Medical and Non-Medical Marijuana Use in Depression: Longitudinal Associations with Suicidal Ideation, Everyday Functioning, and Psychiatry Service Utilization

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Abstract

Background—Marijuana use is clinically problematic in depression, and non-medical and medical use may both contribute to barriers to care in this population. Among outpatients with depression, we examined the differential impact of medical or non-medical marijuana use, relative to no-use, on psychopathology and service use over time.

Method—Participants were 307 psychiatry outpatients participating in a trial of drug/alcohol use treatment for depression. Measures of past 30-day marijuana use, depression/anxiety symptoms, psychiatry visits, and functional data related to health status were collected at baseline, 3, 6, and 12 months. Regressions (baseline and 1 year) and growth models (over time) predicted clinical and psychiatry visit outcomes, from medical or non-medical marijuana use (no-use=reference).

Results—At baseline, 40.0% of the sample used marijuana and more reported non-medical (71.7%) than medical (28.2%) use. Relative to non-users at baseline, patients using medically had worse mental/physical health functioning (p's <.05), and non-medical use was associated with higher suicidal ideation ($B = 1.08$, $p = .002$), worse mental health functioning ($B = −3.79$, $p = .015$), and fewer psychiatry visits ($B = −0.69$, $p = .009$). Patients using non-medically over time improved less in depression symptoms ($B = 1.49$, $p = .026$) and suicidal ideation ($B = 1.08$, $p = .003$) than non-users.

Limitations—Participants were psychiatry outpatients, limiting generalizability.

Conclusions—Marijuana use, especially non-medical use, among patients with depression may impede depression symptom improvement while lessening the likelihood of psychiatry visits. Marijuana use and associated barriers to care should receive consideration by depression treatment providers.

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Keywords

Depression; Suicidal Ideation; Marijuana Use; Non-Medical Marijuana; Recreational; Cannabis; Medical Marijuana; Psychiatry Treatment

1. Introduction

The policies and attitudes toward marijuana use are changing in the United States (Volkow et al., 2014; Volkow et al., 2016; Hasin et al., 2017). As of January 2018, 30 states and the District of Columbia have passed medical marijuana laws (National Conference of State Legislatures, 2018), and fewer adults perceive non-medical marijuana use as risky (Pacek et al., 2015). Although some adults can use marijuana without harm (Hasin et al., 2016), marijuana users with comorbid psychiatric disorders, such as depression, are at increased risk of experiencing poor symptom and functional outcomes (Bahorik et al., 2013; Trull et al., 2016). Yet the degree to which medical or non-medical marijuana use may contribute to adverse clinical outcomes in depression is less clear.

Comorbidity of depression and marijuana use has been studied extensively, with evidence showing a high prevalence of depression among marijuana users and vice versa (Chen et al., 2002; Feingold et al., 2014; Substance Abuse and Mental Health Services Administration [SAMHSA], 2015). In the U.S., 7% of adults had major depressive episodes in 2014–2015, and the past year prevalence of non-medical marijuana use among them was 15% (SAMHSA, 2015). Non-medical medical marijuana use among adults with depression is associated with increased risk of severe psychiatric symptoms (Degenhardt et al., 2003; Bahorik et al., 2017; Trull et al., 2016) high rates of suicidal ideation (Degenhardt et al., 2003), and low psychiatric service utilization (Campbell et al., 2016). A recent study found non-medical users and nonusers were equally prone to develop depression over time (Feingold et al., 2017), while several others report of significant associations between non-medical marijuana use and future occurrence of anxiety and depression symptoms and vice versa (Bonn-Miller et al., 2011; Crippa et al., 2009; Bahorik et al., 2013). Depression and anxiety are associated with more frequent non-medical marijuana use (Bonn-Miller et al., 2011; Crippa et al., 2009), and in one dispensary-based study, medical use for depression was associated greater problems with use (Bonn-Miller et al., 2014). Since these studies have not concurrently examined non-medical and medicinal use it remains unclear if medicinal users experience some degree of symptom relief or differential impairment in depression.

Several studies report that medical marijuana is currently used as a therapeutic intervention for depression, even among clinical populations, although its safety and efficacy in depression treatment have not been established (Volkow et al., 2014; Belenduik et al., 2015; Turna et al., 2017). Depression is also comorbid with several medical conditions in which cannabinoid drugs have therapeutic value (e.g., HIV/AIDS, chronic pain, epilepsy, and hepatitis C), (Young et al., 2016; Volkow et al., 2014; Belenduik et al., 2015; Turna et al., 2017), suggesting a high prevalence of medical marijuana use among adults with depression, although less remains known about the clinical impact of medicinal use on this population.

