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Do characteristics of marijuana use correspond to overall health levels for medical marijuana patients?

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Abstract

The current study assesses how characteristics of medical marijuana use are related to general health status and past year change in health. An analytic sample of 312 patients were recruited from 16 medical marijuana dispensaries across Los Angeles, California. Patients completed a short intercept survey and a longer patient survey. Surveys asked information about health, marijuana use behaviors, preferred ways to use marijuana, marijuana recommendation, and sociodemographic information. Data were analyzed using hierarchical linear modeling of patients nested within dispensaries. For general health status, patients who smoke marijuana, have more medical conditions for which they received their medical marijuana recommendation, and use marijuana more times per day report lower levels of general health. The number of days using marijuana per month was related to worse health in the past year. Medical marijuana use does not appear to improve overall health status according to the results presented here, but is limited by the cross-sectional nature of the study. As the legalization of medical marijuana use continues to grow across the United States, identifying how marijuana is related to health will allow physicians to better determine who may benefit from its use.

Medical marijuana use is currently allowed in 29 states and the District of Columbia, despite remaining illegal at the federal level. Even as states are legalizing or considering legalizing marijuana for recreational use, a separate system remains in effect for the people who have a recommendation by a physician to use marijuana medically. Medical marijuana is generally taxed at a lower rate, than recreational use marijuana and often has limits regarding purchase amounts per transaction (Legal Science 2016; Williams, 2016). Despite a longer history of medicinal marijuana use research on what conditions are best treated using cannabis and how cannabis use can improve overall health is not well studied.

In 1996 California became the first state to legalize marijuana use for medical purposes via Proposition 215. Prop 215 specified that marijuana could be used to address specific health conditions including cancer, anorexia, AIDS, spasticity, glaucoma, arthritis, migraines, chronic pain, and any other illness for which marijuana provides relief. The categories of ‘chronic pain’ and ‘other illness’ have allowed physicians to recommend cannabis use for

virtually any medical condition, regardless of the lack of empirical evidence supporting its effectiveness as a medication to reduce health problems.

Studies of medical users of marijuana tend to focus on the conditions for they have been prescribed marijuana or the demographic information of the users. These studies have found that marijuana is most often recommended for chronic pain and anxiety (Reinarman, Nunberg, Lanthier & Heddleston 2011; Nunberg, Kilmer, Pacula & Burgdorf 2011; Nussbaum, Boyer & Kondrad 2011; Bonn-Mill, Boden, Bucossi & Babson 2014; Aggarwal et al. 2008; Ilgen et al. 2013; Walsh et al. 2013; Nussbaum, Thurstone, McGarry, Walker, & Sabel, 2015). Estimates from California and other countries show that users of medical cannabis are primarily male, two-thirds to three-fourths of all users (Ogborne, Smart & Adlaf 2000; Ware, Adams & Guy 2005; Swift, Gates & Dillon 2005; Reiman 2007; Nunberg et al. 2011) and Caucasian (Reiman 2007; Nunberg et al. 2011).

Fewer studies have focused on whether or not marijuana actually improves the quality of life and general health status of those using medical cannabis. In a sample of California medical users, patients rated marijuana as helpful for 11 different conditions, including chronic pain, headaches and PTSD (Bonn-Miller et al. 2014) and found to be helpful or very helpful for 52 of 58 medical marijuana registrants who were receiving treatment in an inpatient psychiatric unit in Colorado (Nussbaum et al., 2015). Marijuana was found to be helpful in HIV symptom treatment and control in a sample from the United Kingdom (Woolridge et al. 2005). In Australia, 86% of medical cannabis users reported medical marijuana use as providing great relief, 14% reported little relief, and 0% reported no relief or worse (Swift, Gates & Dillon 2005). Sixty-eight percent of patients from a study in the U.K. reported that cannabis improved symptoms of health conditions and 45% said it worked better than their prescribed medications in disease and symptom management (Ware, Adams & Guy 2005). Additional research also points to marijuana in helping patients reduce or discontinue prescription drug use for pain, anxiety and insomnia (Webb & Webb 2014). With regards to changes in health after receiving a medical marijuana recommendation, a Michigan based study found patients renewing their medical marijuana recommendations reported somewhat lower pain and higher physical and mental functioning compared to those patients who were getting their medical marijuana recommendation for the first time (Ilgen et al. 2013). Webb and Webb (2014) reported a 64% reduction in pain among patients re-applying for their medical recommendation.

