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Effects of Research Setting on Observed Depressive Symptoms in Marijuana Users

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Abstract

A post hoc analysis examined depressive symptoms in regular marijuana smokers interested in nontreatment, laboratory studies and marijuana-dependent treatment-seekers considering clinical trial participation. Among marijuana-dependent treatment-seeking patients screened for a clinical trial, the mean Beck Depression Inventory Score (BDI) was significantly higher than for marijuana-using volunteers screened for non-treatment laboratory studies. Mean self-reported baseline marijuana use was not significantly different between groups and BDI score was not correlated with use. While the methods by which the two groups were selected influenced their characteristics (i.e., treatment-seekers are more likely to be experiencing some degree of clinical distress), it is notable that treatment-seeking, and not marijuana use per se, is associated with significantly higher rates of depression.

1. Introduction

Cannabis is the most commonly used illicit substance in the world and its abuse represents a substantial public health problem. Among National Comorbidity Survey (NCS) respondents, 46.3% reported a history of cannabis use and 4.2% of respondents had a history of cannabis dependence (Kessler et al., 1994). Among National Longitudinal Alcohol Epidemiologic Survey (NLAES) respondents the prevalence of past year cannabis abuse and dependence among past year cannabis users was 23.1% and 6.3% respectively (Grant & Pickering, 1998). Among National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) respondents (Grant et al., 2004) the twelve-month prevalence of cannabis use disorders was 1.45%, which was the second most prevalent substance use disorder after alcohol use disorders (8.46%). In addition, the prevalence of cannabis use disorders in the US increased significantly between 1991–1992 (1.2%) and 2001–2002 (1.5%) (Compton, Grant, Colliver, Glantz, & Stinson, 2004).

There is accumulating evidence that cannabis use is linked to major depression (Kalanit, 2004). Respondents to the NLAES with diagnoses of cannabis dependence were more likely to have had a major depressive episode during the past year (Grant & Pickering, 1998), and the odds of cannabis dependence were 2.6 times greater among those respondents with

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comorbid major depression. A secondary analysis revealed that the risk of first major depressive episode was associated with cannabis use and with the development of cannabis dependence (Chen, Wagner, & Anthony, 2002). A study of the prevalence of psychiatric disorders among 1439 heavy cannabis users seeking treatment found that cannabis users had significantly raised levels of depression compared with users of other drugs (Arendt & Munk-Jorgensen, 2004). This indicates that cannabis use and depressive symptoms frequently co-occur.

Possible explanations for the association of cannabis use and depression include: 1) cannabis use is a contributory factor of depression, 2) depression is a contributory factor of cannabis use, or 3) there is no direct relationship and the observed association is explained by shared risk factors. A meta-analysis of cohort studies in the general population reported a modest association between heavy or problematic cannabis use and depression, but little evidence of an increased risk of later cannabis use among people with depression, suggesting the “self-medication” hypothesis is unlikely (Degenhardt, Hall, & Lynskey, 2003).

Additionally, the role of comorbid psychiatric symptoms in influencing those with cannabis use disorders to seek treatment is of interest. Since the consequences of cannabis use are generally less severe than those due to alcohol, cocaine or opioid use, the factors that contribute to an individual’s motivation to seek treatment may be related to associated psychiatric symptoms, rather than direct effects of the substance. An analysis of the NCS database found that the combination of alcohol dependence and major depression predicted treatment contact among individuals with cannabis dependence and that severity of cannabis dependence was not associated with seeking treatment (Agosti & Levin, 2004). It may be that the presence of comorbid psychiatric disorders is what ultimately leads a “cannabis user” to become a “treatment-seeker”.

To better understand the differences between treatment-seeking and nontreatment-seeking cannabis users, we compared baseline depressive symptoms in a group of marijuana smokers recruited for a pharmacotherapy clinical trial to a group recruited for controlled laboratory studies on smoked marijuana. We hypothesized that cannabis users interested in nontreatment, laboratory studies would have substantially lower rates of depressive symptoms compared to those interested in treatment.