Clearly, marijuana use has the potential to be clinically problematic in depression, and it is also possible that both non-medical and medical marijuana use could differentially contribute to adverse clinical outcomes and lead to barriers to mental health care in this population. We followed 307 participants in a trial for drug/alcohol use treatment for depression, delivered in a psychiatry setting 1 year post-enrollment to examine: (1) prevalence of non-medical, medical, and non-users of marijuana at baseline; (2) characteristics of non-medical, medical, and non-users of marijuana; and (3) the differential impact of non-medical and medical marijuana use, relative to non-users, over time and 1 year post enrollment clinical and psychiatry service utilization outcomes. Building on our prior work showing that marijuana use has adverse clinical effects on depression (Bahorik et al., 2017), the findings would help to distinguish the impact of non-medical and medical use on clinical outcomes and inform prevention and intervention models.

2. Method

2.1. Participants and procedures

Data were from participants in a randomized controlled trial of motivational interviewing (MI) for drug/alcohol use treatment in depression, delivered in an outpatient psychiatry setting. The details of the parent trial have been reported previously (Satre et al., 2016). Briefly, a total of 307 participants were recruited from a large outpatient psychiatry clinic from Kaiser Permanente Northern California. Study clinicians determined eligibility based on inclusion criteria, which required patients to be at least 18, have a Patient Health Questionnaire (PHQ-9: Kroneke et al., 2001) score 5 indicating at least mild depression severity, and either drink at hazardous levels (3/ 4 drinks/day for women/men) or have used drugs (illicit/non-prescribed prescription drugs) in the past 30 days. All participants provided written informed consent at an in-person appointment in the same clinic where they received usual care. Procedures were approved by the University of California, San Francisco and Kaiser Permanente Northern California Institutional Review Boards.

Enrolled participants were randomized to one of two study arms after completing screening procedures, either MI or a non-treatment control. The MI treatment intervention consisted of one 45-minute session followed by two 15-minute telephone "booster" sessions (Satre et al., 2013), which were about two weeks apart. Participants in the control arm were given a 2-page brochure, produced by the NIH National Office of Drug Control Policy (U.S. Department of Justice, 2003), on use risks specific to the substances reported by participants at baseline (Satre et al., 2013; Dunn et al., 2001). Participants also continued to receive usual depression care based on current best practices for medication management and empirically supported psychological treatment (Kaiser Permanente Care Management Institute, 2006) over the 1 year follow-up.

Participants used laptop computers to complete the baseline measures including self-report assessments of past 30-day drug/alcohol use, the PHQ-9 (Kroneke et al., 2001), the Generalized Anxiety Disorder scale (GAD-7: Spitzer et al., 2006), and the Short Form Health Survey (SF-12: Ware et al., 1998). Participants were re-assessed with the same substance use, symptom, and functional assessments three times (3, 6, and 12 months) via telephone interviews (response rate: 3 months 96%; 6 months 98%; 12 months; 98%) by

trained interviewers over the follow-up. Patients were offered $50 gift cards for completing the baseline and 6-month interview, and $100 for completing the 12-month interview.

2.2. Measures

2.2.1. Participant characteristics—Participant characteristics were identified via self-report questions at baseline. Responses were coded for descriptive analyses at baseline for age, gender, ethnicity, income, marital and employment status. Age, gender, marital and employment status served as covariates in multivariable analyses (baseline, 1 year, and change).

2.2.2. Marijuana use status groups—Past 30-day marijuana use was assessed during study interviews (baseline, 3, 6, and 12 months) via self-report. Patients were asked: (1) "How many days in the past 30 days have use you used marijuana" and (2) "Was the marijuana used in the past 30 days always used for medical purposes, prescribed or recommended by a provider." We created a categorical measure to define marijuana use status 30 days prior to each period (coded: = 1 if non-medical marijuana use, e.g., patient endorsed using marijuana either other than, or in addition to, using medical marijuana ≥ 1 day in the past 30 days; = 2 if medical marijuana use, e.g., patient endorsed using medical marijuana exclusively ≥ 1 day in the past 30 days; or = 0/reference if no marijuana use, e.g., patient did not endorse using any marijuana in the past 30 days. Marijuana use status was a predictor of interest in multivariable analyses (baseline, 1 year, and change).

