

Correlates of Cannabis Use and Self-Control Across a Diverse Sample of College Students: 2020-2022

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ABSTRACT

Background: Despite the established relationship between substance use and self-control, it is unknown how the COVID-19 pandemic may have played a role in this association. Given the unique circumstances of the pandemic along with changing societal regulations surrounding cannabis use, and their collective impact on college students, there is a need to examine the relationship between cannabis and self-control during the pandemic era. **Methods:** Data was collected from a repeated cross-sectional sample of college students at a mid-sized, urban U.S. institution during 2020-2022. Logistic and negative binomial regression analyses along with an ANCOVA were conducted to examine associations between self-control and past 30-day cannabis use. **Results:** Lower self-control was significantly associated with using cannabis in the past 30-days with those individuals with self-reported low self-control using cannabis significantly more and more times per day. Finally, we found that both past 30-day cannabis use and cohort significantly predicted self-control with both individuals who report past 30-day cannabis use and the 2020 cohort reporting lower levels of self-control. There was not a significant interaction effect. **Conclusions:** Despite evolving legislation regarding both medicinal and recreational cannabis use, colleges often maintain drug-free campus policies. Given high rates of cannabis use among college students and continued development of self-control, this association should be examined longitudinally and considered when creating college-level cannabis policies. Implications for college students surrounding COVID-era environments, and self-control are discussed.

Key words: = cannabis use, college-aged students, self-control

Policies regarding the legalization of cannabis are changing rapidly in the United States (Espinosa et al., 2022). In 2016, 24 states and Washington D.C. had legalized medical cannabis, and an additional 4 states had legalized recreational cannabis (Wu et al., 2016). However, by 2022, 37 states, 3 territories, and the District of Columbia had legalized medical cannabis, and 21 states, 2 territories, and the District of Columbia had regulated recreational cannabis

use (National Conference of State Legislatures, 2022). By 2019, approximately 48 million people aged 12 and over in the United States reported using cannabis in the past year (Montgomery et al., 2022). One specific age group with a high prevalence of cannabis use is college students (Espinosa et al., 2022). In 2020, the prevalence rate of past-year cannabis use in college students rose to 44%, which was historically high (Espinosa et al., 2022; Schulenberg et al., 2020).

College students constitute a large segment of the population, as there are about 20 million students enrolled in postsecondary institutions in the United States alone (Lederer & Oswalt, 2017). College students include individuals who graduated from high school and who state that they are full time students enrolled at a two-year or four-year university (Schulenberg et al., 2020). Typical college age generally includes those aged 18-26 and many identify this as a unique developmental period due to further brain development that continues until about age 30 (Lederer & Oswalt, 2017). Many college students report high rates of substance use and mental health problems (Lederer & Oswalt, 2017). College students tend to use cannabis in a concentrated form (i.e., THC rich products that are often inhaled by vaping or dabbing; NIDA, 2020) and tend to have an earlier age of first use compared to middle and older aged adults (Prince & Conner, 2019). In 2020, 7.9% of college students engaged in daily cannabis use compared to 3-4% of older adults reporting daily use (Schulenberg et al., 2020). Vaping cannabis was also high among college students, with 25% endorsing vaping cannabis (Schulenberg et al., 2020). For college students, the first year of college in particular is a unique period where students' long-term academic paths begin, and these trajectories are determined by how academic engagement is balanced; cannabis use can influence this balance (Arria et al., 2015). First year college students who use cannabis are more likely to skip classes and earn lower grades compared to college freshmen who do not use cannabis and increases in cannabis use over time among college students predicted declines in GPA (Arria et al., 2015).

