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Detrimental Effects of Long-Term Cannabis Use For Anxious and Depressed Users

Introduction

Marijuana is consumed throughout the world to help people cope with anxiety and depression. According to the WHO “About 147 million people, 2.5% of the world population, consume cannabis (annual prevalence) compared with 0.2% consuming cocaine[11.76 million] and 0.2% consuming opiates[11.76 million].” Since Marijuana is cheaper compared to opiates it is more accessible and affordable its usage is higher compared to other drugs.

Hine et al.’s (2020) study found that use of high-potency marijuana was associated with marijuana addiction. Also those who consumed marijuana in high doses were more likely to experience psychotic experiences though the paper suggests reducing dose can mitigate the chances of a psychotic event. On the other hand Spechler et al. 's (2020) concluded that the anxiety/depression+cannabis group (Anx/Dep+CB) showed higher levels of impulsivity on the negative and positive urgency scale compared to the other 2 groups. The other 2 groups consisted of Anx/Dep+ low CB and healthy individuals that did not consume marijuana and were mentally intact. Also Hser et al.’s (2017) study suggests that marijuana use increases risk of mental health depending on dosage. The study also came to the conclusion that higher dosage meant higher risk of patients displaying symptoms of psychosis.

Marijauna is not considered a narcotic drug but it affects cognitive and motor control [body movement] just like alcohol would.Symptoms caused by usage include feeling lethargic,Trouble focusing and mild hallucinations when taken in very high doses.Depending on the user they either feel relaxed or more anxious.

Marijuana is composed of 113 different compounds that are called cannabinoids. THC and CBD are the 2 main compounds in Marijuana that have been studied and are still being researched. CBD is mainly used for physical treatment by incorporating them in essential oils, Drinks, creams and other products that can be consumed or applied topically. CBD is being researched for treatments such as Parkinson's disease, schizophrenia, diabetes, anxiety and other diseases. On the other hand THC is what gives users that high feeling. THC is what makes people lethargic, difficult to focus and mild hallucinations.THC has no clinical application.

People use marijuana and other drugs as a means to relieve stress and to feel high. Drugs are perceived to be additive but they also possess the ability to make people feel good and/or be the cure to certain diseases. Marijuana is not an effective drug that can decrease depression and anxiety yet instead it creates higher dependency, Likelihood of future mental problems and exacerbates symptoms of anxiety and depression.

Methodology

To begin, Spechler et al. (2020) used a combination of participant survey data, motor tracking software and neuroimaging to track impulsivity among groups differing in cannabis use frequency. Functional MRI (fMRI) measurements were taken of the right inferior frontal gyrus and insula of the brain. Only these areas of the brain were examined since Borgwardt et al. (2020) and Hester et al. (2009) found that these two sections of the brain show changes in activity when suppressing reactions. The sample of 500 participants were selected from the Tulsa 1000 project, a longitudinal study of 1000 individuals who were seeking treatment for psychiatric disorders and controls who were never seeking treatment (Victor et al., 2018). Participants who presented a positive alcohol or illicit drug urine screening, active suicidal ideation, bipolar, OCD, or schizophrenia disorder, traumatic brain injury, unmedicated serious

medical disturbances, and “fMRI contraindictons” were excluded from Spechler et al. (2020) participant pool. The independent variables obtained from the sample were three ordinal levels; “Anx/Dep+CB”, “Anx/Dep-lowCB”, and a “healthy” control group. “Anx/Dep+CB” group was made up of 42 individuals that were diagnosed with lifetime anxiety, or depression disorder, and a lifetime DSM-IV diagnosis of cannabis dependence, or reported cannabis use within the year to be 50 or more times. “Anx/Dep-lowCB” group consisted of 42 participants with similar low levels of anxiety and depression to each other. Grouping of this variable was determined using a programming software (R) that analyzed and grouped participants based on several demographic variables and their scores from Gershon et al.’s (2010) “Patient-Reported Outcomes Measurement Information System” as well as, “alcohol, nicotine dependence, anxiety and depression scores” obtained from initial clinical interviews performed by Spechler et al.’s (2020) staff. The “ MINI International Neuropsychiatric Interview” provided the diagnostic scores. The healthy control group had no lifetime diagnoses of anxiety or depression and have used cannabis less than 15 times in their life, making up a total of 37 control participants. After grouping the participants, surveys and trials testing impulsivity were administered.