Current work on medicinal marijuana's effect on general health and changes in health status is limited in that it mainly relies on patient report for specific medical conditions or symptoms. This research seldom attempts to measure general health, or assess specific health metrics related to marijuana use, frequency of use, or mode of use and instead focuses only on patient perspectives on medicinal marijuana use. Our study attempts to improve on this work by examining how different characteristics of marijuana use is related to general health or past year changes in health status. Specifically, we seek to understand if (1) specific types of marijuana use are related to higher or lower levels of general health status and (2) if overall health improves after receiving a medical recommendation.

Methods

Study Design and Procedures

The current study utilizes a sample of medical marijuana dispensary patients in the city of Los Angeles, California. The sample was obtained in a multi-stage process. In the first stage, a premise assessment of all known current and previous locations of medical marijuana dispensaries was completed to identify those dispensaries which were open and operating as a dispensary. In this stage, we identified 476 open medical marijuana dispensaries within the city limits of Los Angeles. We then randomized the list of open dispensaries and conducted recruitment of dispensaries to determine who would allow us conduct intercept and patient surveys. Sixteen dispensaries agreed to participate; a response rate of 28.6% of those asked to participate. Participating vs. non-participating dispensaries only differ in the number of products sold (Thomas & Freisthler, 2016).

In the second stage, five minute intercept surveys were conducted with patients as they exited the dispensary. Patients provided informed consent and then answered questions about their purchase that day and basic demographic characteristics. Respondents received a \$20 cash incentive for completing the intercept survey. The response rate was 84.5% and there were about 37 respondents per dispensary. After the completion of the intercept survey, patients were given a business card with a unique ID and encouraged to complete a longer 20 to 30 minute survey online (for a \$30 Amazon gift card sent via email), or patients could complete the survey onsite (using either a computer tablet or a pen and paper) for a \$30 Target gift card provided immediately. Of those who completed the intercept survey 70.5% subsequently completed the patient survey. The study protocol was approved by the institutional review board at UCLA.

Sample

The number of people who completed both the intercept and patient surveys was 423. Three intercept surveys were not properly downloaded leaving us with 420 fully completed surveys. The analytic sample for this study was 312 respondents. About three quarters of respondents were male; one-third were Black or African American, 37.2% were White and 19.9% are Hispanic or Latino and average age was just under 35 years. (see Table 1). The majority (73.4%) of respondents were married or living in a marriage-like relationship. With respect to education, about one-third of respondents had a high school diploma, one-third had some college, and one-third were college graduates. We conducted missing data analyses to assess whether or not differences existed between cases with and without complete data. The variables with the most missing data were the number of days a person used marijuana (11%) and the number of times per day a person used marijuana (15.5%). Significant differences on missing data were found for race/ethnicity ($X^2(2, N=412) = 14.88, p = .001$) and education ($X^2(3, N=417) = 15.90, p = .001$). No significant differences were found for gender ($X^2(2, N=417) = 1.63, p = .20$), marital status ($X^2(2, N=409) = 1.56, p = .21$), age ($F(1, 415) = 3.59, p = .06$), or medical marijuana condition ($X^2(4, N=414) = 3.28, p = .51$).

Measures

General health.—The first dependent variable for this study was a measure of general health, measured using the RAND 36-Item Health Survey (Ware & Sherbourne 1992). The general health measure included five items: (1) general health (2) getting sick easier than others; (3) health compared to anybody I know; (4) expectations of health worsening; and (5) being in excellent health. The first item about general health had five response categories for excellent, very good, good, fair, and poor. The remaining four items were measured with definitely true, mostly true, don't know, mostly false and definitely false as response options. The item was then scored, where item numbers 1, 3, and 5 were given 100 points for the most positive response (i.e., excellent or definitely true), 75, for the next category, then 50, 25, and 0. The remaining two items had the same score values, but in the opposite direction where definitely true was given a score of 0. An overall general health score was obtained by averaging a respondent's individual score on those five items. The average score for general health in this sample was 66.29. Internal consistency reliability, measured with Cronbach's alpha, was .78 for this sample.