The onset of the COVID-19 pandemic had a significant impact on the stress and well-being of college students (Hoyt et al., 2021). Before the onset of the COVID-19 pandemic in early 2020, past month cannabis use rates were highest among college students not living with their parents, and the most common method of cannabis use in college students was at parties and in small groups of friends (Merrill et al., 2022). During 2020 and after, there was a decrease in college student cannabis use. Individuals moved from independent to dependent living following campus closures because of the pandemic (Merrill et al., 2022). This decrease in use may be explained by the lack

of social opportunities and limited access to cannabis, and parental involvement preventing cannabis use at home (Merrill et al., 2022). However, many college age individuals continued engaging in social activities despite the recommendations, leading to an increase in *social* cannabis use with close friends during the pandemic (DiGuseppi et al., 2022).

The Implications of Self-Control on College Student Cannabis Use and Behavior

Changes in cannabis use among college students, compared to middle aged and older adults, could be explained by differences in self-control. According to Baumeister et al. (2007), self-control can be defined as, "the capacity for altering one's own responses, especially to bring them in line with standards such as ideals, values, morals, and social expectations, and to support the pursuit of long-term goals" (p. 351). Self-control allows an individual to deliberately choose to override or restrain themselves from acting upon an initial choice and enables the person to choose a different response (Baumeister et al., 2007). Low self-control, which includes traits such as being impulsive, insensitive, and taking risks, has been associated with an increased risk of cannabis use in college students (Gottfredson & Hirschi, 1990; Ford & Blumenstein, 2013). However, college students with high self-control have fewer impulse control problems, better psychological adjustment (i.e., higher self-esteem), and better interpersonal relationships compared to students with low self-control (Tangney et al., 2004). Self-control also has academic implications for college students, specifically, as students with high self-control demonstrate higher grades compared to students with low self-control (Tangney et al., 2004).

In addition to self-control, social influence is a significant correlate of cannabis use in college students as well (Bierhoff et al., 2019). The most common way cannabis is consumed among college students is small groups of friends sharing cannabis use devices (DiGuseppi et al., 2022). Whereas college students tend to use cannabis at much higher rates, they tend to experience fewer negative consequences directly related to their use compared to older adults (Prince & Conner, 2019). Despite this, about 1 in 10 college students have met criteria for cannabis use disorder, and

many students have met criteria for prior diagnoses like cannabis abuse and dependence as well (Caldeira et al., 2008). Among college age students, past studies have linked cannabis use to health risk behaviors including smoking tobacco and unsafe driving practices (Caldeira et al., 2008). More specifically, and directly related to self-control (Baumeister, 2002; Sriram et al., 2018), concentration difficulties and missing class are consequences that occur most commonly in students with cannabis use disorder (Caldeira et al., 2008).

Despite the known relationship between substance use and self-control, it is not known how the pandemic and its related effect on social influence has impacted this association. Given the unique circumstances of the COVID-19 pandemic along with changing societal regulations in cannabis use, and their impact on college students, there is a need to examine the bidirectional relationship between cannabis and self-control during the pandemic era. Therefore, this study examined cannabis use among a repeated cross-sectional sample of college undergraduate students to address the following aims: (1) examining differential rates and correlates of cannabis use and self-control across different years (i.e., 2020, 2021, 2022); and (2) examining significant differences in self-control and past 30-day cannabis use. Secondary analyses examined the association between self-control and number of times used on cannabis using days. This research examines the hypotheses that cannabis use (past 30 day use as well as times used) and self-control will demonstrate a negative relationship.

METHODS

Participants and Recruitment

Four hundred and forty-five college students were recruited in three unique cohorts of data in spring 2020 (N = 190; 42.7% of the total sample), spring 2021 (N = 161; 36.2%), and fall 2022 (N= 94; 21.1%) from a mid-sized, urban-engaged college in the Northeast. Tables 1 and 2 report descriptive statistics for the sample and each cohort, respectively. Students were recruited through online course announcements in a wide range of psychology courses describing the study with the understanding that participation would

result in course extra credit. During the 2020 and 2021 cohorts, courses were primarily offered online with few exceptions while in 2022, courses had returned to in-person; however, the nature of online course announcement recruitment was unchanged. Students are assumed to be primarily psychology majors; however, given the broad nature of these courses, could include any major taking the course.

