Sociodemographic and Drug Use Severity Differences Between Medical Marijuana Users and Non-Medical Users Visiting the Emergency Department

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Background and Objectives: The purpose of this study is to extend what is known about medical marijuana and non-medical marijuana users who visit the emergency department (ED) by exploring differences in their sociodemographic characteristics and their drug-related problem severity.
Methods: Of 292 consecutively enrolled exclusive marijuana-only users visiting the ED for any reason, 37% ($n = 107$) reported using marijuana on the advice of a medical doctor, and 63% ($n = 185$) reported that they did not use it under the advice of a medical doctor (ie, non-medical user). Participants denied using any other drug with the exception of alcohol. Participants completed the Addiction Severity Index-Lite which provided composite and individual items related to drug use problems, psychiatric problems, medical problems, and alcohol use problems. Self-efficacy for avoiding drug use and sociodemographic characteristics were also collected.
Results: In a multivariate model, compared to non-medical marijuana users, medical users reported a higher frequency of days of use, more money spent on marijuana, and lower readiness to change use of marijuana, yet lower frequency of drug problems and tended to be low-risk versus moderate-severe risk users. Medical marijuana use was associated with a greater number of days of psychological problems.
Discussion and Conclusions: Results for medical marijuana users might be interpreted as consistent with that of routine, self-administered treatment for medical or psychological problems.
Scientific Significance: Results suggest behavioral health interventions in acute care settings should consider treating non-medical marijuana users differently than medical users due to the greater drug-related problems associated with non-medical use. (Am J Addict 2016;XX:1–7)

INTRODUCTION

In the United States, the annual cost of drug abuse due to lost productivity, crime, and health care is estimated to be $193 billion.[1] Such use places a significant burden on the healthcare system because drug users (including cannabis users) are more likely than non-drug users to use the emergency department (ED) as a primary source of medical care.[2–4] ED settings have gained interest as venues for drug misuse prevention and intervention, with researchers and practitioners attempting to capitalize on the intersection of need and opportunity within these settings.[4]

There is a changing culture around marijuana use in the United States. Currently, 23 states and the District of Columbia allow the legal sale of marijuana for medical purposes. Four states currently have passed laws legalizing marijuana for recreational use. Although there are some studies that point toward health benefits from the use of cannabinoids, little is known about the risks associated with the new form of legalized marijuana. Legalization of recreation marijuana use has presented unanticipated consequences in Colorado, the first state to pass such legislation. Conditions seen in EDs have included increases in cyclic vomiting caused by frequent intake of high-concentration tetrahydrocannabinol (THC), visits for child ingestion of edibles, and severe burns resulting from THC extraction processes.[5]

The National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) longitudinal epidemiological study found that, between 2001 and 2002 and a decade later in 2012–2013, marijuana use doubled, as did the DSM-IV marijuana disorder prevalence. Using this nationally representative data, Hasin and colleagues[6] reported that the past-year prevalence rate for marijuana use was 4.1% in the first wave of data, but increased to 9.5% by the latter wave. This doubling of prevalence was also reflected in past-year

DSM-IV abuse or dependence disorders, which changed from 1.5% to 2.9%.[6]

The medical community remains split on the benefits and harms resulting from marijuana use. Wilkinson and D'Souza[7] note that although medical marijuana has become more widely available, there is a lack of rigorous, evidence-based research that guides the laws around conditions for which it should be used. Grant and colleagues[8] reviewed clinical trials that examine the efficacy of smoked marijuana for neuropathic pain and other medical uses. They found that there is evidence that marijuana may be useful for vomiting, nausea, peripheral neuropathy, and muscle spasticity.