Change in health status.—The second dependent variable was a single item measure, also from the RAND 36-Item Health Survey. Respondents were asked "Compared to one year ago, how would you rate your general health now?" The response categories included much better now than one year ago, somewhat better now than one year ago, about the same, somewhat worse now than one year ago, and much worse now than a year ago. The scoring options were 100, 75, 50, 25, and 0, with 100 corresponding to the "much better" category and 0 corresponding to the "much worse" response category. In this sample, the average change in health score was 68.53 indicating that most people were between in about the same or somewhat better health.

Marijuana Use Behaviors.—Frequency of marijuana use was measured via two questions. The first question asked on how many days in the past four weeks (28 days) the respondent used any marijuana products. In the second question, respondents reported how many different times per day they used marijuana products. Respondents in this study are heavy marijuana users as the average number of days used in the past four weeks was 19.09 and the average number of times used per day was 3.97.

Mode of Marijuana Use.—Respondents were asked what form they typically used marijuana. The response categories included smoking, vaping, eating or drinking edibles, or other unspecified form. The majority of respondents (91.3%) typically smoke marijuana. Thus a dichotomous variable where 1 indicated smoking and 0 referred to all other forms of use.

Medical Marijuana Condition.—During the intercept survey, respondents were asked to provide the specific medical conditions for which their marijuana use was recommended. The list included 15 conditions, but also allowed the respondent to provide other conditions not originally specified. Conditions were then recoded, in a hierarchical manner where specific medical conditions including anorexia, arthritis, cachexia or wasting syndrome, cancer-related symptoms, Crohn's disease or gastrointestinal issues, epilepsy, glaucoma,

HIV/AIDS, spasticity or multiple sclerosis, and migraines were grouped in one category. Anxiety and depression were grouped into a category for mental health problems. Sleep problems were its own category, as was chronic pain. These categories were mutually exclusive, only including people who did not report any other condition. Finally, appetite stimulant or “other” (which included all those people who did not identify any prior category as their reason for a medical recommendation) were recoded as other. Since this categorization did not account for people who may have specified multiple conditions, a count of the total number of conditions reported was also included as a covariate.

Year Medical Marijuana Recommendation Obtained.—Respondents provided the month and year they first obtained their medical marijuana recommendation. That information was used to determine those respondents who had obtained their medical recommendation with the past year and those who had had it for over a year.

Demographic Characteristics.—A variety of demographic variables were included as controls. These included the respondent’s age, biological sex (1 = male, 0 = female), marital status (married or living in a marriage-like relationship = 1, single, divorced or widowed = 0), race/ethnicity (recoded White, Black or African American, Hispanic or Latino, and other, which included Asian, Pacific Islander, Native American or American Indian), and education (recoded as high school graduate or lower, some college, and college graduate).

Analytic Procedures

Bivariate analyses were conducted to examine the relationship between the two dependent variables and all the independent variables. For dichotomous variables, t-tests were conducted. Analysis of variance (ANOVA) models were run for categorical variables (with more than two categories). Correlations were conducted for ratio level independent variables. Hierarchical linear modeling (HLM) was used to assess the multivariate relationship between the independent variables and the two dependent variables. HLM was chosen to adjust for the clustering of dispensary patients within dispensaries.

Results

The results of the bivariate comparisons can be found in Tables 1 and 2. Gender of the respondent was significantly related to both general health and change in health status. The race/ethnicity of the respondent was significantly associated with change in health status. Respondent age was negatively correlated with both general health status and change in health status. Respondents reporting receiving their medical marijuana recommendation for more conditions and used marijuana more times per day reported worse general health. Respondents who used marijuana more days per month reported that their health status had gotten worse in the past year.

