



# Patterns of marijuana use among psychiatry patients with depression and its impact on recovery

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## ABSTRACT

**Background:** Depression is associated with substance-related problems that worsen depression-related disability. Marijuana is frequently used by those with depression, yet whether its use contributes to significant barriers to recovery in this population has been understudied.

**Method:** Participants were 307 psychiatry outpatients with depression; assessed at baseline, 3-, and 6-months on symptom (PHQ-9 and GAD-7), functioning (SF-12) and past-month marijuana use for a substance use intervention trial. Longitudinal growth models examined patterns and predictors of marijuana use and its impact on symptom and functional outcomes.

**Results:** A considerable number of (40.7%;  $n=125$ ) patients used marijuana within 30-days of baseline. Over 6-months, marijuana use decreased ( $B=-1.20$ ,  $p<.001$ ), but patterns varied by demographic and clinical characteristics. Depression ( $B=0.03$ ,  $p<.001$ ) symptoms contributed to increased marijuana use over the follow-up, and those aged 50+ ( $B=0.44$ ,  $p<.001$ ) increased their marijuana use compared to the youngest age group. Marijuana use worsened depression ( $B=1.24$ ,  $p<.001$ ) and anxiety ( $B=0.80$ ,  $p=.025$ ) symptoms; marijuana use led to poorer mental health ( $B=-2.03$ ,  $p=.010$ ) functioning. Medical marijuana (26.8%;  $n=33$ ) was associated with poorer physical health ( $B=-3.35$ ,  $p=.044$ ) functioning.

**Limitations:** Participants were psychiatry outpatients, limiting generalizability.

**Conclusions:** Marijuana use is common and associated with poor recovery among psychiatry outpatients with depression. Assessing for marijuana use and considering its use in light of its impact on depression recovery may help improve outcomes.

## 1. Introduction

Depression affects approximately 6% (16 million adults) of the U.S. general population and is a leading cause of disability (Substance Abuse and Mental Health Services Administration, 2015). Studies report that depression is associated with substance use, which can worsen depression-related disability (Davis et al., 2008; Grant et al., 2004). These studies have found depression is associated with a two-fold increase in the rate of alcohol-related problems and a six-fold increase in marijuana-related problems (Grant et al., 2004). Yet clinical outcomes of depression patients who use marijuana are understudied in contrast to alcohol, perhaps due to the larger public health burden associated with depression and alcohol use (Hall and Degenhardt, 2009). However, there is also considerable potential for marijuana to

impede the recovery of vulnerable subgroups, including clinical populations. Clinical studies reported that marijuana use among depression patients can lead to worse symptoms, more depressive episodes, and impede treatment (Davis et al., 2008; Bricker et al., 2007). These findings suggest that marijuana may be a critical issue for further understanding recovery outcomes in adults with depression.

Differences in demographic, clinical, and marijuana use characteristics are important considerations for the treatment and recovery of persons with depression. Depressed persons who use drugs, including marijuana are often younger, male, divorced or never married and not of Hispanic origin (Davis et al., 2008; Melartin et al., 2002; McDermut et al., 2001). Marijuana and other drug use among depressed persons can lead to worse anxiety, drug use relapse post-treatment, and poor functioning (Hasin et al., 2002; Davis et al., 2008). Whether such

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findings are present and persist over time in a clinical sample of depressed patients is largely unknown.

This study addresses this important question by examining 6-month patterns of marijuana use and its impact on symptom and functional recovery outcomes for 307 depressed outpatients using and not using marijuana and participating in an alcohol/illicit-drug use intervention. We identified: (1) longitudinal patterns of marijuana use; (2) demographic and clinical predictors of marijuana use; (3) associations between marijuana use, depression and anxiety symptoms, and functioning over the 6-month follow-up.

## 2. Method

### 2.1. Participants

Data were collected for a randomized controlled trial of motivational interviewing (MI) in alcohol/drug use treatment for depressed patients, for which the results have been reported (Satre et al., 2016). A total of 307 patients were recruited from Kaiser Permanente Southern Alameda Center Department of Psychiatry in Union City and Fremont, CA. Inclusion criteria were: aged 18 or older; Patient Health Questionnaire score  $\geq 5$  (PHQ-9: Kroenke et al., 2001); met drug use (illicit/non-prescribed use) or hazardous drinking criteria ( $\geq 3/\geq 4$  drinks/day for women/men) within the past 30-days. A Hazardous drinking standard more conservative than that recommended for the general population was used (Satre et al., 2016). Patients with mania or psychosis were excluded.

The present study makes use of secondary data from the previously described trial of MI in alcohol/drug use for depressed patients. In this secondary analysis, we focused on examining the 6-month patterns and predictors of marijuana use and its association with recovery for those using ( $n=125$ ) and not using marijuana ( $n=182$ ).

