

Depressive Symptoms in Individuals who use Cannabis as Compared to Psychotropic Medications

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Abstract

Marijuana legalization throughout the U.S. has increased over the years; however, research has been limited due to government restrictions at the federal level. This study's purpose is to use the National Survey on Drug Use and Health to investigate the relationship between marijuana use and depressive symptoms as compared to those taking prescribed medications for depression. Data were utilized from participants within the age range of 18-64 years old who endorsed experiencing depressive symptoms within the past year. Using SPSS, we investigated the relationships using an independent samples *t*-test to find any significant differences between the two variables. Results revealed a significant difference between depressive symptoms between marijuana users and psychotropic medication users, showing those medicated for these feelings scored higher on average. These findings indicate that marijuana does not seem to increase depressive symptoms and may in fact lower them.

Keywords: Marijuana, Depression, National Drug Use and Health Survey

Introduction

Marijuana

The usage of marijuana has increased throughout the U.S. as it has been legalized in several states, with medical marijuana legalized in thirty-nine states and recreational marijuana legalized in twenty-one states, leaving only eleven states without any legalization (Hasin, et al., 2023). Additionally, between 1995 and 2014, the potency of cannabis has increased from approximately 4% to 12% (ElSohly, et al., 2016). Many individuals use cannabis for medicinal purposes (Turna, et al., 2019). States that have legalized medical marijuana were found to have a higher rate of self-medicating through marijuana within individuals with mood or anxiety disorders (Sarvet, et al., 2018), despite a lack of research regarding its efficacy in treating these symptoms.

The main psychoactive ingredient of marijuana, tetrahydrocannabinol (THC), works as a partial agonist on cannabinoid receptors CB1 and CB2. These two receptors primarily work together but control distinct functions in the endogenous cannabinoid system (ECS). THC binding to CB1 derives its psychoactive effects, while CB2 modulates inflammation through microglia. The effects of marijuana use vary differently based on the concentration of active ingredients such as THC and CBD. The effects of the main psychoactive ingredient, THC, include feelings of euphoria, a sense of relaxation, heightened sensory perception, mood changes, altered perception, and increased appetite (Kameg, et al., 2021). These receptors work together in the ECS and are involved in regulating emotional and cognitive functions.

When receptor CB1 receives a small dosage of THC it can generate and be associated with antidepressant effects in animal models; however, overdosing THC in these receptors can also have contradicting effects (Langlois et al., 2021). A study from Columbia University also reported that states who only legalized marijuana for medical purposes experienced higher rates of self-medicating individuals with mood or anxiety disorders than those in recreational states (Sarvet, et al., 2018). States continue the trend to legalize cannabis medicinally without investigating further beneficial or non-

beneficial effects of marijuana in depression and other disorders (Spetz, et al., 2021). There is also currently no published court opinion of potential malpractice to those certifying or recommending medical marijuana to patients (Kameg, et al., 2021). A Canadian study found their anxiety group (99.5%) used cannabis recreationally prior to medical usage (Turna, et al., 2019). This leads to the question of whether marijuana may reduce symptoms of depression or anxiety.

Cognitive Effects

Typically, cannabis usage is associated with perceptive impairment alongside other cognitive effects such as memory deficits and verbal memory (Langlois, et al., 2021). This type of impairment also created the question of what these effects can do in the long-term. A long-term study in Pittsburg, Pennsylvania, studied low-income males starting in infancy as part of “The Pitt Mother and Child Project.” As this study continued to monitor their growing participants, they were able to find that those who used cannabis as adolescents were more likely to develop depression at the age of 20 (Lichenstein, et al., 2017). However, as this participant group was already at substantial risk for depression, the study authors highlighted the need to investigate the effects in a broader population. As previously mentioned, increasing the content of THC in cannabis can vary the effects on a user. Another study by Rachel L. Tomko from 2020 aimed to examine associations between cannabis use amounts and depressive scores. This study found that depressive symptoms predicted increases in the amount of cannabis used in grams, but cannabis use did not predict depressive symptoms.

Depression

Depression, also known as major depressive disorder or clinical depression, is prevalent in approximately 7% of 18–29-year-old individuals, occurring more often than those at 60 years of age (American Psychiatric Association, 2013). The DSM-5's diagnostic criteria require five or more of the following symptoms within a 2-week period: depressed mood, diminished interested in all or almost all activities, significant weight loss or weight gain, insomnia or hypersomnia, psychomotor agitation or

retardation, fatigue, feelings of worthlessness, inability to think or concentrate, or recurrent thoughts of death (American Psychiatric Association, 2013). Criteria for a major depressive episode requires five or more of the symptoms mentioned previously, significant distress or impairment due to symptoms, and that other physiological effects, medical condition, or substance use have been ruled out as a cause (5th ed.; DSM-5; American Psychiatric Association, 2013). Typically, those with depression can face several daily living impairments, making it important to understand the effects of cannabis use on depressive symptoms.