The dependent variables for impulsivity testing were obtained from the participants' results of Lynam et al.’s (2006) impulsivity questionnaire “UPPS-P”. The survey organized participants into the following five impulsive personality traits: negative or positive urgency, lack of premeditation, lack of perseverance, and sensation seeking. Once the three independent groups' scores were recorded, they then completed a computer tracking task, Matthews et al. 's (2005) Stop Signal Task (SST), to measure how participants can stop an initiated motor response in the moment. While taking the task, neuroimaging was simultaneously performed with the fMRI. This was how response inhibition was determined. For the SST task, participants had the

option of pressing two buttons, each corresponding to “go” when on the screen, but were instructed to not select a button if a stop signal was shown. The fMRI initial images were performed using Cox’s (1996) AFNI software and four sections of the right inferior frontal gyrus and insula of the brain were observed: “R, Opercularis, R. Orbitalis, R. vAnt. Insula, and R. dAnt. Insula” (Spechler et al., 2020). Response to the SST task was observed and recorded from the four sections using two general linear model analyses. Analysis methods for the UPPS-P were a multivariate linear mixed effects model, and a post-hoc pairwise test for differences within the five impulsive personality traits. The SST was analyzed using multiple regression models and correction was included using the Holm-Bonferroni method. Finally, Bayes factors instead of p-values were used to support or reject the null hypothesis.

Hser et al. (2017) investigated if changes in anxiety, depression, quality of sleep and life are associated with long term cannabis use, and if reduction use improved these areas, using data from a medication trial on cannabis users. Gray et al. (in press) trial was a longitudinal study for N-Acetylcysteine (NAC) to treat cannabis use disorder. Gray et al. (in press) randomly divided a sample of 302 adults into two groups; the control received a placebo and the experimental received 1200mg of NAC twice daily, for 12 weeks. They also had to receive contingency (two times a week) and medication management therapy (weekly) . The participants chosen had all passed a urine drug screen that was positive for cannabis and failed to meet the criteria for synthetic and tobacco dependence. Screening occurred at the initial day, four, eight, and 12 weeks of treatment. Sleep monitoring was assessed weekly for the first month.

The dependent variables were anxiety, depression, sleep quality, quality of life, alcohol, cannabis, and tobacco use. Anxiety and depression were screened using Zigmound & Snaith (1983) Hospital Anxiety and Depression Scale; scoring on a scale from 0-21. Hser et al. (2017)

considered scores 8 and above to be clinically significant depression and anxiety. Sleep quality was measured using Buysse et al. 's (1989) Pittsburgh Sleep Quality Index (PSQI). Also ranging from score 0-21, scores over 5 indicated poor sleep quality. Quality of life was measured using the Phenx Toolkit, on a scale from 0-60 participants were asked the duration of days having physical and mental health problems in the past 30 days. Lastly, self reported days of cannabis, standard alcohol drinks , and tobacco used within the past week were recorded for the final variable.

Hser et al. (2017) took this data and analyzed it using SAS (2013) growth curve model. The growth curve model created two slopes for cannabis use trajectory: reduction and increase. Using the slope results, Hser et al. (2017) divided the 302 participants into two independent groups; negative slopes were in the "Cannabis Use Reduction group (n = 152)" and positive slopes were in the "Cannabis Use Increase (n=150)" group. Trends for each dependent variable were created using Model I and Model II linear growth curves. Model II controls for nicotine use, alcohol use and demographics.

