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# Changes in Mental Health Symptoms as a Predictor of Cannabis Coping Motives and Consequences: Examining the Impact of COVID-19 Among College Students

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## ABSTRACT

**Objective:** Cannabis use is common among college students and many students use cannabis to cope with negative affect. The COVID-19 pandemic was a particularly stressful time for college students. Subsequently, the present study compared college students who reported increases in anxiety/depression symptoms since COVID-19 stay at home orders to those who reported no change in anxiety/depression symptoms on cannabis coping motives, use frequency, and negative consequences. Specifically, we examined whether self-reported changes (i.e., group that indicated increases) in poor mental health during COVID-19 were associated with problematic cannabis use via higher cannabis coping motives. **Method:** College students (analytic  $n = 291$ ) completed an online survey for research credit regarding their personal mental health, COVID-19 stressors, and cannabis use behaviors. **Results:** Individuals who reported increased depressive symptoms (57.4% of the current sample) due to COVID-19 (as compared to individuals whose depressive symptoms remained the same) reported significantly higher cannabis coping motives ( $d = .79$ ) as well as more cannabis consequences ( $d = .37$ ). Further, students who reported increased (61.5% of the current sample) anxiety symptoms (as compared to those whose anxiety symptoms stayed the same) also reported significantly higher cannabis coping motives ( $d = .47$ ). Moreover, we found that students who reported an increase in depressive/anxiety symptoms reported more cannabis consequences via higher endorsement of cannabis coping motives while controlling for gender, cannabis use frequency, and past-week anxiety/depressive symptoms. **Discussion:** Providing resources for substance-free coping strategies to manage the mental health impact of COVID-19 may be extremely useful for this population.

**Key words:** = cannabis, mental health, COVID-19, college students, cannabis coping motives

Cannabis use has been prevalent on college campuses for decades and use rates continue to increase (Miech et al., 2017). Within a recent study, about 53.3% of college students reported that they have used cannabis, and 26.2% reported that they have used cannabis in the past month (Pearson et al., 2017). Further, excessive cannabis use is associated with numerous negative outcomes (see Memedovich et al., 2018 for a review), including experiencing negative cannabis-related consequences (Bravo et al., 2019b) and cannabis use disorder (Gunn et al.,

2020). In examining risk factors of problematic cannabis use, poor mental health has been identified as a key risk factor (Phillips et al., 2018; Walters et al., 2018). In the United States, rates of depression and anxiety have consistently increased between 2007 and 2018 and likely will continue to do so (Duffy et al., 2019). Although there are different types of treatments and therapies for mental health issues, students may take it upon themselves and use unhealthy methods to cope with their struggles.

Although students may use cannabis for a

variety of reasons (Barker & Moreno, 2021; Lee et al., 2009; Simons et al., 1998), some use cannabis to help deal with negative affect (i.e., coping motives, see Cooper et al., 2016 for a review of cannabis motives). Using cannabis to decrease issues such as anxiety, sleep, depression, pain, loneliness, social discomfort, and concentration is prevalent in this population, with one study finding that 76% of college students supported using cannabis to self-medicate (Wallis et al., 2022). Clinically, coping with negative affect by using cannabis leads to problematic cannabis use and negative cannabis outcomes (Hartmann & McLeish, 2020). In support of the self-medication hypothesis (Khantzian, 1997) and other negative affect models of addiction (Sher et al., 2005), research has found that depressive and anxiety symptoms are indirectly related to cannabis consequences via cannabis coping motives (Bravo et al., 2019a, c; Buckner et al., 2007; Walukevich-Dienst et al., 2022). Although the relationship between mental health issues, cannabis coping motives, and problematic cannabis use has been established, COVID-19 has become another stressor for college students.