2. Materials and Methods

2.1 Participants

Participants were drawn from two distinct research populations: 1) treatment-seeking patients recruited for a cannabis dependence pharmacotherapy clinical trial and 2) nontreatment-seeking cannabis users recruited for laboratory studies of smoked marijuana. Research protocols were approved by the New York State Psychiatric Institute Institutional Review Board and all participants provided informed consent. The treatment group (n=83) was recruited by advertisement for treatment-seeking cannabis users; recruitment was not directed at those with depression. Recruitment advertising emphasized free treatment, including psychotherapy and medication, but did not specify that the medications being studied were antidepressants. The treatment group met DSM-IV-TR criteria for cannabis dependence. Participants in the treatment study were reimbursed for travel expenses and for completing lengthy study measures, but were not otherwise compensated for their study participation.

The laboratory group (n=94) was recruited by advertisement for nontreatment-seeking laboratory studies. Recruitment advertising emphasized that “healthy marijuana smoker” would be eligible for participation and receive compensation for time and travel. During the initial contact (telephone screening) fewer than 5% of potential laboratory participants were

rejected because of psychotropic medication use or for report of psychiatric symptoms. Laboratory group participants underwent psychiatric and medical evaluation, but did not undergo a standardized diagnostic evaluation and were not required to meet a DSM-IV-TR substance use disorder diagnosis to be eligible for participation. Individuals seeking treatment were referred elsewhere and not eligible to participate. Participants in the laboratory study were compensated for their study participation.

2.2 Data Collection

A retrospective chart review was conducted extracting demographic data (age, sex, and race), baseline marijuana use, and Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) score at the time of screening evaluation for study participation. Baseline marijuana use was collected using a variety of units (e.g., “joints”/day, “blunts”/day, “bowls”/day, and dollars/day). Daily baseline use was therefore converted to a standardized unit calculated using the following conversion formula: 3 joints = 1 blunt = 3 bowls = \$5 = 1 standardized unit (su). This conversion formula was developed by querying cannabis-using research participants and consulting with faculty and research staff experienced in interviewing marijuana users.

2.3 Data Analysis

All data were entered into SPSS (version 12). Differences between groups in categorical variables (racial and gender distribution) were analyzed using the Chi-Square test for independent samples. Differences between groups on measures with continuous variables (age, BDI score, and baseline daily use) were analyzed using independent sample t-tests. Pearson’s correlation coefficient was calculated to examine the relationship between marijuana use and BDI score. Alpha = 0.05 was set as the level of significance for all 2-tailed analyses.

3. Results

Demographic data are reported in Table 1 and are notable for the treatment group being slightly older and having proportionally more white and Hispanic, while fewer black participants. Among the 83 treatment-seeking-patients screened for the clinical trial, the mean Beck Depression Inventory Score (BDI) was significantly higher than for 94 nontreatment seekers [19.3 (± 11.7) vs. 4.9 (± 6.1); $t_{(120)} = -10.0$, $p < 0.001$] (Figure 1). No participants reported using any form of cannabis other than marijuana. Mean self-reported baseline marijuana use in standardized units (su) was not significantly different between groups [treatment = 2.2 su/day (± 2.1) vs. nontreatment = 1.9 su/day (± 2.0); $t = -1.0$, $df = 175$, $p = 0.28$]. Baseline marijuana use was not correlated to BDI score across the entire study population ($r = 0.10$; $p = 0.20$) or within either study group (treatment: $r = .03$, $p = 0.21$; nontreatment: $r = 0.13$, $p = 0.83$). A multiple linear regression found that treatment group predicted BDI score (Beta = 0.61) after controlling for age and race.