2.2.3. Substance use—Past 30 day alcohol/drug use, other than marijuana use (e.g., alcohol, cocaine, amphetamine, stimulants other than as prescribed, opioids other than as prescribed, heroin, ecstasy, and other drugs) was assessed during study interviews (baseline, 3, 6, and 12 months). We created a dichotomous measure to define substance use other than marijuana use, 30 days prior to each period. Patients were coded as using substances if they endorsed ≥ 1 day in the past 30 (1 = if any substance use, else), providing a dichotomous indicator of substance use, which served as a covariate in multivariable analyses (baseline, 1 year, and change).

2.2.4. Treatment assignment—A treatment assignment variable consisting of two categories (= 1 if MI, =0 if control) was included as a covariate in multivariable analyses as MI was found to be more effective at reducing marijuana use than the control arm in the trial (Satre et al., 2016).

2.2.5. Depression and anxiety symptoms—Symptoms were assessed with the PHQ-9 and GAD-7. The PHQ-9 is a 9-item self-report questionnaire, in which patients rate how often they experience indicators of depressive symptoms on a 4-point Likert type scale (0 = "not present" to 3 = "nearly daily/every day"). Items are summed to generate a total score, providing a continuous measure of depression severity. Higher total PHQ-9 scores indicate greater depression severity (range: 0–27: score ≥ 5, at least mild depression). The GAD-7 is a 7-item self-report questionnaire, in which patients rate how often they experience indicators of anxiety symptoms on a 4-point Likert type scale (1 = "not present" to 3 "nearly daily/every day"). Items are summed to generate a total score, providing a

continuous measure of depression severity. Higher total GAD-7 scores indicate greater anxiety severity (range: 0–21: score   5, at least mild anxiety). Symptom measures served as outcomes of interest in multivariable analyses (baseline, 1 year, and change).

2.2.6.   Suicidal ideation—Suicidal ideation was measured with the PHQ-9 item 9. Patients were asked: "How often have you had thoughts that you would be better off dead, or of hurting yourself in the past 2 weeks", rated on a 4-point Likert-type scale (1 = "not present" to "3 nearly daily/every day"). Patients were coded as having suicidal thoughts if they endorsed having any suicidal ideation (1 =   1 any suicidal ideation, else), providing a dichotomous measure. This measure served as an outcome of interest in multivariable analyses (baseline, 1 year, and change).

2.2.7.   Functioning.—Functional outcomes were measured with the SF-12. The SF-12 is a 24-item self-report questionnaire used to index everyday functioning and consists of physical and mental health subscales (P/MCS-12: 12-items, per subscale). On MCS-12 and PCS-12 subscale items, patients rate how often they experience impairment related to their health status (e.g., MCS-12 items are specific to mental health and PCS-12 items are specific to physical health) during the past 4 weeks, from 1 to 100 (1 = "poor functioning" to 100 = "superior functioning"). SF-12 total scores are generated by summing the scores from the PCS-12 and MCS-12, providing a continuous measure of everyday functioning. These three measures (P/MCS-12, and total SF-12 score) served as outcomes of interest in multivariable analyses of functional status (baseline, 1 year, and change).

2.2.8.   Psychiatry utilization—Participants received usual psychiatry care, as needed, over the study from Kaiser providers. Dichotomous measures defined psychiatry service use (1 = if any outpatient visits, 0 = otherwise) 30 days prior to each period (baseline, 3, 6, 12 months). Utilization served as an outcome of interest in multivariable analyses (baseline, 1 year, and change).

2.3.   Data Analysis

Frequencies and means were used to describe the sample at baseline. Next, χ^2 or analysis of variance (ANOVA) tests were used to describe demographic differences between the marijuana use groups, e.g., non-users, medical-users, and non-medical-users. Analyses of interest began with using frequencies and means to describe the baseline rates of psychiatric symptoms, functioning, and psychiatry service use across marijuana use groups (see Supplementary Table S1). To compare these groups on psychiatric symptoms, functional status, and psychiatry visits at baseline, we used a series of multivariable regression analyses, comparing non-medical users and medical users to non-users (reference = non-users). Binary dependent variables were fit with multivariable logistic regression models (e.g., suicidal ideation and psychiatry visits), and fit continuous dependent variables using multivariable linear regression models (e.g., symptom and functioning scores). Next, 1 year outcomes were examined using similar analytic procedures as described above. We conducted regression models on follow-up psychiatric symptom, functional status, and psychiatric visit data, comparing non-medical users and medical users to non-users on these outcomes. All regression models at baseline and 1 year adjusted for patient characteristics.