### *The Impact of COVID-19*

COVID-19 destabilized life for college students (Telli et al., 2021) and researchers are continuing to gather data to understand the impact COVID-19 has had on mental health and cannabis use among college students. One study found that 60.8% of students had increased anxiety and 54.1% of these students had increased depression (Lee et al., 2021). In a study at a large Texas university, researchers found that more than 71% of students reported that their anxiety levels had increased during the pandemic (Wang et al., 2020). However, less than half of the students reported that they were able to cope effectively with the stress related to the pandemic (Wang et al., 2020). Taken together, the growing literature (Fruehwirth et al., 2021; Kecojevic et al., 2020; Son et al., 2020) suggests a clear increase in mental health struggles due to COVID-19 among college students.

Particularly concerning is the possibility that struggling college students may turn to cannabis to self-medicate and temporarily feel better about their issues. In the fall of 2020, a national study

found that 15.7% of 19-year-olds used cannabis to cope with COVID-19 (Patrick et al., 2022). Moreover, at the beginning of the pandemic researchers found that young adults believed their peers had increased their cannabis use during COVID-19 compared to their use in January of 2020, months before the lockdown (Graupensperger et al., 2021). However, when examining changes in cannabis use and consequences, the evidence is mixed. For example, a recent study across seven universities demonstrated that cannabis use days were 24% higher in college students after schools were closed (i.e., classes were moved to remote platforms) due to COVID-19, but cannabis consequences did not increase (Schepis et al., 2021). Another study found no changes in cannabis use as a result of COVID-19 (Graupensperger et al., 2021), whereas a different study found that cannabis use declined (Merrill et al., 2022).

### *Purpose of Present Study*

In a pre-COVID-19 world, college students were using cannabis to cope with mental health issues. However, in the present day as COVID-19 continues to cause stress and mental health challenges, problematic cannabis use may be increasing because students may be using it to cope with poor mental health resulting from COVID-19. The present study compared college students who reported increases in anxiety/depression symptoms since COVID-19 stay at home orders to those who reported no change in anxiety/depression symptoms on cannabis coping motives, use frequency, and negative consequences. Further, we examined whether self-reported changes (i.e., group that indicated increases) in poor mental health during COVID-19 were associated with problematic cannabis use via higher cannabis coping motives.

## **METHODS**

### *Participants and Procedure*

Participants ( $n = 1,318$ ) were college students recruited from Psychology Department participant pools from two universities in Virginia between Fall 2020 and Spring 2021. Participants

completed an online survey for research credit regarding their personal mental health, COVID-19 stressors, substance use behaviors, and coping strategies. For the present study, we only used data from students that: a) consumed cannabis on at least one day in the previous month ( $n = 330$ ), b) answered questions about changes in mental health due to COVID-19, c) completed assessments of cannabis coping motives, cannabis use frequency, and consequences, and d) reported their gender (final  $n = 291$ ). Among the analytic sample, most participants identified themselves as being either White, non-Hispanic ( $n = 179$ , 61.5%) or Black/African American ( $n = 103$ , 35.4%), female ( $n = 206$ , 70.8%), and reported a mean age of 20.31 ( $SD = 3.71$ ) years. The study was approved by the institutional review boards at the participating institutions.

### *Measures*

*Self-reported Changes in Mental Health due to COVID-19.* The impact of COVID-19 on depressive and anxiety symptoms was measured using one question for each symptom. The questions asked, “Since the COVID-19 stay at home order went into effect in your state, has your general level of depression/anxiety” and the response options included “increased”, “decreased”, or “remained the same”.

*Depressive/Anxiety Symptoms.* Past week depressive/anxiety symptoms were assessed using the 21-item Depression, Anxiety, Stress Scale (DASS-21; Lovibond & Lovibond, 1995). Participants responded to items related to depression symptoms (6 items;  $\alpha = .89$ ) and anxiety symptoms (7 items;  $\alpha = .85$ ) on a 4-point scale (0 = *did not apply to me at all*, 3 = *applied to me very much, or most of the time*). These subscales were used as covariates in the models.

