structured diagnostic interview administered by trained lay interviewers. While the Wave 2 interview covered the entire period since the initial Wave 1 interview, many of the Wave 2 items clearly indicated that they covered the last 12 months only, including many items in the substance use modules. This was done to create a consistent timeframe for the reporting periods in the Wave 1 and 2 interviews.

2.2.1 State-level medical marijuana laws—The primary exposure was the presence of a state-level medical marijuana law (MML). Year of MML passage was determined by review of publically available state policies conducted by a team of legal scholars, policy analysts and economists (Hasin et al., 2015b; Pacula et al., 2014). A single binary variable was created; the variable indicated if a participant was living in a state that passed a MML by 2004, the year in which most Wave 2 interviews were conducted (Cerda et al., 2012). MML states in 2004 included Alaska, California, Colorado, Hawaii, Maryland, Maine, Montana, Nevada, Oregon, Vermont, and Washington.

2.2.2 DSM-IV mood and anxiety disorders—Participants were assessed for DSM-IV mood disorders (major depressive disorder, bipolar disorder, dysthymia) and anxiety disorders (panic disorder, social phobia, specific phobia, generalized anxiety disorder, and post-traumatic stress disorder). The AUDADIS-IV demonstrates fair to good psychometric properties for these diagnoses (Grant, B. F. et al., 2003; Ruan et al., 2008). If a participant met inclusion criteria for at least one of these disorders in the past 12 months, then they were coded as having a current mood or anxiety disorder and were thus included in the primary analytic sample. The prevalence of any mood or anxiety disorder within the year prior to interview in MML states and non-MML states are 20.61% (standard error [SE]=0.96%) and 20.30% (SE=0.39%), respectively, a difference of 0.31 percentage points (95% confidence interval: −1.71 – 2.32).

2.2.3 Self-medication—All participants who met inclusion criteria for a mood or anxiety disorder were asked if they had used drugs "on their own" in the past twelve months to improve the symptoms they had endorsed. These questions were asked separately at the end of the modules for each disorder. For example, individuals who met inclusion criteria for major depressive disorder were asked "During the last 12 months, did you take any drugs or medicines ON YOUR OWN, that is, without a prescription, in greater amounts or more often or longer than prescribed to improve your mood or to make yourself feel better when you (felt sad, blue, depressed or down/didn't care about things or enjoy things)?" and could provide a "Yes" or "No" response. Self-medication with particular substances (including marijuana) was not directly assessed, except for alcohol. Participants were asked separately whether they had consumed alcohol to improve their mood or anxiety (Table S1[1]). Participants were coded as positive for self-medication with any drug in the past 12 months if they endorsed this item for at least one mood or anxiety disorder. Participants were coded similarly for self-medication with alcohol in the past 12 months.

2.2.4 Substance use (for any reason)—Participants' non-medical marijuana use (i.e., "Marijuana, hash, THC, or grass"), alcohol use, and other substance use (for any reason) were assessed for the 12 months prior to the interview. Participants were asked: "Now I'd like to ask you about your experiences with medicines and other kinds of drugs that you may have used ON YOUR OWN - that is, either WITHOUT a doctor's prescription (PAUSE); in GREATER amounts, MORE OFTEN, or LONGER than prescribed (PAUSE); or for a reason other than a doctor said you should use them. People use these medicines and drugs ON THEIR OWN to feel more alert, to relax or quiet their nerves, to feel better, to enjoy themselves, or to get high or just to see how they would work. Since your LAST interview in (MO/YR), did you use any of these medicines or drugs ON YOUR OWN?" Participants were then presented with a list of substances, including marijuana, for which they could positively respond to this question. For all positively endorsed substances, participants were asked if they had used the substance in the past 12 months, and if so, how often. They were then asked a series of additional questions involving patterns of use in the past 12 months and prior to that. Non-medical marijuana use and alcohol use variables were coded positive among participants who reported using the substance at least once in the past 12 months. These variables were used to define analytic subpopulations (i.e., marijuana-only users and drinkers). Non-medical marijuana and alcohol use frequency were coded as every day or nearly every day; every other day to 2 or 3 times per month; 3 to 12 times per year; 1 to 2 times per year. Participants' other substance use (for any reason) was also assessed for the 12 months prior to the interview. A variable corresponding to non-medical use of any drug other than marijuana was coded positive if a participant reported using either sedatives, tranquilizers or anti-anxiety drugs, painkillers, stimulants, cocaine, hallucinogens, inhalants or solvents, heroin, or any other medicines, drugs, or substances (besides marijuana) at least once in the past 12 months. This variable permitted examination of the self-medication question among participants whose only drug was marijuana. Among this group, self-medication with drugs implied self-medication with marijuana. Finally, for sensitivity analyses, we coded three additional substance use covariates:1) tobacco use status (current

[1]Supplementary material can be found by accessing the online version of this paper at http://dx.doi.org and by entering doi:…

tobacco user, ex-user, never-user); 2) past-year non-medical use of prescription sedatives or anti-anxiety drugs; and 3) past-year non-medical use of prescription tranquilizers.