Control variables were chosen because research suggests that the variable is related to marijuana use or the variable was significant in univariable analyses. All regression models were adjusted for age, sex, marital and employment status, treatment assignment, substance use, past 30-day psychiatry visits (except the psychiatry visit outcome model), and the number of days of marijuana use in the past 30-days.

Differential changes in psychiatric symptoms, functioning, and psychiatry visit trajectories were examined between non-medical users and medical users compared to non-users over the 1 year follow-up, using mixed-effects growth models. This approach to longitudinal data analysis is a form of hierarchical linear/non-linear modeling for repeated measures data, where multiple measurement occasions are nested within individuals (Raudenbush and Bryk, 2009). To determine the average rate of change on the outcomes of interest, we computed unconditional growth models, predicting the psychiatric symptom, functional status, and psychiatry visit outcomes from time (0 = baseline; 1 = 3-months; 2 = 6-months, etc.). Differential changes in these outcomes were then examined between non-medical users and medical users compared to non-users, predicting each outcome of interest from time, and a time varying marijuana use group variable (reference = non-users). All conditional models adjusted for age, sex, marital and employment status, marijuana use, and treatment assignment. Additionally, time-varying indicators of psychiatry visits (except for the psychiatry visit outcomes model), substance use, and the number of days of marijuana use 30-days prior to each interview, were included as potentially confounding covariates.

Analyses were carried out in R version 3.3.1 (R Development Core Team, 2017). Overall, missing data were modest at <5% over the study. Rather than discard partial study completers (~2.8%) and potentially bias the sample analyzed, the expectation maximization method was used to handle missing data during maximum likelihood estimation at the time of analysis. Statistical significance for all tests was defined at $p < .05$.

3. Results

3.1. Participant characteristics and prevalence of medical and non-medical marijuana use

As shown in Table 1, the sample was 70.3% women, 38.1% white, 66.4% employed, and less than half were married (41.0%). Participants were 37 years old on average and 53.0% had an income $50K. Overall, 40.7% used marijuana at baseline, and considerably fewer participants used marijuana for medicinal (28.2%) purposes relative to participants using for non-medicinal (71.7%) purposes. In addition, participants who used non-medical marijuana tended to be younger (non-medical: $M = 31.79$; $SD = 11.83$; medical: $M = 37.85$; $SD = 14.63$; no use: $M = 37.82$; $SD = 12.98$, $p < .001$) and unmarried (non-medical: 30.3%; medical: 44.1%; no use: 47.2%; $p = .028$) compared to their counterparts who either used medical or no marijuana (Table 1).

3.2. Cross-sectional differences in psychiatric symptoms, service utilization, and functioning by marijuana use

As shown in Table 2, participants using non-medical marijuana presented with higher levels of depression severity ($B = 1.70$; $SE = 0.86$, $p = .048$) and poorer mental health functioning

($B = -3.79$; $SE = 1.47$, $p = .015$) than those not using marijuana. Participants using non-medical marijuana were also significantly more likely to present with suicidal ideation ($B = 1.08$; $SE = 0.35$, $p = .002$) and had fewer psychiatry visits ($B = -0.69$; $SE = 0.26$, $p = .009$) than those not using marijuana. Participants using medical marijuana presented with significantly worse mental health functioning ($B = -4.61$; $SE = 2.17$, $p = .034$) and physical health functioning ($B = -5.03$; $SE = 2.31$, $p = .030$), and trends were observed indicating higher levels of depression ($B = 2.26$; $SE = 1.27$, $p = .075$) and anxiety severity ($B = 2.32$; $SE = 1.17$, $p = .050$) as well as poorer everyday functioning ($B = -9.40$; $SE = 4.77$, $p = .050$).

At 1 year, participants using marijuana continued to exhibit poorer symptom and functional outcomes and remained less likely to use psychiatry services. Specifically, participants using non-medical marijuana ($B = -1.12$; $SE = 0.55$, $p = .043$) were less likely to have psychiatry visits compared to non-users, and a trend was observed showing poorer mental health functioning ($B = -2.15$; $SE = 2.39$, $p = .084$). Significant differences in depression severity and suicidal ideation that were found at baseline among those using non-medical marijuana than non-users; however, did not remain at 1 year. Participants who used medical marijuana had higher levels of anxiety severity ($B = 1.70$; $SE = 0.86$, $p = .048$) compared to non-users, and a trend was observed indicating poorer physical health functioning ($B = -2.46$; $SE = 1.39$, $p = .077$). Additionally, significant differences in mental health functioning found at baseline between those who used medical marijuana relative to those with no use, however, were not observed at 1 year (Table 2).