*Cannabis Coping Motives.* Cannabis use motives in the past 30-days were measured using the 15-item Marijuana Motives Questionnaire Short Form (MMQ-SF; Simons et al., 1998). Participants responded on a 5-point scale (1 = *almost never/never*, 5 = *almost always/always*) and only coping motives (3 items;  $\alpha = .92$ ) were used given the study aims. The three items that assessed coping motives were: “to forget my worries”, “because it helps me when I feel

depressed or nervous”, and “to cheer me up when I am in a bad mood”.

*Cannabis Use Frequency and Consequences.* Cannabis use frequency was measured using a table in which participants were asked to approximate the number of grams of cannabis they used on a typical week in the last 30 days (Pearson et al., 2022). The table included each day of the week sectioned off into four-hour time slots beginning with 12am-4am. Participants indicated how much cannabis they used, when they used it, and the number of grams they used. Frequency of use (covariate in the model) was calculated by summing the endorsed time blocks in which cannabis was used (range = 0 – 42). Cannabis consequences were measured using the Brief Marijuana Consequences Questionnaire (B-MACQ; Simons et al., 2012). Participants were asked to indicate whether each of the 21 statements described happened (yes/no) to them in the last 30 days. A total score was created such that higher scores indicate greater number of consequences experienced ( $\alpha = .88$ ).

### *Data Analysis Plan*

Before running the primary analyses (i.e., mediation models), we first computed bivariate correlations and conducted a series of mean comparisons on cannabis coping motives, frequency of use, and negative consequences between students endorsing differing self-reported changes in mental health due to COVID-19. Next, mediation analyses (Model 4 in PROCESS) were conducted using the PROCESS 4.0 macro for SPSS (Hayes, 2017) examining the indirect effect of cannabis coping motives on the relationship between self-reported changes in anxiety/depressive symptoms and cannabis consequences. Gender, frequency of cannabis use, and past week anxiety/depressive symptoms were estimated as covariates in the mediation models. Statistical significance was determined by percentile-bootstrapped 95% confidence intervals that do not contain zero.

## **RESULTS**

Among students that reported past 30-day cannabis use ( $n = 330$ ), 53.2% reported an increase, 38.5% reported that it remained the same,

Table 1. *Bivariate Correlations of All Observed Variables among Total Sample (n = 291)*

	1	2	3	4	5	6	7	8	<i>M</i>	<i>SD</i>
1. Changes in Depressive Symptoms	---								0.57	0.50
2. Changes in Anxiety Symptoms	<b>.47</b>	---							0.63	0.48
3. Cannabis Coping Motives	<b>.37</b>	<b>.24</b>	---						2.35	1.35
4. Cannabis Use Frequency	<b>.11</b>	-.03	<b>.33</b>	---					5.60	7.96
5. Cannabis Consequences	<b>.19</b>	.10	<b>.50</b>	<b>.37</b>	---				3.44	4.07
6. Gender	<b>.13</b>	<b>.14</b>	.10	-.08	<b>-.12</b>	---			0.71	0.46
7. Depressive Symptoms – DASS-21	<b>.31</b>	<b>.25</b>	<b>.44</b>	<b>.13</b>	<b>.38</b>	.04	---		5.24	5.05
8. Anxiety Symptoms – DASS-21	<b>.22</b>	<b>.23</b>	<b>.29</b>	<b>.18</b>	<b>.31</b>	.10	<b>.68</b>	---	4.60	4.39

*Note.* Significant correlations ( $p < .05$ ) are bolded for emphasis. Changes in Depressive /Anxiety Symptoms was coded: 0 = remain the same, 1 = increase in symptoms. Gender was coded: 0 = men, 1 = women. DASS-21 = 21-item Depression, Anxiety, Stress Scale. Associations between dichotomous variables (i.e., gender and changes in depressive/anxiety symptoms) and continuous variables are represented as Point-Biserial correlation coefficients. Associations between dichotomous variables are represented as Spearman Rho correlation coefficients. Associations between continuous variables are represented as Pearson r correlation coefficients.