Current Study

Previous relational studies between cannabis and depression have been investigated in the past using NSDUH's open data set and had investigated rates of usage over the years. In one study (Pacek et al., 2020), they investigated the prevalence of marijuana usage over the years 2005-2017 and depression scores among marijuana users. They were able to find in their analysis for each year those who had used in the past 30 days were more likely to express depressive symptoms than those who did not use cannabis (18.84% vs. 8.67%; $p < 0.001$). Additionally, there is some overlap between depressive symptoms and effects of acute cannabis use, such as changes in appetite and psychomotor slowing. The second study that used this dataset observed cannabis use disorder among those who used cannabis (Santaella-Tenorio, et al., 2019). They were able to classify daily marijuana users if they used cannabis more than 300 days (about 10 months) in the past year. Their main age targets included adolescents (12-17 years old), young adults (18-25 years old), and 26 or older adults. The authors found reductions in the prevalence of cannabis dependence among daily users from 2002-2016 in adolescents and young adults. However, this study also encountered a similar obstacle to the first study mentioned by not knowing the amount of cannabis used among these participants (Santaella-Tenorio, et al., 2019).

Methods

Participants

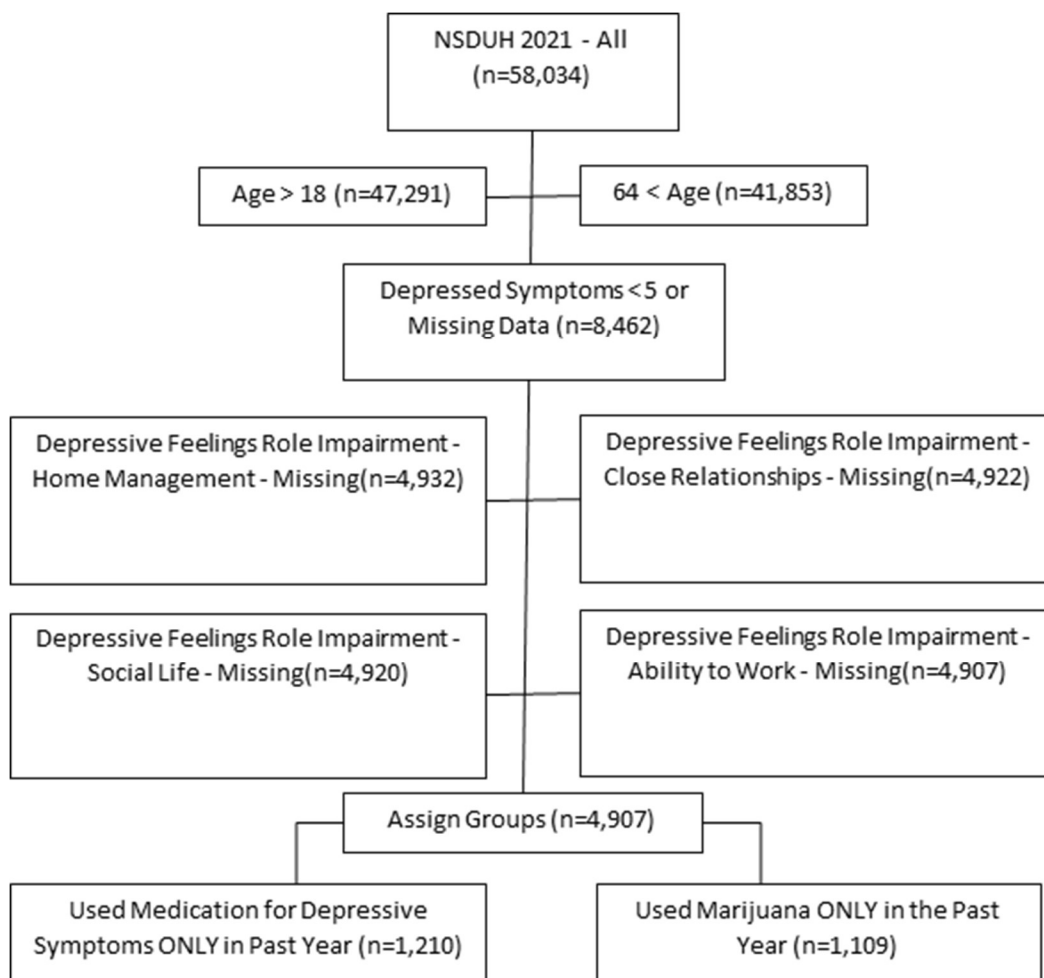
The 2021 National Survey on Drug Use and Health (NSDUH), formerly known as the National Household Survey on Drug Abuse, is an open dataset that provides statistical data on mental health, alcohol, tobacco, drug use, and other health-related issues (U.S. Department of Health & Human Sciences, n.d.). Only participants between the ages of 18-64 years old were included in the current study.