Hines et al. (2020) also performed secondary analysis on the Avon Longitudinal Study of Parents and Children to observe association between cannabis potency, substance use disorder, and mental health outcomes. This cohort tracked participants from birth until 24 years of age. Focused only on 1087 participants that reported cannabis use within the past year, this sample was asked to report on cannabis potency, frequency of use, prospective measures and mental health outcomes. Mental health was assessed by having the participants take Lewis et al. 's (2009) Clinical Interview Schedule–revised, a diagnostic tool to assess for psychiatric disorders. Other substance use was assessed for dependency using Heatherton et al. 's (1991) Fagerström Test for Nicotine Dependence, the DSM-5's criteria for Alcohol Use Disorder, and self-reported

substance use. Age of onset was taken and socioeconomic status at adolescence. Analysis of the association between results of cannabis potency (independent variable now), substance use, and mental health was conducted using univariable and multivariable logistic regression. All analysis accounted for sex, socioeconomic status, history of bullying, race, and any self-reported parental mental health problems.

Results and Analysis

Spechler et al. measured the neurological progression of cannabis use disorder in three different psychiatric groups. The three groups include anxiety/depression prone cannabis abusers and anxiety/depression prone low frequency cannabis users. As seen in table 1, the psychiatric groups were evaluated on their mental health in a variety of categories. In table 2 these psychiatric groups were related to a urgency abuse model which predicted the likelihood of them using cannabis based on different psychological stressors. This group included a control group known as the healthy group of people who use cannabis very infrequently or don't use it at all.

Feature	Psychiatric Groups				
	Anx/Dep+CB (*n*=42)		Anx/Dep-lowCB (*n*=42)		
	N	***%***	***N***	***%***	***p***
Lifetime Anxiety/Depression Diagnoses					
Any MDD **and** Anxiety Disorders*	19	.45	28	.67	.08
Any MDD **without** Anxiety Disorders	15	.36	10	.24	.34
Any Anxiety Disorders **without** MDD	8	.19	4	.10	.35
MDE Frequency					
Single Episode	9	.21	7	.17	.78
Recurrent Episode	24	.57	31	.74	.17
MDE Status					
Current Episode	12	.29	21	.50	.07
Partial Remission	13	.31	14	.34	.99
Full Remission	8	.19	3	.07	.20

Table 1: The data tabulated above presents the mental health issues associated with the low and high cannabis use psychiatric groups.The MDE status refers to major depressive episodes for the respective group.

Measure	Group					
	Healthy		***A/D-lowCB***		***A/D+CB***	
	Sum Scores (M,SD)	***Mean Scores (M,SD)***	***Sum Scores (M,SD)***	***Mean Scores (M,SD)***	***Sum Scores (M,SD)***	***Mean Scores (M,SD)***
Negative Urgency	20.2, 6.2	1.7, .52	28.3, 7.0	2.4, .58	34.6, 7.0	2.9, .58
Positive Urgency	18.7, 6.1	1.3, .44	25.5, 9.6	1.8, .68	31.5, 10.2	2.3, .73
Lack of Premeditation	19.4, 4.1	1.8, .38	19.2, 6.5	1.8, .60	23.1, 7.1	2.1, .65
Lack of Perseverance	16.2, 3.2	1.6, .32	18.7, 5.0	1.9, .50	20.6, 5.6	2.1, .56
Sensation Seeking	34.3, 6.9	2.9, .57	32.4, 9.1	2.7, .76	34.5, 8.2	2.9, .68

Table 2: This table demonstrates the urgency use of different psychiatric groups.

Hser et al. 's (2017) found significant findings in group Cannabis Use Reductions (CR) and the four dependent variables. First, the demographics obtained revealed there was no significant difference in the groups age (CR had an average of 30.8 year olds while Cannabis Increase group (CI) had an average age of 29.9 years old), gender (32.3% females in CR, 24.7% females in CI), attended college education or higher (64.5% in CR, 64% in CI), and employment (61.8% in CR, 64% in CI) (Hser et al., 2017). At baseline, these groups did not significantly differ overall in demographics besides the CR group having 16.2% more ethnically black participants than CI. Clinical screenings shown in table 3 show no significant difference in the average scores reported between groups (CR) and (CI) on the initial day of the 12 week treatment. Only reported cannabis use was lower in the CI group by an average of 2.4.