2.2.5 Control covariates—Individual and state-level covariates were included. Individual covariates included sex (male, female), age (18–29, 30–39, 40–49, 50+), education (less than high school vs. others), race/ethnicity (Hispanic, non-Hispanic White, non-Hispanic Black, other), marital status (unmarried vs. married/living as if married), urbanicity (in metropolitan statistical areas vs. others), personal income level (<$20,000, $20,000–$34,499, $35,000–$69,999, ≥$70,000), and insurance coverage during the past 12 months (privately-obtained insurance vs. no private insurance but covered by Medicaid, Medicare, or military insurance vs. no insurance). State-level covariates included four variables derived from the 2000 US decennial census: % of state population male, white, <30 years old, and ≥25 years old without a high school diploma (Cerda et al., 2012; Hasin et al., 2015b).

2.3 Statistical analyses

Survey weights were used in multivariable logistic regression models to generate weighted predicted marginal prevalence estimates and adjusted standard errors (Bieler et al., 2010) of self-medication among subpopulations in MML and non-MML states. Marginal prediction standardizes groups to the population distribution of covariates included in the model, and thus controls for differences in covariates between MML and non-MML states (Guabard and Korn, 1999). Prevalence values between groups (populations in MML and non-MML states) were compared using t-tests. Wald-type 95% confidence intervals for prevalence differences were computed from estimated standard errors for these differences.

We ran two models to examine if the prevalence of self-medication differed by whether participants lived in states with and without MML. The first model estimated prevalence of self-medication with drugs in MML and non-MML states among all participants with a current mood or anxiety disorder. This model included the binary MML variable and all individual and state-level control covariates. We tested differences in the prevalence of self-medication with drugs between MML and non-MML states. The second model estimated the prevalence of self-medication among the analytic sample, further restricted to those who used only non-medical marijuana and no other drug in the past year. This further sample restriction sharpens the specificity so that the outcome indicates self-medication with marijuana. This second model included all control covariates in the first model and additionally controlled for frequency of non-medical marijuana use. Frequency of use was controlled because self-medication motives are consistently related to marijuana use frequency (Bonn-Miller et al., 2007; Simons et al., 2005), and because residence in medical marijuana states may also be associated with patterns (e.g., frequency) of use among users (Cerda et al., 2012). Uncontrolled analyses were also conducted and presented in supplementary materials [2], as well as alternative measures of association (prevalence ratio, prevalence odds ratio).

[2]Supplementary material can be found by accessing the online version of this paper at http://dx.doi.org and by entering doi: …

We also performed a negative control analyses by re-running all models with self-medication with alcohol use as the outcome instead of self-medication with drugs. Negative controls help to detect bias that has not been controlled by study design or statistical adjustment. A good candidate for a negative control variable is arguably unassociated with the exposure of interest (medical marijuana laws), and similar to the outcome of interest (self-medication with drugs), to the extent that a similar set of biases affects the negative control's measured association with the outcome (Lipsitch et al., 2010). Self-medication with alcohol serves as a useful negative control, since we expect the relationship between medical marijuana laws and self-medication to be relatively specific to marijuana.

Finally, we examined the robustness of primary results in two ways: 1) to assess sensitivity of results to inclusion of particular MML states, we repeated primary analyses 11 times, each time systematically excluding one of the 11 MML states considered in this study; and 2) we repeated the main analyses controlling for tobacco use status (current tobacco user, ex-user, never-user), as well as past-year alcohol use frequency, past-year non-medical use of prescription sedatives or anti-anxiety drugs, and past-year non-medical use of prescription tranquilizers

All analyses were conducted using SUDAAN 11.0.1 (Research Triangle Institute, 2012), including survey weights and stratification variables, to account for the complex survey design of the NESARC.

3. Results

3.1 Self-medication with drugs

Among the sample with mood or anxiety disorders, the prevalence of self-medication with drugs was 4.52% (standard error [SE]=0.34). The predicted prevalence was 3.73 percentage points higher, nearly double, among those living in an MML state (7.59%) compared to a non-MML state (3.86%; Table 1). This difference was statistically significant (p=0.01), controlling for individual and state-level covariates.

Among the subset of participants whose only drug use involved marijuana, the prevalence of self-medication with drugs was 23.40% (SE=3.40). The predicted prevalence was 21.22 percentage points higher, more than double, among those living in an MML state (39.60%) than in a non-MML state (18.37%; p=0.02; Table 1). Uncontrolled analyses are presented in Table S2[3].