Table 1. *Sample Descriptives, overall (N=445)*

Var	% (N) / M(SD)
Calendar year	
2020	42.7% (190)
2021	36.2% (161)
2022	21.1% (94)
Year in School/College	
Freshman	20.0% (89)
Sophomore	20.4% (91)
Junior	31.5% (140)
Senior	27.9% (124)
Missing	0.2% (1)
Age	20.8 (1.7)
Gender	
Woman	82.7% (368)
Man	16.2% (72)
Other	1.1% (5)
Race	
White/Caucasian	40.7% (181)
Black/African American	42.2% (188)
Asian/Asian American	5.6% (25)
Native American	0.9% (4)
Multiracial	6.7% (30)
Other	2.7% (12)
Missing	1.1% (5)
Ethnicity	
Hispanic/Latino	13.7% (61)
Not Hispanic/Latino	85.6% (381)
Missing	0.7% (3)
Employment Status	
Employed full-time	11.0% (49)
Employed part-time	52.4% (233)
Not employed	34.2% (152)
Prefer not to answer	2.2% (10)
Missing	0.2% (1)
Cannabis use	
Lifetime	56.0% (249)
Past 30-day	32.1% (143)
Self-control	3.3 (0.7)

Across all participants ($N = 445$), students, on average, were 20.84 years of age ($SD = 1.67$) ranging from 18 to 26 years of age. The sample was diverse with 42.2% of participants self-identifying as Black/African American, 40.7% as White/Caucasian, 6.7% as multiracial, 5.6% as Asian/Asian American, 2.7% as other, and 0.9% as Native American. 5 participants (1.1%) did not provide a response regarding race. Of the total sample, 13.7% of the participants indicated that they were Hispanic/Latino (0.7% did not answer). Most participants identified as juniors (31.5%) or seniors (27.9%) in college, with relatively even distributions across freshman (20.0%) and

sophomores (20.4%). Over half of participants reported that they were employed either full-time (11.0%) or part-time (52.4%).

Differences in sociodemographic characteristics were examined by cohort, revealing no significant differences in gender, race, and ethnicity across cohort [$\chi^2s < 6.98$, $ps > .05$]. There were significantly more individuals employed full time across later cohorts (i.e., 2021 and 2022) than during 2020 [$\chi^2s > 13.37$, $ps = .04$]; however, given the impact of the COVID-19 pandemic on work (Sáenz & Sparks, 2020), this difference was not unexpected.

Table 2. *Sample Descriptives, by cohort year (N=445)*

Var	% (N) / M(SD)		
	2020	2021	2022
Calendar year	42.7% (190)	36.2% (161)	21.3% (95)
Year in School/College			
Freshman	30.0% (57)	18.6% (30)	2.1% (2)
Sophomore	20.0% (38)	19.3% (31)	23.4% (22)
Junior	26.8% (51)	29.2% (47)	44.7% (42)
Senior	23.2% (47)	32.3% (52)	29.8% (28)
Missing	0.0% (0)	0.6% (1)	0.0% (0)
Age	20.7 (1.8)	20.8 (1.6)	21.2 (3.4)
Sex			
Woman	80.0% (152)	85.1% (137)	84.0% (79)
Man	20.0% (38)	13.7% (22)	12.8% (12)
Other	0.0% (0)	1.2% (2)	3.2% (3)
Race			
White/Caucasian	38.4% (73)	42.2% (68)	42.6% (40)
Black/African American	42.6% (81)	41.0% (66)	43.6% (43)
Asian/Asian American	6.8% (13)	5.6% (9)	3.2% (3)
Native American	1.1% (2)	0.0% (0)	2.1% (2)
Multiracial	7.9% (15)	5.6% (9)	6.4% (6)
Other	2.1% (4)	4.3% (7)	1.1% (1)
Missing	0.0% (0)	1.2% (2)	1.1% (1)
Ethnicity			
Hispanic/Latino	13.2% (25)	13.0% (21)	16.0% (15)
Not Hispanic/Latino	85.8% (163)	86.3% (139)	84.0% (79)
Missing	1.1% (2)	0.6% (1)	0.0% (0)
Employment Status			
Employed full-time	7.9% (15)	13.0% (21)	13.8% (13)
Employed part-time	50.0% (95)	54.7% (88)	53.2% (50)
Not employed	40.0% (76)	29.8% (48)	29.8% (28)
Prefer not to answer	2.1% (4)	1.9% (3)	3.2% (3)
Missing	0.0% (0)	0.6% (1)	0.0% (0)
Cannabis use			
Lifetime	54.2% (103)	50.9% (82)	68.1% (64)
Past 30-day use	28.9% (55)	30.4% (49)	41.5% (39)
Self-control	3.1 (0.7)	3.3 (0.7)	3.4 (0.7)