3.3. Longitudinal impact of marijuana use on psychiatric symptoms, service utilization, and functioning

Over the follow-up, non-medical marijuana use decreased whereas medical marijuana use slightly increased (Figure 1). Patients using non-medical marijuana over 1 year had significantly less improvement in depression symptoms ($B = 1.49$; $SE = 0.67$, $p = .026$) and suicidal ideation ($B = 1.08$; $SE = 0.29$, $p = .003$). compared to non-users, and a trend was found for less improvement in mental health functioning ($B = -2.83$; $SE = 1.44$, $p = .050$). Among non-medical marijuana users, a trend was observed of fewer psychiatry visits ($B = -0.25$; $SE = 0.14$, $p = .085$). Change in medical marijuana use over time was not associated with significant change in symptom, mental and physical functional status, or psychiatry service utilization trajectories; however, there was a trend indicating that those who continued to use medical marijuana over 1 year had less improvement in everyday functioning, ($B = -5.76$; $SE = 3.19$, $p = .070$), (Table 2).

Given associations between non-medical marijuana use and both fewer psychiatry visits and younger age, we conducted post-hoc analyses in the marijuana use subsample by age. We used Cox proportional hazard survival models to explore differences in the time without psychiatry visits between those aged 18–45 and   45 who used non-medical marijuana and medical marijuana over 1 year. Results showed a trend where older, but not younger, participants using non-medical marijuana had more psychiatry visits over time than those using medical marijuana (Figure 2).

4. Discussion

This study examined baseline and longitudinal differences in the characteristics of patients in treatment for depression based on their use of marijuana. Results at baseline revealed that the overall prevalence of marijuana use was slightly higher (~40% vs. 30%−37%) than prior rates documented among psychiatry samples (Bahorik et al., 2013; Trull et al., 2016). This may be explained by the observation that marijuana use is more frequent in states that have permissive marijuana laws (Hasin et al., 2017), and may reflect more normalized views about marijuana use within California. In addition, only ~28% of patients endorsed using marijuana use for medical purposes, as recommended by a physician.

Non-medical marijuana users had higher suicidal ideation, greater depressive symptoms, and poorer mental health functioning compared to non-users at baseline. Non-medical use was also associated with less improvement in each of these domains over 1 year. These findings extend prior work indicating associations among non-medical marijuana use and greater psychopathology (Degenhardt et al., 2003; Bahorik et al., 2013; Trull et al., 2016; Bahorik et al., 2017), including suicidal ideation (Degenhardt et al., 2003), and worse functional outcomes (Degenhardt et al., 2003; Bahorik et al., 2013; Bahorik et al., 2017). Future research should develop and test strategies to reduce non-medical marijuana use while improving symptoms and remediating functional impairment in depression. As the parent MI trial found that this intervention was effective in reducing marijuana use (Satre et al., 2016), MI may help attenuate the adverse impact of non-medical use on psychological symptoms and functional impairment and warrants further study.

Non-medical marijuana users had fewer psychiatry visits at baseline and at the 1 year follow-up, indicating that providers may have fewer opportunities to educate these patients about the adverse clinical effects of marijuana on depression. All participants using non-medical marijuana underutilized psychiatry services, although post-hoc analyses found this to be less true of older patients. It is possible that older adults using non-medical marijuana have greater psychiatry service use needs due to combined changes in brain plasticity and age-related cognitive decline, which could increase their risk of adverse clinical effects (Volkow et al., 2016). Future studies of older adults would be valuable in expanding the range of populations examined in marijuana research, which has largely focused on youth and young adults (Campbell et al., 2016, Volkow et al., 2016), and is particularly important given changing U.S. demographics.

Medicinal marijuana users had worse mental and physical health functioning compared to non-users at baseline. These differences were not observed at 1 year. Because the conditions for which medical marijuana is often used or recommended to alleviate symptoms (e.g., chronic pain, epilepsy, hepatitis C, and HIV) are also associated with deficits in cognitive and physical capacity (Belenduik et al., 2015), medicinal users could be expected to show less functional improvement. Unfortunately, data on the reason for medicinal use was not collected, and further work will be needed to determine associations between use indications and expected outcomes.