In the general health multivariate models, respondents who reported typically smoking marijuana had significantly worse health. Using marijuana more times in a day and having more conditions for which the medical marijuana recommendation was received were also related to having a lower general health score. No demographic variables were related to overall general health status in these models.

For the change in health status, men reported significantly better health. African American and Latino respondents (compared to Whites) also reported their health had improved in the past year. With respect to marijuana use characteristics, the only variable related to a change in health status was the number of days a respondent used marijuana in the past year. Using marijuana on more days was related health status getting worse.

Discussion

Our study examined how patterns of medical marijuana use were related to general health and past year change in health in a sample of dispensary patients in California. With regards to general health, smoking marijuana was related to lower levels of self-reported health. Previous work has found that the medically ill preferred inhaling medication and may consume less than recreational users (Bostwick 2012). Given the overwhelming number of patients in the current study who smoke marijuana it is difficult to tell if this choice is related to perceived medical benefits of smoking over other forms of ingestion on overall health. Patients who received their medical recommendations for marijuana for more conditions had lower overall self-rated general health. However, the condition for which medical marijuana was recommended was not related to the measure of overall general health. Dispensary patients who used marijuana more times per day reported lower levels of overall general health. These patients could be using marijuana more often per day because their health is already poor or higher frequency of marijuana use per day could lead to overall worse health. In previous studies, patients self-reported that medical marijuana use was related to improvements in medical conditions for which they received marijuana (Swift, Gates & Dillon 2005; Ware, Adams & Guy 2005; Illgen et al. 2013; Webb & Webb 2014). It could be that the medical conditions for which medical marijuana use is recommended are not related to overall general health.

The only marijuana use question related to change in health question was the number of days using marijuana, which exhibited a negative relationship. This might indicate that a respondent's health is getting worse, so he or she is using more often. Of course, given the cross-sectional nature of the study, it could be that using marijuana more often leads to worse health. We expected to see that those with a recent (past year) medical marijuana recommendation would report better health, compared to a year ago after commencing medical marijuana use. However, there was no statistically significant relationship between these variables. Respondents may have been using marijuana illicitly for their medical conditions before getting a recommendation. Or, it could be that when asked about change in health (as opposed to the specific condition prompting the marijuana recommendation), respondents are factoring in many other things into their decision. Finally, it could be that California's lax recommending practices means that majority of patients in this sample were using marijuana recreationally. If the latter is the case we could expect no relationship between receiving a medical recommendation in the past year and change in health status. As with general health status, our results differ from previous work (Swift, Gates & Dillon 2005; Ware, Adams & Guy 2005; Illgen et al., 2013; Webb & Webb 2014). Finally, it is also possible that patients of medical marijuana dispensaries in California were getting incorrect medical advice from dispensary staff about what strains of marijuana were best for their

particular medical condition (Haug, Kieschnick, Dottle, Babson, Vandrey, & Bonn-Miller, 2016).

Limitations

The cross sectional nature of this study does limit our ability to make definitive conclusions about causation. This leaves us with the classic ‘which came first dilemma?’ For example, do people use more times per day on the days they use marijuana because they are experiencing lower levels of health, or does smoking more times per day cause health to get worse? This is a sample of people who are heavy marijuana users. Thus results might differ for people who use marijuana infrequently for less severe medical conditions. Although the respondents for the study had medical recommendations for marijuana use, some portion of the users in our sample may be recreational users. The proportion of recreational users in the study may skew the results of how marijuana use is related to general health and change in health status. Bias might also exist due to the differential levels of missing data between racial and ethnic groups and education.

Conclusion

Medical marijuana use does not appear to improve overall health status according to the results presented here. The findings do, however, suggest some new directions for research. Comparing health levels of patients before and after commencing marijuana for medical use would provide a better assessment of changes in health due to medical marijuana. Further, comparing the health status of confirmed medical users with recreational users would also allow us to better understand the medical benefits of marijuana. Finally, instead of measures of overall health, studying how medical marijuana use may improve the conditions for which patients received their medical recommendation. As the legalization of medical marijuana use continues to grow across the United States, identifying how marijuana is related to health will allow physicians to better determine who may benefit from its use.