Table 2. *Summary of Mean Differences on Cannabis Outcomes Based on Self-Reported Changes in Mental Health due to COVID-19*

<b>Changes in Depressive Symptoms due to COVID-19</b>				
Outcome Variable:	Remained the Same ( <i>n</i> = 126)	Increased ( <i>n</i> = 174)	<i>t</i>	Cohen's D
Cannabis Coping Motives	1.78 (0.98)	2.78 (1.43)	<b>t = -7.12</b>	<b>0.79</b>
Cannabis Use Frequency	4.62 (7.13)	6.21 (8.33)	t = -1.73	0.20
Cannabis Consequences	2.56 (2.99)	4.03 (4.54)	<b>t = -3.40</b>	<b>0.37</b>
<b>Changes in Anxiety Symptoms due to COVID-19</b>				
Outcome Variable:	Remained the Same ( <i>n</i> = 106)	Increased ( <i>n</i> = 185)	<i>t</i>	Cohen's D
Cannabis Coping Motives	1.97 (1.17)	2.59 (1.41)	<b>t = -4.05</b>	<b>0.47</b>
Cannabis Use Frequency	5.82 (8.28)	5.38 (7.46)	t = 0.47	0.06
Cannabis Consequences	2.85 (3.67)	3.69 (4.18)	t = -1.79	0.21

*Note.* Significant t-tests and Cohen's D estimates were determined by 95% CIs that did not contain zero. Significant mean differences are in bold typeface for emphasis.

and 8.3% reported a decrease in depressive symptoms. Further, 58.7% reported an increase, 34.6% reported that it remained the same, and 6.7% reported a decrease in anxiety symptoms. Given low sample sizes for those reporting a decrease ( $n = 27$  for depression,  $n = 22$  for anxiety), all analyses focused only on comparisons between participants that reported an increase versus those that reported their symptoms remained the same ( $n = 291$  for depression model;  $n = 282$  for anxiety model).

Bivariate correlations and descriptive statistics of all study variables are presented in Table 1. Results from the independent t-tests are reported in Table 2. For changes in depressive symptoms, we found significant mean differences between groups on cannabis coping motives and cannabis consequences. Specifically, the group that indicated an increase in depressive symptoms due to COVID-19 reported higher coping motives and consequences (coping:  $M = 2.78$ ,  $SD = 1.43$ ; consequences:  $M = 4.03$ ,  $SD =$

4.54) compared to the group that indicated their depressive symptoms remained the same (coping:  $M = 1.78$ ,  $SD = 0.98$ ; consequences:  $M = 2.56$ ,  $SD = 2.99$ ) (Cohen's  $D$  coping = 0.79; Cohen's  $D$  consequences = 0.37). For changes in anxiety symptoms, we found only one significant difference such that students who indicated an increase in anxiety symptoms due to COVID-19 reported higher coping motives ( $M = 2.59$ ,  $SD = 1.41$ ) compared to the group that indicated their anxiety symptoms remained the same ( $M = 1.97$ ,  $SD = 1.17$ ) (Cohen's  $D = 0.47$ ).