Procedures

Participants completed an online survey that took approximately 45 minutes. Surveys first describe the purpose of the study where individuals provided informed consent. They then completed a series of questionnaires and behavior tasks. Participants were provided extra credit in requested courses upon completion and were entered into a raffle to win a \$25 Amazon gift card. All procedures were approved by the University Institutional Review Board.

To reduce participants completing the survey in multiple cohorts, the Qualtrics survey was set to prevent multiple submissions. Data was then examined to determine the number of multiple submissions based on basic identifying information. Upon review of the data, less than 10% of the data included duplicate submissions.

Measures

Cannabis use. Following procedures used by Substance Abuse and Mental Health Services Administration (SAMHSA, 2016), in each year of data collection, participants initially indicated whether they have ever used cannabis or marijuana in their lifetime. Students who endorsed lifetime use were prompted with subsequent questions to indicate the frequency of their cannabis use on a 7-point Likert scale (e.g., 0=never, 1=1-2 times, 2=3-5 times, 3=6-9 times, 4=10-19 times, 5=20-39 times, and 6=40 or more) during the last 30 days.

Cannabis items were updated for the 2022 survey administration to be more aligned with best practices in assessing cannabis use. Items were used or adapted from several sources, including the International Cannabis Policy Study (Hammond et al., 2020) and the National Survey on Drug Use and Health (SAMHSA, 2016). Specifically, questions regarding past 30-day use were adjusted to ask on how many days the individual used cannabis as well as the times per day that they used. In order to equate the questions, two steps were taken. First, the Likert scale questions from cohorts 1 (i.e., 2020) and 2 (i.e., 2021) were adjusted to be average number of days endorsed by the participant. For example, if a participant chose 3, the number of days the individual used cannabis was adjusted to be 7.5 as it is the average number from the scale provided.

In order to limit inferences from the Likert scale, participants who endorsed 40 or more cannabis use events over the past 30 days were coded as 40.

Second, the 2022 data included two questions, the first asking the number of days used per month and the second asking the average number of times used per day. Participants entered a numeric response for both questions. These two variables were multiplied to create a measure that aligned more closely with that from 2020 and 2021 (i.e., average number of times used in the past 30 days). Scores higher than 40 were adjusted to account for outliers within the data and provide consistency across cohorts. Both included the prompt of 'use over the past 30 days'. Thus, the 2020 and 2021 cohorts answered questions regarding frequency of use over the past 30 days allowing for comparison across cohorts.

Self-Control. To measure self-control, individuals across all cohorts completed the Brief Self-Control Scale (BSCS; Tangney et al., 2004). The BSCS consists of 13 items assessing one's ability to regulate and control their behavior using statements like "I say inappropriate things" and "I often act without thinking through all the alternatives" on a five points scale from not at all (1) to very much (5). Nine of the items were reverse coded and all items were averaged so that higher scores indicate more self-control ($M = 3.26$, $SD = 0.68$). The measure demonstrated good reliability for the current sample (Cronbach's $\alpha = 0.82$).