Negative psychological and physical harms have been found associated with regular marijuana use.[9–10] About 9% who experiment will become addicted and that percent increases to as much as 50% for those who use daily.[10] Use of marijuana during adolescence has been shown to impact brain development associated with alertness, learning, and memory.[11] Furthermore, marijuana use has been found to be the most prevalent illicit drug involved in vehicular accidents and particularly fatal accidents.[12]

Despite the breadth of research in the areas of the biopsychosocial effects of marijuana use and the continued increase of legalization of its use, there is a lack of research examining the characteristics of medical and recreational users. To date, one study was identified that examined the differences in characteristics between medical marijuana users compared to recreational users. That study utilized a primary care population in the state of Washington.[13] It was reported that, compared to recreational users, medical marijuana users had lower severity scores for alcohol problems and drug use problems, and had a medical problem for the majority of days in the past month.[13]

Because of the Affordable Care Act's movement to integrate mental and behavioral health care into medical practices,[14] it is important to understand the differences between the two groups of marijuana users who present to the ED. Differences and similarities between the two groups need to be better understood so that medical and behavioral health specialists can be educated about the ramifications of different use patterns. The purpose of this study is to extend what is known about medical marijuana and non-medical marijuana users who visit the ED by exploring differences in their sociodemographic characteristics and in their composite drug-related problem severity scores. In hopes of identifying more specific patterns of use and risk between the two types of marijuana users, we also focused on analyzing the *individual* items that comprised the composite severity measures.

METHODS

Procedures

Data for the present study are baseline measures from a larger study examining the effect of brief intervention on illicit drug use among ED patients (see Eisenberg & Woodruff, 2013,

and Woodruff et al., 2014, for more information about the larger study).[15–16] Participants were 292 near-consecutive adult patients visiting the trauma units and EDs of two large urban "safety net" hospitals in Southern California who reported to trained paraprofessional health interviewers that they had used marijuana during the past 30 days, but had not used other drugs other than alcohol. The 292 individuals in the present study were marijuana-only users from a total of 700 patients reporting illicit or non-prescribed drug use.[16] Over a 1-year period, interviewers working 7 days a week during peak hours (7:00 am to 11:30 pm), attempted to approach all capable adult patients, regardless of the reason for the patient's visit, to screen them for substance use. Patients under the age of 18, those with severely altered mental status, those physically incapable of participating due to severe illness or injury, and those unable to speak English or Spanish were excluded from participation. After providing consent, these patients were interviewed further to collect sociodemographic information, additional self-reported drug use data, and problems related to drug use. Refusals to be screened by trained interviewers were rare. Although the interviews were available in Spanish, only eight individuals asked to be interviewed in Spanish. For additional details on study procedures and IRB approvals, refer to Woodruff et al., 2014.[16]

Self-Reported Measures

Participants completed the ASI-Lite, a condensed version of the Addiction Severity Index.[17–18] The ASI-Lite, a structured clinical interview, gathers quantitative information (ie, number of days in the past 30 days) about the participant's recent use of several types of drugs (ie, heroin, methadone, other opiates/analgesics, barbiturates, sedatives/hypnotics/tranquilizers, cocaine, amphetamines, cannabis/marijuana, hallucinogens, and "other drugs"), as well as alcohol. Participants reporting use of marijuana in the past 30 days were further asked (yes/no) if their use was based on the advice of a medical doctor (ie, medical vs. non-medical use).

The ASI-Lite yields mathematically derived composite severity scores of problem areas or domains in the participant's life commonly affected by substance use, including a drug use severity score, a medical problem score, a psychiatric problem score, and an alcohol problem score.[17–18] ASI-Lite composite scores range from 0 to 1, with higher scores indicating greater severity of the problem. In addition to the composite scores, *individual ASI-Lite items* were analyzed to gain more insight into specific differences between those that used marijuana for medical reasons versus for non-medical use. These items, typically referencing the past 30 days, included: (i) frequency of marijuana use and related phenomenon (ie, number of days one experienced a drug problem such as craving or disturbing effects of use, degree that one was troubled by problems, importance of treatment for problems, readiness to change use; and money spent on marijuana); (ii) frequency of medical problems, degree of being troubled by medical problems, importance of treatment for medical problems, and number

of times hospitalized in one's life; (iii) whether or not one had experienced seven psychiatric problems (ie, depression, anxiety, hallucinations, cognitive difficulty, explosive violent behavior, suicidal ideation, and attempted suicide), whether one had been prescribed medication for psychological/emotional problems, degree that one had been troubled by these problems, and importance of treatment for the problems; and (iv) frequency of alcohol use, frequency of use to intoxication, and related phenomenon (eg, percent reporting problems related to alcohol use, importance of treatment for alcohol problems, and money spent on alcohol).