Our overall results support our prediction that the degree to which psychiatry patients with depression have adverse clinical outcomes would be influenced by whether marijuana was used for non-medical or medical purposes. Results showed that non-medical use was associated with adverse clinical effects in terms of psychological symptoms and associated functional impairment, and these effects persisted for 1 year. This highlights a need for education efforts in psychiatry treatment contexts around the elevated risks associated with non-medical marijuana use (Satre et al., 2014). Although our baseline results showed that medical use had an adverse impact on functional impairment, these effects did not persist over the follow up period. Given the changing political landscape around marijuana, further studies focused on the potential adverse clinical effects and differences between recreational and medical marijuana users in psychiatry treatment samples will be needed to shape prevention and treatment strategies.

4.1. Study limitations

Limitations should be noted. Data were collected from an outpatient psychiatry setting of insured patients in the San Francisco Bay Area, limiting generalizability. A PHQ-9 score of 10 indicates a positive screen for major depression, after which diagnostic assessments are required before a diagnosis of major depressive disorder can be made based on DSM criteria (Manea et al., 2012). Since inclusion was based on a PHQ-9 score 5, indicating at least mild depression, many participants would not have met the DSM criteria for major depressive disorder; results should be interpreted accordingly. Our marijuana status measure required medical users endorse exclusive medical use, and allowed for non-medical users to endorse non-medical use alone or in addition to medical use. As such, the data derived from this measure may underestimate medical marijuana use and overestimate non-medical marijuana use. Regarding medical marijuana use, data were not available on medical reasons for use, and future work would benefit from incorporating objective and subjective measures into the assessment. Although adjusted multivariable analyses were used, clinical differences could present between the marijuana-use/no-use groups on unobserved factors, such as medical comorbidities and marijuana use frequency, and the results should be interpreted accordingly. Data were not available on primary marijuana compounds, Δ^9-tetrahydrocannabinol (THC) and cannabidiol (CBD), and given the potential for marijuana use to have either anxiolytic (e.g., high-CBD/low-THC) or anxiogenic (e.g., high-THC/low-CBD) effects based on the primary cannabinoid (Crippa et al., 2009), it will be important for future work to examine the contribution of these factors to clinical outcomes in psychiatry samples. Given that several statistical tests were computed without adjustment for multiple inference testing, and all measures were based on self-report, future work would benefit from use of more robust methods and analytic procedures.

5. Conclusions

Results indicate that non-medical marijuana use is more common than use for medicinal purposes in psychiatry patients with depression. Patients using non-medical marijuana showed less improvement in psychopathology and functional outcome recovery, while using less psychiatry services. Patient education around the health risks of marijuana for patients