Analytic Approach

For this study, all analyses were conducted using IBM SPSS Statistics, Version 29.0 (IBM Corp, 2022) and Stata 14 (Statacorp, 2015). Pearson's chi-square tests were used examine significant differences in past 30-day cannabis use (yes/no) and other correlates (i.e., age, gender) across cohort (2020 vs. 2021 vs. 2022). To examine how self-control and cohort were associated with past 30-day cannabis use (i.e., past 30-day cannabis use as an outcome), both logistic (whether one used cannabis in the past 30-days) and negative binominal regression analyses (frequency of use of cannabis in the past 30 days) were used due to the nonnormality of the data. Secondary analyses were conducted with the 2022 cohort to examine the association between self-control and the typical number of times

individuals engaged in cannabis use on days when any use was reported (this data was not available in earlier cohorts). Next, an ANCOVA was conducted examining how past 30-day cannabis use predicted self-regulation across different cohorts (i.e., IVs were 30-day cannabis use and cohort, DV was self-regulation). The interaction between cohort and binary cannabis use was included in the model. All models included gender and age as covariates. Although “other” was measured for gender, data was recoded to be dichotomous due to the low rate of individuals identifying as “other” and thus, not allowing an adequately sized category for analyses. A probability value of 0.05 and 95% confidence intervals will be used to determine significance.

RESULTS

Descriptive statistics were first conducted to evaluate cannabis use rates in the current sample. Among all students, 54.4% of the sample reported using cannabis at least once in their lifetime, and 32% reported using within the past 30 days (among students reporting lifetime use, 59% reported using within the past 30 days; see Table 1). The average rating of self-control was 3.26 ($SD = 0.68$).

There was a significant difference in past 30-day cannabis use (coded yes/no) across the three cohorts ($\chi^2 = 12.06, p < .01$). Pairwise comparisons showed significantly more past 30-day cannabis use in 2022 than in both 2021 and 2020 (see Table 3).

Table 3. *Prevalence of past 30-day cannabis use (yes/no) by cohort*

	2020	2021	2022
		Column % (N)	
Cannabis use in the past 30 days (binary; yes)	26.7% (56 ^a)	30.7% (55 ^a)	46.7% (43 ^b)
Did NOT use in the past 30 days	73.3% (154 ^a)	69.3% (124 ^a)	53.3% (49 ^b)

Note. $\chi^2 = 12.06, p = .002$. Use of the same subscript letter denotes column proportions that do not differ from each other.

Binary cannabis use (yes/no)

Logistic regression was then conducted to examine whether self-control and cohort uniquely predicted whether participants used cannabis in the past 30 days. There were significantly lower odds of cannabis use for every one unit increase in self-control (OR = 0.47; 95% CI: 0.29, 0.77). Regarding cohort, the 2022 group demonstrated significantly higher cannabis use (OR = 1.42; 95% CI: 0.36, 5.65) than 2020. However, there was no significant interaction between self-control and cohort (OR = 1.01; 95% CI: 0.66, 1.54).

Cannabis use (frequency per month)

Follow up analyses were then conducted to examine whether self-control predicted frequency of past 30-day cannabis use among those who use cannabis. Given the skewed nature of count data, a negative binomial regression was used to examine how self-control predicted frequency of past 30-day cannabis use, controlling for cohort, age, and gender. When accounting for the distribution of past 30-day

cannabis use, self-control significantly predicted cannabis use frequency (OR = 0.60; 95% CI: 0.45, 0.81). There was a nonsignificant trend for the 2022 cohort (OR = 0.59; 95% CI: 0.34, 1.02). No other variables within the model were significant. An interaction term was added into the model to examine whether there was an interaction effect of self-control and cohort; however, no variables were significant.