	Cannabis use reduction group	Cannabis increase group	Total
	N = 152	*N* = 150	*N* = 302
Cannabis use in past 30 days (mean/SD)	27.2/4.8	24.8/7.2	26.0/6.2
Number of standard alcohol drinks per week (mean/SD)	4.0/7.2	4.9/6.8	4.5/7.0
Number of cigarettes per week (mean/SD)	22.4/41.3	21.1/43.8	21.8/42.5
N-acetylcysteine/placebo (%)	45.4/54.6	56.0/44.0	50.7/49.3
Anxiety (mean/SD)	6.3/3.8	6.5/4.0	6.4/3.9
Above the normal range (N/%)	57/37.5	51/34.0	108/35.8
Depression (mean/SD)	3.9/3.2	4.0/3.4	4.0/3.3
Above the normal range (N/%)	31/13.8	26/17.4	47/15.5
Quality of life (mean/SD)	7.4/10.8	8.5/11.0	8.0/10.9
≥14 days (N/%)	28/18.4	36/24.0	64/21.2
Sleep quality (mean/SD)	6.5/3.3	6.3/3.3	6.4/3.3
Poor sleep quality (N/%)	105/69.1	103/68.7	208/68.9

Table 3: Mean/SD result scores of clinical screening from initial day of treatment. No significant differences between Cannabis Use Reduction (CR) group and Cannabis Increase (CI) group besides average cannabis use in 30 days at initial assessment (CR M=27.2, CI M=24.8), ($p < 0.01$ chi-square and t-test). (Hser et al., 2017).

The latent growth curve models for the four dependent variables are represented in table 4. Intercepts for Model II were on average .38 higher than Model I. Model II slopes for anxiety in CR were negatively proportionate at -0.09. The other three variables were also negatively associated with cannabis demonstrating a negative slope. Considering these results, more reduced cannabis use was shown to be associated with less anxiety but also less quality of life. Hser et al. (2017) found reduced cannabis use led to significantly greater reduction of anxiety, depression, and sleep quality.