with depression is needed, particularly in terms of non-medical use, to improve patient outcomes.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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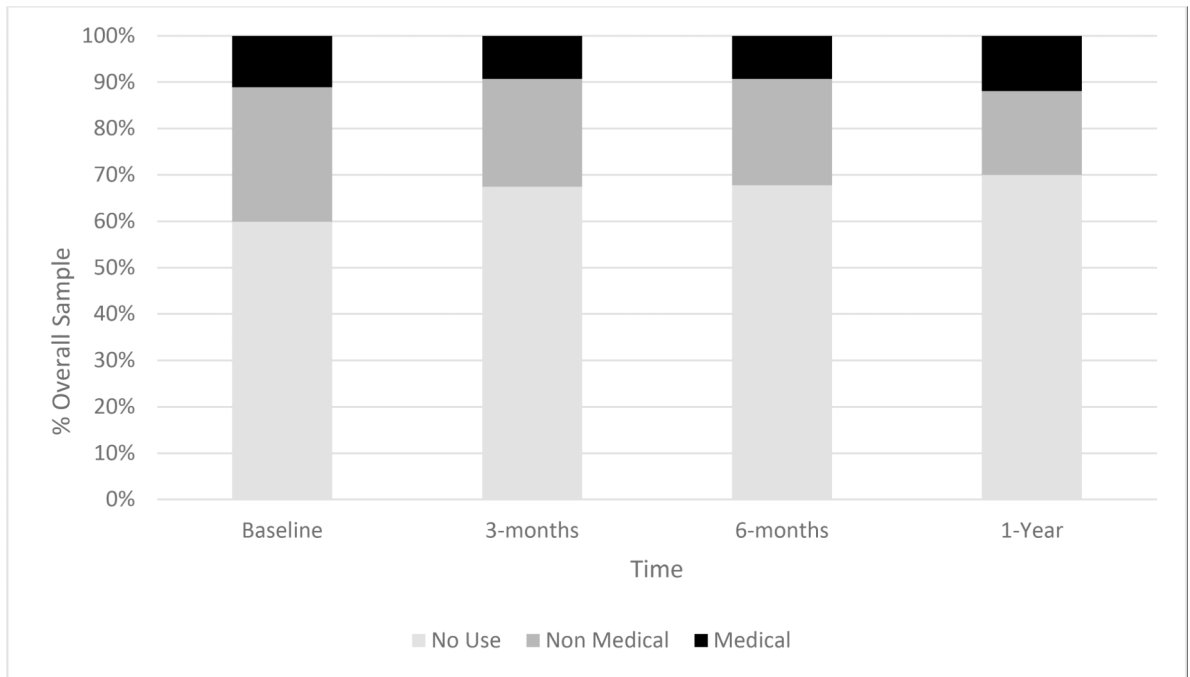
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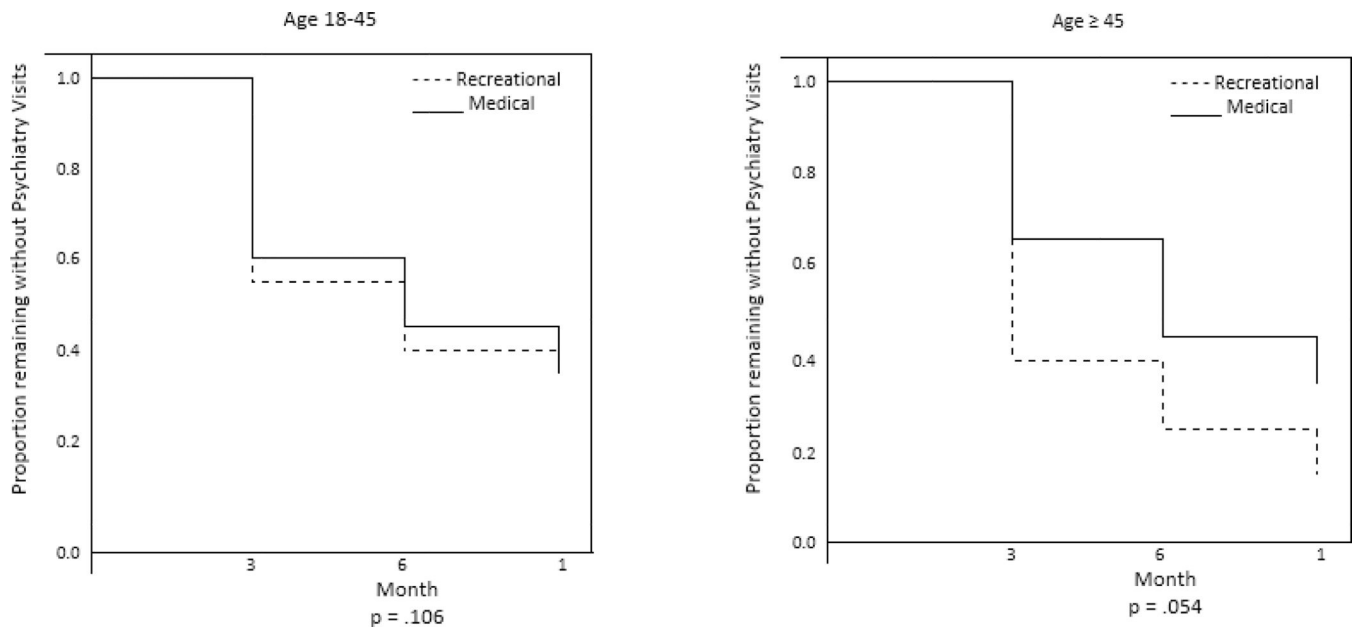
Figure 1.
Past 30-day medical, non-medical, or no marijuana use.

Figure 2.
Results from Cox proportional hazard survival analysis showing the proportion of participants aged 18–45 and 45 who used non-medical and medical marijuana as function of the length of time that patients remained without psychiatry visits between baseline and 1 year follow-up.

Table 1.