4. Discussion

These data clearly show that individuals seeking treatment for a cannabis use disorder report markedly higher levels of depressive symptoms than nontreatment seekers participating in laboratory studies of marijuana, indicating that regular users of cannabis encountered in different research settings may have disparate levels of depressive symptoms. These results support our hypothesis that regular cannabis users seeking treatment would have higher depressive symptoms than those recruited for non-treatment laboratory studies, and are consistent with previous studies that have observed an association between cannabis use disorders and depressive symptoms. These findings were obtained despite the fact that participants in each study group reported similar amounts of marijuana use.

These are the first data that compare the baseline depressive symptom severity of a treatment-seeking marijuana-smokers with a group of nontreatment-seeking marijuana smokers. The mean BDI score of the treatment-seeking group (19.3) is comparable to other published reports of treatment seeking marijuana-dependent patients. Budney et al. (2000) reported a mean baseline BDI score of 15.8 for 60 participants in an outpatient psychotherapy clinical trial. Copeland et al. (2001) reported a mean baseline BDI score of 17.2 among 229 participants in a brief intervention study. The Marijuana Treatment Project Research Group (2004) reported a baseline mean BDI score ranging from 10.1 to 13.2 across three treatment arms in 450 treatment-seeking marijuana-dependent clinical trial participants. In a study of 119 patients in community-based treatment Arendt (2007) reported a mean BDI score of 14.3. The mean baseline BDI score in the treatment-seeking group reported here (19.3) was higher; our study used participants recruited for a pharmacotherapy clinical trial, which may have selected for participants with more severe symptoms. As future cannabis use disorder clinical trials are conducted it will be important to examine baseline patient characteristics to better understand the relationship between cannabis use and depression, and its potential effects on treatment outcome.

There are several important limitations to this study. The results of this study are secondary analyses of two distinct research populations recruited for different purposes. Clearly, the methods of recruitment (e.g., advertisement directed at research treatment studies vs. advertisement directed at healthy research participants and exclusion of participants using psychiatric medication) influenced the population selected. Treatment study participants are more likely to have clinical distress than those recruited for nontreatment studies. However, the degree to which the recruitment methods influenced the wide disparity in baseline depressive symptoms is unknown. Additionally, the study groups differed in mean age and in racial distribution and these demographic differences may have contributed to the disparity in baseline BDI score. Since depression is more prevalent among whites (Riolo, Nguyen, Greden, & King, 2005), the differences in racial distribution between groups may have affected the degree of depressive symptoms in the treatment-seeking group. Beck Depression Scale scores do not vary with age (Rabbitt, Donlan, Watson, McInnes, & Bent, 1995), so it is unlikely that the higher mean age in the treatment-seeking group influenced the results. Finally, nontreatment seekers responding to recruitment advertising were initially pre-screened by telephone interview, and although fewer than 5% of respondents to recruitment efforts were rejected due to psychotropic medication use or for evidence of psychiatric symptoms, nevertheless this procedure might have influenced the findings reported here.

The results presented in this report are significant in that they suggest that it may be the associated mood symptoms that leads a marijuana smoker to seek treatment rather than the marijuana use per se. Further investigation of the association of marijuana use and depressive symptoms is warranted.

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Figure 1. Mean BDI scores by recruitment group Mean BDI scores
Legend: Error Bars show 95.0% CI of Mean

Table 1

Characteristics of Marijuana Smokers

	Treatment- Seeking (n=83)	Nontreatment- seeking-(n=94)	statistic	df	p
Age	32.0 (± 9.6)	29.2 (± 6.4)	t = -2.3	139	0.02
Gender n(%)			$\chi^2 = 0.03$	1	0.87
Male	60 (72.3%)	69 (73.4%)			
Female	23 (27.7%)	25 (27.0%)			
Ethnicity n(%)			$\chi^2 = 12.8$	3	0.005
White	29 (34.9%)	22 (23.4%)			
Black	23 (27.7%)	48 (51.1%)			
Hispanic	25 (30.1%)	23 (24.5%)			
Other	6 (7.2%)	1 (1.0%)			