3.2 Negative control: Self-medication with alcohol

Among the sample of individuals with a mood or anxiety disorder, the prevalence of self-medication with alcohol was 12.32% (SE= 0.49), and among drinkers, the prevalence was 18.11% (SE=0.79). The predicted prevalence was similar in MML and non-MML states overall (11.74% vs. 12.49%; p=0.6143; Table 1) and among drinkers in MML and non-MML states (18.40% vs. 17.24%; p=0.5849; Table 1).

[3]Supplementary material can be found by accessing the online version of this paper at http://dx.doi.org and by entering doi: …

3.3 Sensitivity analyses

Differences in the prevalence of self-medication with drugs between MML states and non-MML states were largely robust to exclusion of a single MML state (Table S3[3]). The only minor exception involved the exclusion of Washington from the analysis among the subset of participants whose only drug use involved marijuana, in which the prevalence difference was consistent in direction but attenuated to 12.93 percentage points (95% confidence interval: −6.61 – 32.47 percentage points).

Results of analyses that additionally controlled for tobacco use, alcohol use, non-medical use of prescription sedatives or anti-anxiety drugs, and non-medical use of prescription tranquilizers were nearly identical to main analyses (Table S4[4]).

4. Discussion

In previous research, the prevalence of marijuana use (Cerda et al., 2012; Hasin et al., 2017; Wen et al., 2015) and marijuana use disorder (Cerda et al., 2012; Hasin et al., 2017) is higher among adults who reside in states with laws permitting medical marijuana use and the prevalence of adult marijuana use and disorders may be increasing faster in MML states than in other states (Hasin et al., 2017; Wen et al., 2015). The present study extends the link between medical marijuana laws and marijuana use by exploring differences in how marijuana is used in a sub-population that is especially vulnerable to the development of marijuana use disorder (Kessler, 2004; Kessler et al., 1996; Lai et al., 2015; Regier et al., 1990). Among all individuals with a mood or anxiety disorder, and among those whose only drug use involved marijuana, the prevalence of self-medication with drugs was significantly elevated in medical marijuana states.

The latter association among individuals who had only used marijuana is important for two reasons. First, it rules out the possibility that differences in self-medication with drugs are due simply to higher overall rates of marijuana use among individuals with a mood or anxiety disorder in medical marijuana law-states, as all those in the subsample are marijuana users. Second, it suggests differing rates of self-medication in MML vs. non-MML states are due to self-medication with marijuana rather than other drugs of abuse. The large difference in prevalence of self-medication among marijuana users is especially striking given the nearly identical rates of self-medication with alcohol among drinkers in MML and non-MML states.

Several study limitations should be noted. First, the data were collected in 2004–05, but there have been substantial changes in the marijuana landscape in the U.S. Baseline rates of marijuana use have increased among adults (Compton et al., 2016; Hasin et al., 2015a) and 17 additional states have passed medical marijuana laws as of November 2016. Furthermore, there has been a rapid increase in the number of MML states that include post-traumatic stress-disorder (PTSD; 21 as of July 2017) as an approved condition for medical marijuana (the only psychiatric disorder on such lists). These changes are largely due to the efforts of groups lobbying on the behalf of veterans (The Associated Press, 2017), despite the

[4]Supplementary material can be found by accessing the online version of this paper at http://dx.doi.org and by entering doi: …

continued lack of clinical evidence demonstrating efficacy for marijuana use or cannabinoids as an effective treatment for PTSD. In spite of these changes, non-medical marijuana use remains higher among adults living in states with medical marijuana laws, including in early-adopting MML states, than in other states (Hasin et al., 2017; Wen et al., 2015; see Table S5[5]). Additionally, no national survey conducted since the NESARC Wave 2 has specifically asked participants about self-medication. Given the persistent relationship between MML and non-medical marijuana use, and the lack of recent national data on self-medication behaviors, it may be prudent to assume that the relationship between self-medication with marijuana and residence in a state with a medical marijuana law has also persisted.

Second, individuals may have been more willing to disclose self-medicating motivations for marijuana use on a survey in MML states than in non-MML states. However, evidence suggests that prescriptions for anxiety, depression, and psychosis were all significantly reduced in states that had passed medical marijuana laws (Bradford and Bradford, 2016), which may reflect an increasing substitution of marijuana for prescribed psychotropic medications in MML states. These parallel findings, which do not rely on self-report, suggest that social desirability bias likely would not entirely explain the association observed in this study.

Third, this cross-sectional study does not provide evidence that medical marijuana laws play a causal role in self-medication. Indeed, permissive attitudes towards marijuana and its therapeutic appropriateness among the electorate may have played a role in the passage of these laws in the first place, or individuals with these attitudes may have a greater propensity to migrate to these states following law passage. However, in view of the known risks of self-medication, as well as the current lack of reliable evidence of a therapeutic benefit of marijuana use for mood or anxiety disorders (Whiting et al., 2015), the results suggest particular consideration should be given to efforts to prevent self-medication of mood and anxiety symptoms in states with MML.