Cannabis use (times per day)

We conducted secondary analyses of the data collected in 2022 to examine whether there was a significant correlation between self-control and the number of times individuals engaged in cannabis use on those days that they used cannabis in the past 30 days. Skew and kurtosis were not violated (skew = 1.69, kurtosis = 2.12) suggesting normality of the data (Kline, 2010). There was a significant negative correlation ($r = -0.28, p = .04$) such that the lower an individual's self-control, the increased number of times during the day that they use cannabis (on days they report cannabis use). Given these findings,

linear regression was conducted predicting number of times cannabis was used on use days by self-control. Gender and age were entered as covariates. The overall model was significant [$F(3, 40) = 2.91, p < .05, R^2 = 0.18$] with lower self-control significantly associated with increased use ($b = -0.76, p = .02$). There was a nonsignificant trend for age with use ($b = -0.11, p = 0.07$) but no significant association with gender.

Self-Control

Next, a two-way ANCOVA was conducted to examine differences in self-control based on cohort (i.e., 2020 vs. 2021 vs. 2022) and whether individuals used cannabis (yes/no) in the previous 30 days. Data were normally distributed (skew = -0.19; kurtosis = -0.42) and did not violate assumptions of equality of variance [$F(5, 396) = 0.68, p = 0.64$]. There was a significant main effect of both cohort [$F(2, 401) =$

$5.69, p < .01$] and past 30-day cannabis use [$F(1, 401) = 26.22, p < .001$]. For the latter, any past 30-day cannabis use (yes/no) was associated with lower self-control ($M = 3.05, SE = 0.05, 95\% CI: 2.95, 3.16$) than those who did not use cannabis in the past 30 days ($M = 3.41, SE = 0.04, 95\% CI: 3.32, 3.49$; see Figure 1). There was no significant interaction effect of cohort and cannabis use (yes/no) predicting self-control, [$F(2, 401) = .25, p = .78$]. We then examined differences in self-control across cohorts (see Table 4 for cohort ratings of self-control and other variables). Pairwise comparisons demonstrated that self-control was significantly lower in 2020 ($M = 3.07, SE = 0.05, 95\% CI: 2.96, 3.18$) than in 2021 ($M = 3.28, SE = 0.06, 95\% CI: 3.17, 3.39$) and 2022 ($M = 3.34, SE = 0.07, 95\% CI: 3.20, 3.48$; $ps < .01$) but no significant difference in self-control between 2021 and 2022 ($p = 0.48$). Gender and age were all included in the model but were not significantly associated with self-control in the overall model.

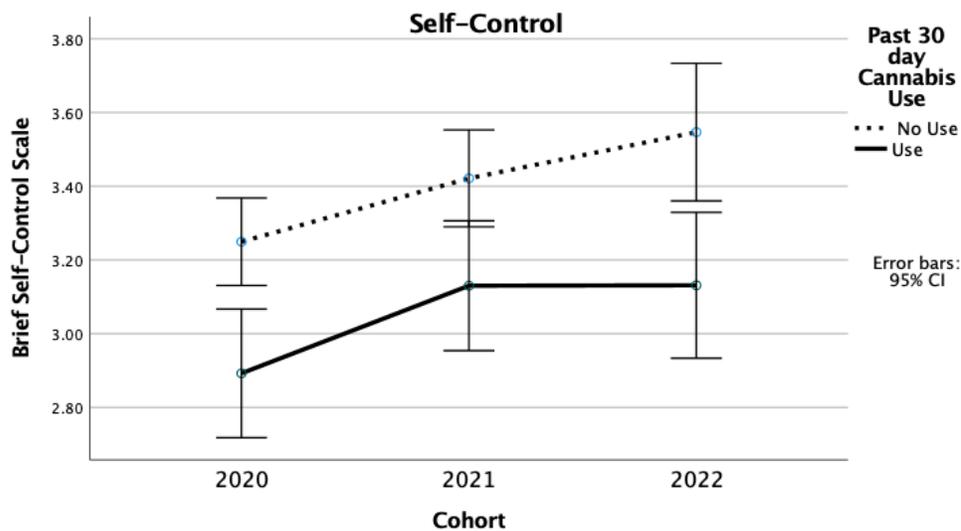
Table 4. Regression analyses predicting past 30-day use