### 2.2. Measures

#### 2.2.1. Marijuana and other substance use

Patients were asked how many days they used marijuana and other substances, including alcohol during the past 30-days at baseline, 3- and 6-months: alcohol, marijuana, cocaine, amphetamine, stimulants, sedatives (other than prescribed), opioids (other than prescribed), heroin, and ecstasy; collapsed as dichotomous (any use=1; else=0) due to low frequency. To adjust for non-marijuana substance use in longitudinal analyses a composite was created, where ‘any use’ of the mentioned substances=1 (except marijuana) and 0= otherwise. Patients endorsing marijuana use were asked “was the marijuana used in the past 30-days always used for medical purposes, as recommended/prescribed by a provider (medical use=1; otherwise=2)?”

#### 2.2.2. Symptom and functioning recovery outcomes

PHQ-9 depression was measured 2 weeks prior to each interview; higher scores indicate greater depression (9-items, range 0–27; score  $> 5$ = at least mild depression) (Kroenke et al., 2001). Generalized Anxiety Disorder scale (GAD-7; Spitzer et al., 2006) anxiety was measured 2 weeks prior to each interview; higher scores indicate greater anxiety (7-items, range 0–21; score  $> 5$ = at least mild anxiety) (Spitzer et al., 2006). SF-12 mental health functioning using the MCS-12 subscale was assessed 4 weeks prior to each interview; lower scores indicate worse mental health functioning (12-items, range 0–100,  $M=50$ ;  $SD=10$ ) (Ware et al., 1998). SF-12 physical health functioning using the PCS-12 subscale was assessed 4 weeks prior to each interview (12-items, range 0–100,  $M=50$ ;  $SD=10$ ); lower scores indicate worse physical health functioning (Ware et al., 1998).

### 2.3. Procedures

Eligibility of the 307 participants was determined by baseline

alcohol/drug use measures and PHQ-9 depression. Patient information was collected at baseline and then participants were randomized (MI: 45 min in-person session followed by two 15-min boosters; Control: 2-page brochure on substance use risk). Patients were offered \$50 gift cards for completing the interviews (baseline, 3-, and 6-month). Of the 307 participants, 296 (96%) completed the 3-month telephone follow-up, 302 (98%) completed 6-month follow-up. Substance use, and participant's symptoms and functioning were collected at baseline, 3-, and 6-months. The University of California, San Francisco (UCSF) Committee on Human Subjects and the Kaiser Permanente Institutional Review Board approved the procedures. Patients were provided with written informed consent prior to participation.

### 2.4. Data analysis

Analyses began by examining baseline differences between patients using and not using marijuana by using  $\chi^2$  (categorical) and independent sample  $t$  (continuous) tests. Longitudinal analyses proceeded using a series of mixed-effects growth models, a form a hierarchical linear modeling for repeated measures data, where multiple measurement occasions are nested within individuals (Raudenbush and Bryk, 2009). Patterns of patients using marijuana were tested using generalized mixed-effects growth models employing penalized-quasi likelihood estimation for computing parameter estimates of binary outcomes. Analyses began with unconditional growth models predicting marijuana use from time (coded: 0= baseline; 1=3-months; 2=6-months) to examine overall trajectories of marijuana use. Conditional growth models were computed to examine characteristics that may predict increased use of marijuana. Age, sex, marital status, race/ethnicity, MI, non-marijuana substance use, time-varying psychiatry visits, and time-varying depression were included in conditional models with marijuana use. Predictors were chosen because prior research signaled the variable as related to marijuana use and depression or the variable was significant in prior analyses. GAD-7 anxiety was not included as a predictor with marijuana use outcomes, owing to its high correlation with PHQ-9 depression. Finally, associations between marijuana use and recovery outcomes were examined. These analyses were conducted with mixed-effects growth models using restricted maximum likelihood estimation for continuous outcomes, predicting symptom and functioning outcomes from time and time-varying marijuana. Rather than discard partial completers (~4.0% of the sample), the expectation maximization approach was used to handle missing data at analysis. Analyses were carried out in R version 2.14.2 (R Development Core Team, 2016). Statistical significance was defined at  $p < .05$ .

## 3. Results

### 3.1. Prevalence and characteristics of depression patients using marijuana

A considerable number of depressed patients were using marijuana at baseline, with 125 (40.7%) of the 307 patients reporting use in the prior 30 days (Table 1). Overall, few differences existed between those using and not using marijuana. Marijuana using patients were younger, less likely to be married, and more likely to use tobacco than those not using the drug (Table 1).

### 3.2. Longitudinal patterns and predictors of marijuana use and the impact of marijuana on symptom and functional outcome

After finding few baseline differences between the marijuana using and non-marijuana using groups, the patterns and predictors of marijuana use over 6-months were investigated. As reported in Table 2, the unconditional growth model results showed that the number of patients using marijuana significantly declined over time. Depression symptoms were associated with significantly increased

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