Parameter	Anxiety		Depression		Quality of life		Sleep quality	
	Model I	Model II	Model I	Model II	Model I	Model II	Model I	Model II
Intercept	5.91(0.94)**	6.75(1.14)**	2.49(0.76)**	2.98(0.89)**	9.36(2.64)**	9.44(3.12)**	5.30(0.70)**	5.39(0.82)**
Age	0.03(0.02)	0.02(0.03)	0.04(0.02)	0.03(0.02)	0.04(0.07)	0.03(0.08)	0.03(0.02)	0.02(0.02)
Gender	−1.37(0.49)**	−1.33(0.58)*	0.23(0.40)	0.18(0.45)	−3.90(1.38)**	−2.74(1.59)	−0.76(0.36)*	−0.69(0.42)
White	0.81(0.53)	1.20(0.63)	−0.51(0.43)	0.13(0.49)	1.93(1.48)	2.98(1.72)	0.17(0.39)	0.40(0.46)
Black	−1.09(0.59)	−0.25(0.70)	−0.08(0.48)	0.53(0.55)	−0.40(1.66)	0.67(1.93)	−0.24(0.44)	−0.06(0.51)
Treatment arm	0.56(0.44)	0.02(0.52)	0.57(0.36)	0.17(0.41)	0.73(1.24)	−0.21(1.43)	−0.09(0.33)	−0.18(0.38)
Cannabis use reduction	0.03(0.44)	−0.63(0.54)	−0.04(0.36)	−0.31(0.42)	−1.15(1.25)	−1.69(1.49)	0.30(0.33)	0.09(0.40)
Slope	−0.14(0.08)	−0.18(0.08)*	0.003(0.07)	−0.007(0.08)	−0.35(0.28)	−0.31(0.29)	−0.07(0.07)	−0.03(0.07)
Age	0.002(0.002)	0.003(0.002)	−0.001(0.002)	−0.001(0.002)	0.01(0.01)	0.01(0.007)	0.00(0.002)	0.00(0.002)
Gender	0.04(0.04)	0.01(0.04)	0.01(0.04)	−0.007(0.04)	0.11 (0.14)	−0.03(0.15)	0.01(0.03)	−0.01(0.03)
White	0.01(0.04)	−0.02(0.05)	0.005(0.04)	−0.04(0.04)	−0.07(0.15)	−0.17(0.16)	−0.02(0.04)	−0.03(0.04)
Black	0.03(0.05)	0.005(0.05)	−0.04(0.05)	−0.06(0.05)	0.05(0.17)	0.03(0.18)	−0.06(0.04)	−0.06(0.04)
Treatment arm	−0.01(0.04)	−0.006(0.04)	−0.005(0.03)	0.001(0.04)	−0.14(0.13)	−0.14(0.13)	0.05(0.03)	0.04(0.03)
Cannabis use reduction	−0.10(0.04)**	−0.09(0.04)*	−0.10(0.04)**	−0.11(0.04)**	−0.06(0.13)	−0.12(0.14)	−0.06(0.03)	−0.07(0.03)*
Covariance slope and intercept	−0.16(0.09)	−0.18(0.09)*	−0.15(0.07)*	−0.13(0.07)	−2.48(1.07)*	−2.13(1.06)*	−0.12(0.05)**	−0.12(0.05)*
Time varying covariates								
Cigarettes								
baseline		0.005(0.006)		0.004(0.005)		0.03(0.02)		0.003(0.005)
Week 1								−0.002(0.005)
Week 2								−0.004(0.005)
Week 3								−0.005(0.005)
Week 4								−0.007(0.005)
Week 5		−0.004(0.006)		0.003(0.005)		0.02(0.02)		0.001(0.005)
Week 9		−0.005(0.007)		0.01 (0.006)		0.03(0.02)		−0.003(0.006)
Week 12		0.007(0.007)		0.02(0.006)**		0.02(0.02)		0.00(0.006)
Alcohol								
Baseline		−0.07(0.03)*		−0.05(0.03)*		−0.24(0.09)*		0.03(0.03)
Week 1								−0.004(0.02)
Week 2								0.02(0.02)
Week 3								0.001(0.02)
Week 4								−0.02(0.02)
Week 5		−0.05(0.02)*		−0.04(0.02)		−0.02(0.09)		−0.02(0.02)
Week 9		0.05(0.03)		−0.004(0.02)		−0.04(0.08)		−0.004(0.02)
Week 12		0.03(0.03)		0.007(0.03)		0.14(0.13)		−0.02(0.03)
Goodness of fit								
N	302	219	302	219	302	219	302	219
χ^2	29.73*	47.54	29.73*	58.97*	28.21*	71.53**	156.89**	257.34**
Df	17	41	17	41	17	41	67	179
RMSEA	0.05	0.03	0.05	0.05	0.05	0.06	0.07	0.05
CFI	0.98	0.99	0.97	0.95	0.96	0.88	0.93	0.93
TLI	0.96	0.98	0.94	0.93	0.92	0.82	0.91	0.92

* $p < 0.05$.
** $p < 0.01$.

Table 4: Latent growth model coefficient estimates, and standard errors in parenthesis, for variables: anxiety, depression, sleep quality, and quality of life.

Hines et al. 's (2020) study consisted of participants ages 24 and below targeting “new” users.The study also asked the participants questions to determine sanity and screen for possible symptoms of psychosis that might be present. The study consisted of 4 groups, First group contained healthy individuals,second group had Mairjuana users, third group had alcohol users and lastly nicotine(tobacco) users.