Baseline patient demographic characteristics in the overall sample and by marijuana use status (N = 307)

| | Overall | | Marijuana Use Status | | | | | | Analysis[a] | |
| | N = 307 | | No Use n = 184 | | Medical Use n = 34 | | Non-Medical Use n = 89 | | | |
Variable	M	SD	M	SD	M	SD	M	SD	p	Direction
Age	37.2	13.8	39.82	12.98	37.85	14.63	31.79	11.83	<.001	1, 2 > 3
	%		%		%		%			
Female	70.3		72.2		55.8		71.9		.146	-
White	38.1		38.5		26.4		41.5		.297	-
Married	42.0		47.2		44.1		30.3		.028	1, 2 > 3
Employed	66.4		66.8		50.0		71.9		.069	-
Income 50k	53.0		58.1		52.9		42.6		.056	-

[a] χ^2 test or analysis of variance test (two tailed) for significant differences between marijuana groups; Hochberg's method was used to adjust for multiple tests.

Table 2.

Multivariable models predicting clinical outcomes and psychiatry visits from marijuana use status at baseline, follow-up at 1 year and change over time.

Dependent Variables	Baseline				1-Year				Change			
	Medical[a] n = 34		Recreational[a] n = 89		Medical[a] n = 36		Recreational[a] n = 55		Medical[a] n = 34		Recreational[a] n = 89	
	B (SE)	p[b]	B (SE)	p[b]	B (SE)	p[b]	B (SE)	p[b]	B (SE)	p[c]	B (SE)	p[c]
Depression Severity[d]	2.26 (1.27)	.075	1.70 (0.86)	**.048**	0.83 (1.04)	.432	0.58 (0.74)	.434	1.08 (0.96)	.261	1.49 (0.67)	**.026**
Anxiety Severity[e]	2.32 (1.17)	.050	0.76 (0.79)	.336	2.47 (1.00)	**.014**	0.68 (0.71)	.338	0.26 (0.60)	.664	-0.18 (0.87)	.830
Everyday Functioning[f]	-9.40 (4.77)	.050	-3.79 (3.23)	.241	2.25 (3.25)	.434	-1.78 (2.73)	.513	-5.76 (3.19)	.070	-1.15 (2.22)	.604
Mental Health Functioning	-4.61 (2.17)	**.034**	-3.59 (1.47)	**.015**	0.02 (1.70)	.904	-2.15 (2.39)	.084	-3.10 (2.09)	.139	-2.83 (1.44)	.050
Physical Health Functioning	-5.03 (2.31)	**.030**	0.15 (1.57)	.923	-2.46 (1.39)	.077	-2.34 (1.96)	.232	-0.52 (1.45)	.718	-0.49 (1.02)	.630
Suicidal Ideation[g]	0.59 (0.52)	.255	1.08 (0.35)	**.002**	0.13 (1.09)	.900	-0.01 (0.79)	.984	0.16 (0.29)	.565	1.08 (0.29)	**.003**
Psychiatry Visits[h]	-0.45 (0.38)	.233	-0.69 (0.26)	**.009**	0.25 (0.74)	.729	-1.12 (0.55)	**.043**	-0.31 (0.20)	.163	-0.25 (0.14)	.085

Note. Significant effects are presented in boldface.

[a] Reference = No marijuana use

[b] p-values are from cross-sectional regression analyses predicting clinical outcomes from marijuana use status at baseline and at 1-year, adjusting for age, sex, marital status, employment status, treatment assignment, alcohol/drug use, psychiatry visits, and number of days of marijuana use 30-days prior to baseline. Psychiatry visits were not adjusted in psychiatry visit outcome models.

[c] p-values are from longitudinal growth curve analyses predicting clinical outcomes from time and time-varying marijuana use status, adjusting for age, sex, marital status, employment status, baseline marijuana use status, treatment assignment, as well as time-varying indicators of psychiatry visits, alcohol/ drug use, and the number of days of marijuana use 30-days prior to each interview. Psychiatry visits were not adjusted in psychiatry visit outcome models.

[d] Higher PHQ-9 scores indicate greater depression severity

[e] Higher GAD-7 scores indicate greater anxiety severity

[f] Lower SF-12 scores indicate worse everyday health functioning; lower PCS/MCS-12 subscale scores indicate worse mental/ physical health functioning

[g] Endorsed having suicidal thoughts 2 weeks prior to each follow-up = 1; 0 = otherwise

[h] >1 psychiatry visit in the 30-days prior to each follow-up