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Table 1:

Descriptive Statistics and Bivariate Comparisons of Dependent Variables with Categorical Independent Variables (n = 312)

	% or $\bar{X}$ (sd)	Bivariate Statistics	
		<u>General Health</u>	<u>Change in Health</u>
		$\bar{X}$	$\bar{X}$
General Health	66.29 (20.69)		
Past Year Change in Health	68.53 (25.53)		
Gender		*	**
Male	73.4	67.71	71.02
Female	26.6	62.38	61.75
Race/Ethnicity			**
Black/African American	33.3	65.76	69.23
Hispanic/Latino	19.9	67.71	77.05
White	37.2	67.45	63.48
Other	9.6	60.71	68.10
Marital Status			
Married	73.4	62.68	70.48
Single/Divorced/Separated	26.6	67.60	67.81
Education			
High School Graduate or Lower	32.8	67.00	70.12
Some College	31.1	64.54	69.79
College Graduate	36.1	67.14	66.47
Medical Marijuana Condition			
Medical Condition	27.2	63.53	67.26
Mental Health	28.2	67.98	72.13
Chronic Pain	26.3	65.90	67.90
Sleep Problems	11.5	70.00	65.28
Other Condition	6.7	65.48	66.67
Smoke Marijuana			
Yes	91.3	65.92	68.35
No	8.7	70.19	70.37
Received Recommendation Past Year			
Yes	42.3	68.14	70.54
No	57.7	64.93	67.08

*
p < .05

**
p < .01

p < .001

Table 2:

Descriptive Statistics and Bivariate Comparisons of Dependent Variables with Ratio-Level Independent Variables (n = 312)

	$\bar{X}$ (sd)	Bivariate Statistics	
		<u>General Health</u>	<u>Change in Health</u>
		p	p
Age, in years	34.79 (2.82)	-.129 *	-.138 *
Number of Conditions	1.90 (1.03)	-.161 **	-.076
Number of Days Used Marijuana	19.09 (10.18)	-.062	-.174 **
Number of Times/Day Used Marijuana	3.97 (7.44)	-.186 **	-.098

*
p < .05

**
p < .01

p < .001

Table 3:

Hierarchical Linear Models of the Relationship between General Health and Change in Health on Marijuana Use Characteristics (n = 312)

	<u>General Health</u>			<u>Change in Health</u>		
	B	SE	p	B	SE	p
Constant	83.38	8.43	< .001	74.21	10.39	< .001
Age, in years	−0.17	0.10	.084	−0.16	0.12	.173
Male	4.50	2.58	.081	9.27	3.18	.004
Race/Ethnicity (White is reference group)						
Black/African American	1.54	3.13	.621	9.28	3.79	.014
Hispanic/Latino	1.10	3.36	.743	13.08	4.13	.002
Other	−7.27	4.14	.079	4.66	5.19	.370
Married	−3.87	2.62	.140	4.02	3.20	.210
Education (High School Graduate is reference)						
Some College	−1.08	2.30	.720	3.13	3.68	.396
College Graduate	2.05	2.97	.490	1.40	3.66	.702
Medical Marijuana Condition (Other Condition is reference)						
Medical Condition	2.36	5.19	.649	2.52	6.57	.701
Mental Health	4.33	5.20	.405	7.89	6.47	.223
Sleep Problems	4.42	5.45	.417	−4.45	6.91	.520
Chronic Pain	0.12	4.91	.980	−2.02	6.11	.741
Smoke Marijuana	−9.60	4.07	.018	−6.65	5.01	.184
Received Recommendation Past Year	1.79	2.28	.434	1.02	2.82	.718
Number of Conditions	−3.51	1.30	.007	−2.52	1.61	.119
Number of Days Used Marijuana	0.01	0.12	.931	−0.32	0.14	.028
Number of Times/Day Used Marijuana	−0.53	0.15	< .001	−0.31	0.19	.097