Self-efficacy for drug use avoidance was measured as the mean of four items assessing confidence in avoiding drug use in various situations (eg, "when you're feeling depressed").[19] Scores could potentially range from 1 (low confidence) to 5 (high confidence), the internal consistency (Cronbach's alpha) was .84. Participants also completed the 10-item Drug Abuse Screening Test, or DAST,[20–21] a brief, widely used self-report instrument that yields a quantitative index of problematic substance use. Using a cut-point that has demonstrated accuracy in classifying patients according to Diagnostic and Statistical Manual of Mental Disorders (DSM) classification, those scoring 3 or higher on the DAST were categorized at a moderate-severe level, a level indicative of an increased risk for substance misuse. Those scoring 2 or lower were categorized as low risk.

Sociodemographic variables included participants' age in years, gender, race/ethnicity (Hispanic/Latino, White non-Latino, African-American, and Other); marital status (not married versus married/living as married); mean years of education; annual household income measured by six categories with values ranging from 1 (Less than $9,999) to 6 ($50,000 or more); whether or not the participant had been employed in the past 30 days (yes/no); and for Latino participants, a five-item language-based acculturation measure using Marin and colleagues' acculturation scale (Cronbach's alpha = 0.92).[22] Acculturation scores range from 1 to 5, with higher scores indicating higher acculturation to mainstream U.S. culture.

Analysis

Pearson correlations were used to assess the associations between four ASI composite scores. Analyses included bivariate tests (chi-square and independent sample *t*-test procedures) to assess differences between medical and non-medical marijuana users on sociodemographic factors, ASI composite scores, and ASI individual items measuring drug use and related problems, medical problems, psychiatric problems, and alcohol use problems. Most ASI individual items were measured using Likert response formats ranging from 1 (not at all) to 5 (extremely), and when distributions on those items were acceptable, means were tested using independent sample *t*-tests. However, highly skewed items were recoded into dichotomous variables in which case chi-square analysis was used to test associations with medical/non-medical use. Using variables that were statistically significant in bivariate tests, multivariate analysis (logistic regression) was then conducted to assess the *independent* correlates of medical and non-medical use status. ASI composite scores were not used in the multivariate analysis because of multicollinearity with individual ASI items. Examination of multicollinearity among individual items indicated no evident problems. Because of the

TABLE 1. Comparison of sociodemographic characteristics of medical and non-medical marijuana users visiting two large emergency departments

Characteristic	Mean (SD) or %		t or χ^2
	Medical marijuana users ($n = 107$)	Non-medical marijuana users ($n = 185$)	
Sociodemographic characteristics			
Age (mean yrs)	36.4 (13.5)	34.6 (12.4)	−1.19
% Female	24.3	23.9	.005
Race/ethnicity (%)			
Hispanic/Latino	31.8	32.6	
White non-Hispanic	33.6	33.7	
Black	29.9	27.7	
Other	4.7	6.0	.338
Marital status (%)			
Not married	80.2	84.2	
Married/living together	19.8	15.8	773
Education (mean yrs)	11.8 (3.07)	12.2 (1.83)	1.14
Income (mean category)	1.85 (1.42)	2.06 (1.55)	1.12
Employed past 30 days (%)	33.6	40.8	1.45
Acculturation among Latinos (mean)	3.98 (1.17)	3.66 (1.15)	−1.214

exploratory nature of the study, statistical tests significant at the .10 level were examined.

RESULTS

Of the 292 marijuana users, 37% ($n = 107$) reported using marijuana on the advice of a medical doctor, and 63% ($n = 185$) reported that they did not use it under the advice of a medical doctor (ie, non-medical user). Table 1 presents sociodemographic characteristics of the sample by medical versus non-medical use status. The average age was in the mid-thirties for both groups, and about 24% of both groups were female. Both groups were ethnically diverse, with a third being Latino. The vast majority were unmarried (82–84%), and the mean years of education was about 12 years. The mean income category ranged from 1.85 to 2.06, indicating a low annual income of approximately $10,000–$14,999 for both groups. A higher percent of non-medical users than medical users had been employed in the past-month (41% vs. 34%), although the differences were not statistically significant. Acculturation level among all Latinos was 3.71 (SD = 1.16), a mean level that did not differ significantly for the 34 Latino medical marijuana users and the 60 Latino non-medical users. In short, the two marijuana use groups did not differ significantly on any sociodemographic characteristic.