Outcome variable	Univariable OR (95% CI)	*P* value	Adjusted for childhood sociodemographic factors, AOR (95% CI)	*P* value	Adjusted for prospective mental health measures, AOR (95% CI)	*P* value	Adjusted for frequency of cannabis use, AOR (95% CI)	*P* value
Regular cannabis use	6.21 (4.24-9.11)	≤.001	5.81 (3.90-8.65)	≤.001	4.38 (2.89-6.63)[b]	≤.001	NA	NA
Recent cannabis use problems	13.17 (5.41-32.04)	≤.001	13.52 (5.28-34.60)	≤.001	8.45 (3.04-23.50)[b]	≤.001	4.08 (1.41-11.81)	.009
Recent use of other illicit drugs	2.47 (1.53-3.97)	≤.001	2.19 (1.35-3.56)	.002	1.50 (0.91-2.49)[b]	.11	1.29 (0.77-2.17)	.34
Tobacco dependence	3.31 (2.23-4.92)	≤.001	3.30 (2.18-4.99)	≤.001	2.05 (1.31-3.19)[b]	.002	1.42 (0.89-2.27)	.14
Alcohol use disorder	1.60 (0.94-2.73)	.08	1.49 (0.86-2.56)	.15	0.99 (0.56-1.76)[b]	.97	0.90 (0.49-1.64)	.73
Major depression (moderate or severe symptoms)	1.24 (0.70-2.18)	.46	1.61 (0.89-2.93)	.12	1.54 (0.84-2.82)[c]	.16	1.28 (0.68-2.32)	.44
Generalized anxiety disorder	1.77 (1.09-2.86)	.02	2.35 (1.41-3.92)	≤.001	2.28 (1.36-3.83)[c]	.002	1.92 (1.11-3.32)	.02
Psychotic-like experiences	1.81 (1.01-3.24)	.047	2.03 (1.10-3.73)	.02	1.86 (1.00-3.46)[d]	.05	1.29 (0.67-2.50)	.45

Data set 5: shows data collected by Hines and measures participants dependence and intake of certain drugs.

According to Hines, High potency cannabis use creates an addiction to cannabis among the users. The study also depicts that high potency increased the likelihood of users developing Anxiety disorder. Participants that reported frequent and high potency use frequently experience cannabis related problems compared to participants that either don't use cannabis or consume less frequently and at lower doses. 58% of the male participants reported High cannabis usage while female participants reported 17% . 10.1% of the high potency among males users reported cannabis usage problems while .8% of female users reported problems.

According to the data provided 13.17% of regular users reported problems caused by cannabis use. 1.24% of high potency users were screened positive for major depressive

symptoms and 1.77% displayed some sort of anxiety disorder and 1.88% reporting Psychotic-like experiences. Also according to Hines participants that reported high potency use were 4 times more likely to report problems associated with cannabis use.

Discussion

As shown in the data provided, prolonged cannabis use can be disorderly and destructive in those who have anxiety and depression. This is a significant consideration to make as those with anxiety and depression are the most prone to using the drug as an escape. However, as shown in the data section, we see that dependence is an unavoidable aspect of this use and it causes the person to use the drugs with less discretion than when they started. This phenomenon is shown in the results, Spechler et al. (2020) took a more neurological avenue in examining their subjects. The Anx/Dep+CB"; *n*=42 Group(those with cannabis misuse issues) was shown to score higher on the UPPS-P Impulsivity Questionnaire for both negative and positive urgency scales. This essentially means that they were questioned to see the likelihood of them using cannabis when prompted in situations where it was of variable importance. For instance, a positive urgency situation would be if they were presented with a stressful situation like the death of a loved one. A negative urgency situation would be one where there was very minimal stress placed on the subject. As shown in table 3, the A/D+CB group was the most prone to drug use in a situation of any urgency, and the A/D+lowCB group was followed by the healthy group. Hines et al. (2020) and Spechler agree that cannabis exposure eventually leads to dependence in a majority of cases. The only discrepancy found was that the A/D+CB group seemed to have fewer mental health issues than the A/D+lowCB group. Spechler et al. (2020), tried to rectify this issue