Fourth, the subpopulation in which self-medication with marijuana is specifically measured excludes individuals who used drugs other than marijuana. Baseline rates of marijuana use among individuals who use other drugs may be higher than among individuals who do not use other drugs. However, we do not expect the difference between MML and non-MML states in terms of self-medication to be different in individuals who use other drugs compared to the subpopulation used in this study.

Higher rates of self-medication with marijuana in states that have medical marijuana laws present opportunities for prevention where it is most concentrated. Regardless of its causes, greater public belief in the putative therapeutic benefits of marijuana within MML states may increase the need for clinical vigilance of self-medication. Negatively re-enforcing properties of substance use (Koob, 2006; Kushner et al., 2000) can lead those who self-medicate to conflate withdrawal symptoms with relapse of an exogenous mood disorder, thereby justifying disengagement with important aspects of the healthcare system.

[5]Supplementary material can be found by accessing the online version of this paper at http://dx.doi.org and by entering doi: …

Physicians and other clinicians have opportunities to identify patients with self-medication behaviors, educate them as to the attendant risks, and provide safer treatment alternatives (Lembke, 2012) – screening tools may be useful, but may need to be modified for populations in MML states if risk factors differ. Preliminary evidence supports a role for cognitive, behavioral, preventive interventions (Banes et al., 2014). Reduced stigma of marijuana may facilitate clinical intervention and addressing substance use may be most tractable when self-medication is the primary motivation (Weiss et al., 2004).

Self-medication of anxiety and mood disorders with marijuana is highest in states that have passed medical marijuana laws. Given the high prevalence of self-medication behaviors among those with mood and anxiety disorders and the few studies available suggesting a lack of effectiveness of marijuana or cannabinoids to ameliorate mood or anxiety symptoms (Bahorik et al., 2017; Whiting et al., 2015; Wilkinson et al., 2015), more studies are needed on the specific effects of self-medication with marijuana on the clinical course, severity, and duration of underlying mood or anxiety conditions, particularly among the self-selected individuals who choose this coping strategy. Further, research in this area should also carefully assess the risk of incident substance use disorders. Regardless, although much remains to be learned about causal factors underlying the relationship between marijuana attitudes and self-medication, physicians and other health-care professionals who encounter individuals with a mood or anxiety disorders should consider increased evaluation of marijuana use.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- Self-medication with marijuana was higher in states with medical marijuana laws.
- Screening for self-medication may be especially important in such states.
- Consistent measurement of self-medication is needed on national surveys.

Table 1

Self-medication among those who meet criteria for a mood or anxiety disorder[a]

	Prevalence[b] of self-medication with drugs[c]			
	non-MML states	**MML states**		
	% (SE)	**% (SE)**	***% difference (95% confidence interval)***	***p-value[d]***
Subpopulation:				
Overall (N=7418)[e]	3.86 (0.35)	7.59 (1.31)	3.73 (0.93 – 6.53)	**0.0110**
Used only marijuana (N=314)[e, f]	18.37 (3.41)	39.60 (7.72)	21.22 (3.91 – 38.53)	**0.0191**
	Prevalence[b] of self-medication with ***alcohol***			
	non-MML states	**MML states**		
	% (SE)	% (SE)	*% difference (95% confidence interval)*	*p-value[d]*
Subpopulation:				
Overall (N=7418)[e]	12.49 (0.60)	11.74 (1.23)	−0.75 (−3.63 – 2.13)	0.6143
Used alcohol (N=4879)[e, g]	18.40 (0.86)	17.24 (1.78)	−1.16 (−5.32 – 3.00)	0.5849

Note: Analyses take into account the complex design of the survey, as well as survey weights, using SUDAAN

[a] Subpopulation includes those who met inclusion criteria for past-year major depressive disorder, bipolar disorder, dysthymia, panic disorder, social phobia, specific phobia, generalized anxiety disorder, or post-traumatic stress disorder.

[b] Prevalences are back-transformed from marginal log odds predicted by logistic regression models that take into account complex design of NESARC.

[c] Self-medication with “drugs” includes self-medication with any substance besides alcohol (assessed separately).

[d] p-values estimated from absolute contrasts between predicted prevalences (prevalence differences).

[e] Models adjusted for individual variables (sex, race/ethnicity, age, education, personal income level, urbanicity, insurance status) and state-level variables (% male, % white, % ≥25 without a HS diploma, % under 30).

[f] Includes individuals whose only drug use in the past year was with marijuana, and so self-medication with drugs implies self-medication with marijuana in this subpopulation. This model additionally adjusts for frequency of marijuana use in the past year.

[g] Includes individuals who drank alcohol in the past year. This model additionally adjusts for frequency of alcohol use in the past year.