Correlations among the four ASI composite scores ranged from a low of .042 for Alcohol ASI with Psychiatric ASI, to a high of .42 for Alcohol ASI with Drug Use ASI. Table 2 presents a number of drug use variables by medical/non-medical use status: ASI Drug Use severity composite scores, ASI individual items, DAST risk level categories, and Drug Avoidance self-efficacy scores. The Drug Use ASI severity composite score was statistically significant, with medical marijuana users having a higher mean severity score than non-medical users. With regard to ASI individual items and additional drug use related measures, medical users reported higher frequency of use (mean days in the past 30 days), lower readiness to change use, a greater amount of money spent on marijuana, and lower drug avoidance self-efficacy than non-medical users. On the other hand, despite their higher frequency of use, medical users reported fewer days of drug use problems, and were more likely to be low-risk users (versus moderate/severe risk) compared to non-medical users according to the DAST.

Table 2 also presents medical problem variables by marijuana use group. Medical marijuana users had higher Medical ASI composite scores than non-medical users (marginally significant). In terms of specific items, medical users reported greater importance of getting treatment for medical problems, and had been hospitalized more times in their lifetime than non-medical users. Compared to non-medical users, medical users had higher Psychiatric ASI composite scores (marginally significant), were more likely to report being prescribed medication for psychological/emotional problems, and reported a greater number of days in the past 30 in which they experienced psychological/emotional problems (Table 2). The two marijuana use groups did not differ significantly on past-30 day prevalence of any of the seven specific psychiatric problems. With regard to alcohol use variables, non-medical marijuana users consistently reported greater recent alcohol use and related alcohol problems than did medical users. Alcohol ASI composite scores, days of alcohol use (marginal) in the past 30 days, days of alcohol use to intoxication, percent experiencing alcohol problems, and the amount of money spent on alcohol were all higher among non-medical marijuana users than among their medical marijuana use counterparts.

Multivariate Logistic Regression

Table 3 presents results of a logistic regression assessing the independent association between marijuana user status (medical versus non-medical) and 14 correlates found to be significant in bivariate tests. Medical users were coded as "1" and non-medical users as "0." Five of the six drug use related variables tested were independently related to type of marijuana user. Compared to non-medical marijuana users, medical users reported a higher frequency of days of use, more money spent on marijuana, lower frequency of drug problems (marginal), lower readiness to change use of marijuana (marginal), and tended to be low risk versus moderate to severe risk users according to the DAST. Self-efficacy for drug avoidance was not significant in the multivariate model. Of the two medical problem variables and the two psychological problem variables tested, only number of days one experienced psychological problems remained significant in the model: Medical marijuana use was associated with a greater number of days of psychological problems. None of the four alcohol-related problem variables were significant in the multivariate model.

DISCUSSION

Because of changing policies and norms surrounding commercial sale of marijuana for medical and recreational use, there has been interest in whether those who use marijuana for medical reasons differ clinically from those who use recreationally. Results of the present study indicate that medical and non-medical marijuana users who visited the ED for a variety of reasons do not differ a great deal with regard to their sociodemographic characteristics. On the other hand, four composite ASI problem severity scores in areas often influenced by drug misuse,[23] particularly drug use severity and alcohol use severity, differed by type of user. Medical marijuana users had higher severity scores for drug use, medical problems, and psychiatric problems, although non-medical users had higher alcohol severity scores. These results of composite score analysis suggest that health care providers in the ED should further screen medical marijuana users for

TABLE 2. Comparison of problem areas of medical and non-medical marijuana users visiting two large emergency departments