by determining the difficulty of measuring drug use as a limiting factor. Hser et al. (2017), however, stated that the use of marijuana is shown to actually increase mental health issues and that frequency is an attributing factor. Because Spechler et al. (2020), did not devise a study purely (or even *mostly*) to determine how marijuana affects mental health, this issue can be overlooked. They prioritized the urgency results and made no mention about the mental health results in their discussions section. This issue is better explained by Hser et al. (2017) who explicitly made a study to determine how the symptoms are affected by frequency of use. The biggest takeaway from Hser et al. (2017) was that a decreased frequency of marijuana use led to a better overall severity of symptoms. Hser et al. (2017), emphasize the fact that although cannabis users report reduced levels of anxiety and depression in the short term, they actually experience heightened levels of the symptoms associated over long stretches of time when analyzed. At the beginning of the experiment, the baseline showed that most of the participants were high-level substance users of marijuana and alcohol with poor quality of sleep, anxiety, depression, and mediocre quality of life. Over the course of time when they reduce their use of these substances, it was shown that their anxiety, depression, and quality of sleep became better but not their quality of life. Because of this data, they were able to come to the conclusion that using less marijuana provided the person with a better chance of recovering from their mental illness i.e the opposite can be stated about the increased use of marijuana. More cannabis led to worse symptoms like addiction and resentment of their use of the drug.

Conclusion

Despite the proposed theories that Cannabis use among those who have longitudinal anxiety and depression can help mitigate these symptoms, its success rate in the long term points otherwise. In fact, the opposite could be said as the sustained use of cannabis among these

groups only heightens these symptoms as well as overall quality of life variables. When Spechler et al. (2020) examined those undergoing urgent situations, the A/D+CB group was the most prone to drug use, with the A/D+lowCB and then the healthy group following. Suggesting that the dependence level using cannabis is also increased and thus lowering their quality of life and ability to exercise control in situations causing them tension. When also observing Hser et al. 's (2017) report of the findings it could be seen that the Model II slope for the CR group was negatively proportionate for anxiety and the other factors such as Depression, quality of life, and sleep quality.

Our utilization of multiple papers to examine the effects of cannabis on those with long term anxiety point to mainly higher levels of anxiety with sustained use. With the studies of Hine et al.'s (2020), Spechler et al. 's (2020), and Hser et al.'s (2017) all relatively aiming towards this conclusion with similar results, it shows how sustained cannabis use with higher dosages can lead to negative outcomes such as increased likelihood of experiencing psychotic episodes, higher levels of experiencing increased levels of negative impulsivity, and mental health damage. Analyzing each study's experiments and information from each data and analysis section for reference, allowed us to conclude arguments such as less marijuana provides the person with a better chance of recovering from their mental illness than the increased use of marijuana, along with concluding that Marijuana is not an effective drug that can decrease depression and anxiety yet instead it creates higher dependency, likelihood of future mental problems, and exacerbates symptoms of anxiety and depression.

Because of the data and experiments tested we are able to arrive at the point that Marijuana is not an effective long term drug that can decrease depression for those having longitudinal anxiety. Future examinations to reexamine the effect of cannabis on those who have

longitudinal anxiety should be aware attention to the inclusion of dependent variables in relation to anxiety such as depression, sleep quality, quality of life, alcohol, cannabis, and tobacco use in order to truly evaluate the effects of quality of life as well. We made sure to keep track of these dependent variables to give us a holistic approach to how those in the study were affected. Our studies also gave us different experimental approaches as well. Different environmental factors between the selected population should also be accounted for in relation to the different experimental population pool.

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