Past 30-day Use (yes/no)	Log-Odds	SE	95% CI		p
			LL	UL	
Age	0.10	0.06	-0.01	0.20	0.08
Gender	-0.31	0.28	-0.87	0.24	ns
Group					
2021	-0.42	1.23	-2.83	1.98	ns
2022	1.28	1.49	-1.64	4.20	ns
Self-Control	-0.86	0.27	-1.38	-0.33	0.001

Past 30-day Use (frequency per month)	B	SE	95% CI		p
			LL	UL	
Age	0.02	0.03	-0.05	0.09	ns
Gender	-0.06	0.29	-0.62	0.50	ns
Group					
2021	0.16	0.24	-0.31	0.63	ns
2022	-0.53	0.28	-1.08	0.02	ns
Self-Control	-0.51	0.15	-0.80	-0.22	0.001

Past 30-day Use (times per day)	B	SE	95% CI		p
			LL	UL	
Age	-0.11	0.06	-0.23	0.01	0.07
Gender	0.20	0.65	-1.11	1.50	ns
Self-Control	-0.76	0.31	-1.38	-0.14	0.02

Note. 95% CI = 95% confidence intervals; LL = lower limit; UL = upper limit, ns = nonsignificant; Odds Ratios were determined using $\text{Exp}(B)$.

Figure 1. *Differences in Self-Control by Past 30-Day Cannabis Use and Cohort.*

DISCUSSION

This study examined past 30-day cannabis use and self-control among a sample of college students during cohort years 2020, 2021, and 2022. Results indicate a bidirectional association between past 30-day cannabis use and poor self-control among college students during the era of the COVID-19 pandemic. We observed significant differences in past 30-day cannabis use (yes/no) across cohorts among our sample of college students. More specifically, self-control was significantly lower in 2020 compared to 2021 and 2022, and individuals who used any cannabis in the past 30-days (yes/no) had lower self-control overall compared to students who did not use cannabis in the past 30-days. To examine these associations in more detail, a negative binomial regression was conducted to examine how self-control and cohort was associated with frequency of past 30-day cannabis use. Again, there was a significant association in which self-control negatively predicted frequency of cannabis use over the past 30 days; however there was no interaction effect with cohort. Secondary analyses among the 2022 cohort demonstrated a relationship between the number of times cannabis was used per day and self-control. Findings indicated self-control is negatively associated with more cannabis use on each cannabis using day. Thus, individuals with higher self-control are still using cannabis, but they are

using fewer times per day compared to students with lower self-control. Our results are consistent with previous work (e.g., Dvorak & Day, 2014) that demonstrated a relationship between self-regulation and the intensity of cannabis use. Our findings indicate better self-control plays a significant role in college students' choice to use cannabis *and* both the frequency of use overall as well as the amount of use per cannabis-using day. Other literature indicates that *emotional* self-regulation plays a particularly important role in one's experience of cannabis-related problems (Dvorak & Day, 2014), highlighting the development of emotional self-regulation as a potential intervention point for reducing the negative effects of cannabis use in college students.

In the self-control model, past 30-day cannabis use (yes/no) was associated with lower self-control. However, cannabis use (yes/no) did not predict self-control based on cohort year. As the study did not assess these measures pre-pandemic, more research is needed to make claims about the specific role of COVID-19 in shaping the relationship between cannabis use and self-control.

The timeframe of this study is notable, as data was collected in 2020, at the onset of the COVID-19 pandemic, and in subsequent years (i.e., 2021 and 2022) where pandemic measures, such as social distancing, were in flux. The timeframe of data collection influences the interpretation of our findings, as the COVID-19 pandemic may have

had an impact on both cannabis use and self-control in college students. For instance, a previous study found that lower self-control was associated with increased cannabis use among college students who reported increased opportunity of securing the substance (Ford & Blumenstein, 2013). It is possible that COVID-19 social distancing measures during our data collection may have played a role in college students' social interactions and ability to obtain cannabis. Relatedly, previous work has proposed self-control as fluctuating in capacity, particularly when resources are depleted (Baumeister, 2002). The depletion of social and other support during the COVID-19 pandemic may support this notion given the current findings and highlights the effects of stress on one's ability to exert control over their behavior. Despite these findings, opportunities to better understand cannabis use and self-control considering the COVID-19 pandemic still exist.