Characteristic	Medical marijuana users ($n = 107$)	Non-medical marijuana users ($n = 185$)	t or χ^2
	Mean (SD) or %		
Drug use variables			
Drug ASI scores (mean)	.057 (.039)	.044 (.045)	−2.46**
Frequency of cannabis/marijuana use in past 30 days (mean days)	20.0 (12.1)	13.1 (11.9)	−4.73***
Experienced a drug related problem in past 30 days (%)	5.6	9.7	1.53
Number of days in past 30 you experienced a drug problem (mean days)	.15 (.8)	.60 (2.9)	1.95*
Troubled in past 30 days by drug problem(s) (%)	2.8	6.5	1.86
Treatment for drug problem(s) important now (%)	1.9	4.9	1.68
How ready to change use of cannabis/marijuana (mean)	.61 (1.01)	1.09 (1.11)	3.61***
Dollars spent in past 30 days on marijuana (mean)	96.70 (175.04)	51.95 (157.06)	−2.17**
DAST drug risk level (%)			
Low (1–2)	86.8	76.4	
Moderate-severe (3–10)	13.2	23.6	4.53**
Drug avoid. Self efficacy (mean)	3.21 (1.23)	3.46 (1.25)	1.68*
Medical problem variables			
Medical ASI scores (mean)	.701 (.164)	.676 (.164)	−1.67*
Number of days in past 30 you experienced medical problem(s) (mean days)	6.83 (9.41)	6.15 (7.91)	−.635
How troubled in past 30 days by medical problem(s) (mean)	3.65 (.88)	3.52 (.92)	−1.25
How important is treatment now for medical problem(s) (mean)	3.84 (.66)	3.67 (.77)	−2.01**
Times in life hospitalized (mean)	3.71 (2.98)	2.91 (2.93)	−2.22**
Psychiatric problem variables			
Psychiatric ASI scores (mean)	.289 (.220)	.235 (.223)	−1.91*
Experienced serious depression in past 30 days not due to alcohol/drug use (%)	51.4	42.7	2.06
Experienced serious anxiety or tension in past 30 days not due to alcohol/drug use (%)	60.7	54.1	1.21
Experienced hallucinations in past 30 days not due to alcohol/drug use (%)	2.8	2.2	.119
Experienced trouble understanding concentrating or remembering in past 30 days not due to alcohol/drug use (%)	34.0	29.2	.701
Experienced trouble controlling violent behavior in past 30 days (%)	10.8	13.1	.341
Experienced serious thoughts of suicide in past 30 days (%)	7.5	6.0	.258
Attempted suicide in past 30 days (%)	.9	0.5	.157
Prescribed medication in past 30 days for any psychological/emotional problems (%)	35.2	18.8	9.64***
Number of days in past 30 you experienced psychological/emotional problems (mean)	14.20 (13.22)	10.18 (12.00)	−2.57***
How troubled in past 30 days by psychological/emotional problems (mean)	1.49 (1.44)	1.29 (1.44)	−1.101
How important now is treatment For psychological/emotional problem(s) (mean)	1.25 (1.47)	.98 (1.35)	−1.47
Alcohol-related variables			
Alcohol ASI scores (mean)	.071 (.118)	.112 (.156)	2.47**
Number of days in past 30 you used alcohol (mean)	4.50 (7.95)	6.16 (8.62)	1.63*
Number of days in past 30 you used alcohol to intoxication (mean)	2.23 (5.43)	3.72 (7.31)	1.97**

(*Continued*)

TABLE 2. Continued

Characteristic	Mean (SD) or %		t or χ^2
	Medical marijuana users ($n = 107$)	Non-medical marijuana users ($n = 185$)	
Experienced alcohol problem(s) in past 30 days (%)	5.6	16.2	7.06***
Treatment for alcohol problem(s) important now (%)	2.8	6.6	1.92
Dollars spent in past 30 days on alcohol (mean)	17.50 (51.57)	36.09 (87.18)	2.28**

ASI, Addiction Severity Index Lite.

* $p < .10$.
** $p < .05$.
*** $p < .01$.

psychiatric problems, and non-medical marijuana users for alcohol problems.