Measures

The goal of this investigation was to observe the average scores in depressed individuals between those taking prescribed medications for depression and those who use cannabis. The frequency of usage of psychotropic medication in this population is unknown, but to target only depressed individuals, the DSM-5 major depressive disorder symptoms questionnaire was used to only include individuals that fit this category. To find out if participants used medication for the symptoms, the question of usage of medication for depressive related symptoms in the past year was included. Participants who reported using marijuana in the past year were included as well. Unfortunately, the question of past month usage in medication was unavailable, and thus we were limited to grouping participants by any use within the past year (rather than more recent use). Figure 1 shows the selection process for the applicants in the study. NSDUH 2021's open data set contained a total of 58,034 participants, participants between the ages of 18 and 64 years old were kept in the data. Using the 9 indicators for major depressive disorder questionnaires, those who had five or more symptoms were kept, leaving 8,462 participants. To ensure the average scores were correct, only those who had completed all four questions were included in the analysis. And lastly, from all participants who were kept, we will only analyze those who used marijuana only and medication for depressive feelings only (e.g., individuals who used neither marijuana nor medications and those who used both were excluded from analyses).

Figure 1

Participant inclusion and exclusion criteria



Group Assignment

Participants were assigned to the marijuana use group if they reported use of marijuana during the past year. Participants were assigned to the medication use group if they responded “yes” to using medication for depressive-related symptoms in the past year. Data on the number of days used for psychotropic medication was not available. Participants who did not use either marijuana or medications or who reported use of both marijuana and medications in the past year were not included in the current analyses.

Depressive Symptoms Scoring Variable

Using the NSDUH's questionnaire for major depressive episodes, participants if there ever was a 2 week period that their depressive symptoms impacted their role impairment, on a 5-point scale, in the past year, which included if it ever impaired their ability to complete certain daily activities initially asking "How much did your [FEELNOUN] interfere with your ability to do home management tasks, like cleaning, shopping, and working around the house, apartment, or yard?". The respondents would then score their feelings from one signifying "none" to five representing "very severe" symptoms. This included if their depressed feelings were ever severe enough to impair their ability to maintain "home management," "close relationships," "social life," and their "ability to work." The four questions were then collected to calculate an overall score of depressive feelings in role impairment.

Results

An independent samples *t*-test was conducted in SPSS comparing depressive symptoms in the two groups (marijuana use only, $n = 1,109$; medications only, $n = 1,210$). The group difference in overall average score of adult depressed feelings of role impairment was found to be statistically significant, $t(2317) = -4.05, p < 0.01$. The marijuana only group had an average role impairment score of $M = 3.30$ ($SD = 0.75$), and the psychotropic medication group had an average role impairment score of $M = 3.43$ ($SD = 0.77$), finding that those who used marijuana only reported slightly lower depressive symptoms.

Discussion

Overall, the findings of significance between depressive-like symptoms in marijuana users and psychotropic medicated participants found different results in comparison to both NSDUH studies that observed marijuana usage on a timeline (Weinberger, et al., 2020; Pacek, et al., 2020). However, these studies did not investigate any groups who used psychotropic medications. Previous NSDUH studies had discussed the possible relationships between marijuana usage and depressive feelings, finding that depressive feelings were more commonly associated in those who used marijuana more frequently. They were also able to investigate the frequency in usage in the years they analyzed within the normal

population. In contrast, the current study compared depression-related role impairment in psychotropic medication and marijuana groups and only included participants reporting depressive symptoms.

Despite the contradictory findings from this analysis and previous analyses using NSDUH, there are several key factors to consider. This analysis strictly included participants that meet the criteria for major depressive disorder and excluded anyone who reported less than five of the symptoms listed in the DSM-5. Previous studies used NSDUH datasets from 2005-2017 (Pacek et al., 2020) and 2004-2016 (Weinberger et al., 2020) analyzed the amount of usage in the past year, including only participants who had used marijuana for more than 300 days in a year using NSDUH datasets (Weinberger, et al., 2020; Pacek et al., 2020). Another study included participants who used marijuana daily to weekly in the past three months using a different dataset from different certification centers in the state of Michigan (Perron, et al., 2019). The number of days marijuana used was known in this questionnaire, however, finding how often psychotropic medication was used was not available and led this variable to be excluded when selecting the populations for this investigation. Although studies in the past have investigated the effects of cannabis on depression, there are very few studies comparing these populations to those using psychotropic medications to determine how much of a difference there is in depressive symptoms between the two populations.

Conclusions and Future Directions

This study found that individuals with depressive symptoms who used marijuana had lower depressive symptoms than those who used medications. The use of a publicly available dataset had some limitations, including not being able to examine frequency of psychotropic medication use or the method of marijuana use. Additionally, because this study was cross-sectional, the severity of depressive symptoms prior to use of marijuana or medication is unknown. The lower symptoms in the marijuana group could reflect that the medication use group started with more severe symptoms, leading them to seek healthcare, whereas the marijuana users had milder symptoms. Future research would include

investigating marijuana as a treatment for depression. Researchers can then compare the two treatments side-by-side in those who are diagnosed with clinical depression and then observe those depressive symptoms as they progress. This can also bring the topic of the concentrations that would be necessary for these types of treatments. As mentioned earlier, the levels of cannabis have increased within the United States. Understanding the level of cannabis that could be beneficial or perhaps harmful to those with depression can pinpoint the dosage that can be effective with minimal side effects.

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