Instead of being considered a distinct, priority population, college students are often considered a convenience sample (Lederer & Oswald, 2017). However, college students *should* be viewed as a unique and priority population (Lederer & Oswald, 2017), as college is a unique setting, and the nuances of campus culture make it a distinct environment (Lederer & Oswald, 2017). In addition, college students differ from the general adult population, as most traditional-aged students are young adults whose brains are continuing to develop (Lederer & Oswald, 2017). Emerging adulthood is a unique developmental period as it involves more health risks and negative outcomes compared to during adolescence or adulthood (Arnett, 2007; Lederer & Oswald, 2017).

Our findings have important implications for higher education, particularly as college students attempt to navigate post-COVID learning and social environments. Health and wellness are some of the top factors influencing college dropout rates, which demonstrates the importance of the overall commitment to improving college students' health and well-being (Lederer & Oswald, 2017; Travia et al., 2022). In fact, exposure to stressful events (such as the COVID-19 pandemic) and substance use (including frequent use of cannabis) are among the most salient factors influencing college student retention (Thomas et al., 2021). Pre-COVID-19

pandemic, students with higher self-control had better grades compared to students with lower self-control (Tangney et al., 2004). Thus, the impact of the COVID-19 pandemic and cannabis use may have an impact on learning and students' ability to exert control over their emotions and behavior in the post-COVID-19 world. Using innovative practices such as implementing well-being programs, that are inclusive of behavioral health broadly and substance use specifically, into college campuses could be effective in improving the health and well-being of college students (Travia et al., 2022).

How students engage in their college experience is just as important as where they attend college in determining their later success, which shows the significance of using innovative practices to improve student health and well-being on campus (Travia et al., 2022). Considering prior evidence that indicates self-control is not a static trait, but one that can be developed (Baumeister, 2002; Lee et al., 2023; Sriram et al., 2018), campus administrators seeking to improve student retention should consider including initiatives aimed to increase self-control, given its association with both substance use and academic performance (Duckworth & Seligman, 2005; Sriram et al., 2018). Direct, didactic instruction, inclusive of self-monitoring skills and opportunities for repeated practice of behavioral strategies, has been effective for improving self-control in college students (Duckworth et al., 2016; Lee et al., 2023). Our findings support the hypothesis that improving self-control could potentially reduce cannabis use. While an intervention of this nature was not assessed here, it has important implications for tailoring future prevention and intervention efforts with college students.

Limitations

Although this study has several notable strengths, including a racially diverse sample and data collection that occurred directly during the COVID-19 pandemic, there are limitations. First, this sample was drawn from a mid-sized, urban-engaged university in the Northeast, therefore limiting the generalizability of our findings. The repeated cross-sectional nature of this study also limits the ability to make conclusions about within-person changes in cannabis use behaviors

over time; since the surveys are cross-sectional, results cannot be used to establish causality. Future research should examine changes in both cannabis use and self-control longitudinally to examine the direction of effect. Specifically, it is important to understand whether self-control predicts increased cannabis use and if cannabis use can shape or change self-control. Finally, this study also relied on self-report of past 30-day cannabis use and self-control, however self-report is the most common method of measuring substance use behaviors. Given changing legislation around cannabis use, it may be that student use has increased over the previous years; however, there is also the possibility that individuals feel more comfortable reporting use given the less severe consequences associated with cannabis use.

Conclusions

The mixed and evolving state-level legal cannabis landscape poses challenges to college administrators, whose goal is to promote the health and academic success of college students. Our findings have implications for college administrators and others in higher education in that improving college students' self-control may have potential as a harm reduction strategy for addressing cannabis use among college students.

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