Within our mediation models (depression model total effect  $R^2 = 26.6\%$ ; anxiety model total effect  $R^2 = 24.7\%$ ), we found significant direct effects between changes in depressive/anxiety symptoms (0 = *remain the same*, 1 = *increase*) on cannabis coping motives (depressive symptoms:  $b = 0.64$ ,  $\beta = .47$ , unstandardized 95% CI [0.36, 0.92]; anxiety symptoms:  $b = 0.56$ ,  $\beta = .41$ , unstandardized 95% CI [0.25, 0.86]). We also found significant direct associations between coping motives and cannabis consequences in both models (depressive symptoms model:  $b = 1.09$ ,  $\beta = .36$ , unstandardized 95% CI [0.75, 1.43]; anxiety symptoms model:  $b = 1.22$ ,  $\beta = .41$ , unstandardized 95% CI [0.90, 1.54]). As could be expected by these direct effects, we found significant indirect effects for both depressive symptom (indirect  $\beta = .171$ , standardized 95% CI [.07, .28]) and anxiety symptom models (indirect  $\beta = .166$ , standardized 95% CI [.07, .27]). Specifically, for both models, students who reported an increase in depressive/anxiety symptoms (compared to students endorsing remaining the same) reported more cannabis consequences via higher endorsement of cannabis coping motives.

## DISCUSSION

The present study found that students reporting an increase in internalizing symptoms due to COVID-19 (compared to those reporting no change in their anxiety/depressive symptoms) reported higher cannabis coping motives and more negative consequences (for depression symptoms model only). Prior research has found stronger associations between depressive symptoms and cannabis consequences compared to anxiety (Pedersen et al., 2015); however, those reporting increases in both anxiety/depressive

symptoms reported more coping motives supporting the self-medication hypotheses (Khantzian, 1997). Moreover, we found that students who reported an increase in depressive/anxiety symptoms reported more cannabis consequences via higher endorsement of cannabis coping motives. Our mediation findings are in support of prior research (Bravo et al., 2019a, c; Buckner et al., 2007; Walukevich-Dienst et al., 2022) and theory (e.g., self-medication hypothesis and negative affect models), but extends prior work by examining the impact of COVID-19. Previous research indicates that COVID-19 has created higher levels of poor mental health in college students (Lee et al., 2021; Wang et al., 2020), and we found similar findings in our results (majority of participants reported an increase in anxiety/depression symptoms compared to remain the same or decrease). Moreover, one study found that participants who were anxious about COVID-19 had an increased desire to drink and use drugs (Kleiman et al., 2020). This is consistent with our findings, which suggest that college students with increased anxiety/depression symptoms due to COVID-19 also reported higher cannabis coping motives; which in turn was related to more experiences of negative cannabis-related consequences.

## *Limitations and Future Research*

A major limitation of our study is that all of the data collected was self-reported and cross-sectional. Thus, causal inferences cannot be made and future research employing longitudinal or ecological momentary assessment designs are needed to replicate our findings. Moreover, given that our primary predictor focused on self-report of changes in mental health symptoms, further research using objective measures that examine how much change occurred is needed to further illuminate whether changes in mental health due to COVID-19 are associated with cannabis outcomes. Further, we only examined a few factors that may influence relationships between COVID-19, mental health, and cannabis use outcomes. Future research should examine how other factors, like stress (Halliburton et al., 2021) and isolation (Horigian et al., 2021) due to COVID-19 restrictions, impact our study results. Research has established that mindfulness and

exercise can help with mental health struggles (Goldstein et al., 2020), but future studies could explore how social support may also help college students. Such a study could also explore ways to improve social support, even during periods of physical isolation. Researchers should also explore how COVID-19 has impacted mental health and drug use of among vulnerable student populations (e.g., students that identify as first-generation, a racial/ethnic minority, or as part of LGBTQ+ community), as well as clinical populations.

### Conclusions

Our preliminary findings suggests that college students reporting mental health struggles due to COVID-19 are turning to cannabis to alleviate their struggles; however, this increased motivation to use cannabis to cope is associated with more experiences of negative cannabis-related consequences. Mental health interventions, especially those that are available online, may be increasingly important within this population. Additionally, providing resources for substance-free coping strategies to manage the mental health impact of COVID-19 may be extremely useful. If interventions were able to help students turn to healthier coping mechanisms, rates of using cannabis to cope may decrease which may also reduce negative consequences. Finally, more research is needed to examine longitudinal impacts of COVID-19 on mental health, cannabis use, motives, and consequences among college students.

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