The primary purpose of this exploratory study, however, was to focus on the *individual* items that comprised the ASI composite severity measures, as well as other drug use measures, in hopes of identifying more specific patterns of use and risk between the two types of marijuana users. In bivariate analyses, 14 items were significantly different by group (ie, six measuring drug use problems, two measuring medical problems, two measuring psychiatric problems, and four measuring alcohol-related problems). Results of logistic regression, however, showed that six variables were *independently* associated with type of marijuana user, five of which were drug use measures, and one of which was related to psychological/emotional problems. Medical users reported a higher frequency of recent marijuana use, spent more money on marijuana, reported lower readiness to change use of marijuana, and reported more days of psychological problems than did non-medical users. However, they also reported lower frequency of drug problems and tended to be low-risk versus moderate/severe risk users relative to

non-medical users. Taken together, these results for medical marijuana users might be interpreted as consistent with that of routine, self-administered treatment for medical, or psychological problems. Roy-Byrne and colleagues reported that medical marijuana users in primary care were more likely than recreational marijuana users to have medical problems, pain, disability, lower drug use severity, and fewer alcohol problems.[13] A difference between Roy-Byrne and colleagues' study and the present one is that participants in their study were not exclusively marijuana users and could in fact report using other illegal or non-prescribed drugs in addition to marijuana.

Although a limitation of the present study was the lack of information about participants' medical conditions, pain, reason for the visit, and disability, the similarities between our study and that of Roy-Byrne and colleagues[13] is noteworthy, and suggests that medical marijuana users may be using it as "medicine." Other limitations of the study include the relatively small sample size and the possibility that a selection bias occurred and limited the representativeness of the participants. However, patients were enrolled consecutively during day time ED business hours, and refusals to be

TABLE 3. Medical/non-medical marijuana user status and associated factors

Correlate	Adjusted OR	95%CI	*p*-value
Frequency of cannabis/marijuana use in past 30 days	1.06	1.03,1.09	.000
Number of days in past 30 you experienced a drug problem	.702	.464,1.06	.092
How ready to change use of marijuana	.757	.559,1.02	.072
Dollars spent in past 30 days on marijuana	1.01	1.00,1.01	.036
DAST drug risk category	.333	.137,.807	.015
Drug avoidance self efficacy	1.13	.849,1.52	.392
How important is treatment for medical problem(s)	1.39	.88,2.19	.159
Times in life hospitalized	1.04	.94,1.15	.456
Prescribed medication for psychological/emotional problem(s)	1.73	.79,3.75	.166
Number of days you experienced psychological/emotional problem(s)	1.03	1.00,1.06	.048
Number of days in past 30 you used alcohol	.98	.93,1.03	.437
Number of days in past 30 you used alcohol to intoxication	1.00	.94,1.06	1.00
Experienced an alcohol problem in past 30 days	.562	.18,1.74	.319
Dollars spent in past 30 days on alcohol	.998	.99,1.00	.486

interviewed were rare. Patients may have underreported use of marijuana, or misreported whether it was prescribed. Because of the cross-sectional nature of the data, no cause and effect statements can be made about the direction of associations. Generalizability is limited because the sample was of low socioeconomic status and uninsured or underinsured.

Despite these limitations, this is among the first studies to describe differences between medical and non-medical marijuana users screened in acute care settings. With the quickly changing roadmap of varying types of legalized marijuana use across the country, it is important to understand if there are differences in risk factors and outcomes between the two groups. The groups analyzed in this study were self-reported marijuana-only users; therefore, use of marijuana was not confounded by other substance use. The sample also came from two large urban EDs that serve a high number of uninsured patients, venues that may be the first line of care for behavioral health problems.

This study replicated some findings from one of the only other published studies in which medical and non-medical marijuana users in a health care setting were compared.[13] The results of this study indicate that those who are using marijuana for medical reasons appear to be using it as medicine, and have some distinct differences from recreational users. More studies are needed, but results suggest behavioral health interventions in acute care settings should consider treating non-medical marijuana users differently than medical users due to the greater drug-related problems associated with non-medical use. Marijuana use has become more prevalent and salient among patients in general,[5] and ED providers should be well informed of its type of use and potential effects on patients' health.

Declaration of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this paper.

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