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KEYNOTE ADDRESSES

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Rosalie L. Pacula
University of Southern California

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University of California – Los Angeles

POSTER PRESENTATIONS

All poster presentations and symposia were peer-reviewed by (in alphabetical order): Adrian Bravo (William & Mary), R. Lorraine Collins (SUNY Buffalo), Bradley T. Conner (Colorado State University), Verlin Joseph (University of New Mexico), Benjamin O. Ladd (Washington State University Vancouver), Eric Pedersen (University of Southern California), Kristina T. Phillips (Kaiser Permanente Hawaii), Emma Smith (Colorado State University), Kirstyn Smith-Lecavalier (University of Washington). All abstracts below were approved and voluntarily submitted for publication in Cannabis by the presenting or contact author.

Examining the Chemical Behavior of Cannabinoids and Terpenes in Cannabis sativa L
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The use of Cannabis sativa derived cannabinoids and terpenes has increased in recent years. Consumers demand cannabis flowers containing ideal levels of those compounds. This research aimed to perform chemical analysis of cannabinoids and terpenes to establish the appropriate harvest time to meet commercial standards. Plants were grown for 8 weeks at 16h of light, and later, flowered at 8h of light for 14 weeks. After 6 weeks into flowering, flowers were tested biweekly using GC-MS. Results demonstrated that terpenes such as B-myrcene, D-limonene and caryophyllene levels were the highest on week 6, then, they declined towards week 14. On the other hand, cannabinoids such as

CBD, Δ-9-THC, CBG, and CBN increased from the sixth through the 10th week and started decreasing from week 12 through 14. If growers require high contents of terpenes, they should harvest their plants no later than 8 weeks into flowering, and if highest cannabinoids content is required, plants should be harvested from 8-10 weeks into flowering.

Blood and urinary metal levels among marijuana users in NHANES (2005-2018)

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"With the ongoing nationwide decriminalization of marijuana and rapid expansion of stakeholders including manufacturers, legislators, and consumers, there is an urgent need for epidemiological-relevant data on marijuana contaminants and their potential health risks. Because the cannabis plant is a known heavy metal scavenger, we hypothesized that individuals who use marijuana will have higher metal biomarker levels as compared to those who do not use. To examine the relationship between marijuana use and metal exposures, we acquired and combined seven cycles of data from the National Health and Nutrition Examination Survey (2005-2018) for *n*= 7,254 participants, classified by use: non-marijuana/non-tobacco, marijuana-only, tobacco-only, and dual marijuana and tobacco use; and by recent marijuana use: in the last 7 days, 8-30 days, or 31-365 days. Five metals were measured in blood and 16 in urine using inductively coupled plasma-mass spectrometry; urinary metals were adjusted for urinary creatinine. Linear regression models were adjusted for age, sex, race, education, eGFR, and NHANES cycle year. Compared to participants who used neither tobacco nor marijuana, participants reporting dual marijuana and tobacco use, had statistically significantly higher mean blood cadmium levels (3.5 µg/L; 95%CI: 3.1, 3.9; p<0.001) and urine cadmium levels (0.69 µg/g; 95%CI: 0.56, 0.83; p<0.001). Blood lead levels (0.64 µg/dL; 95%CI: 0.44, 0.87; p<0.001) and urine lead levels (0.54 µg/g; 95%CI: 0.31, 0.80; p<0.001) were also higher among dual users. Participants reporting marijuana-only use had higher mean blood cadmium levels (0.22 µg/L; 95%CI: 0.11, 0.34; p<0.001) and urine cadmium levels (0.18 µg/g; 95%CI: 0.06, 0.31; p=0.004) and higher mean blood lead levels (0.27 µg/dL; 95%CI: 0.07, 0.50; p=0.006) and urine lead levels (0.21 µg/g; 95%CI: -0.006, 0.50; p=0.058). Among marijuana-only users who had used marijuana in the last week, we found a 0.23 µg/L (0.12, 0.35) and a 0.20 µg/g (95%CI: 0.03, 0.39) higher cadmium levels and a 0.39 µg/dL (0.11, 0.75) and 0.31 µg/g (95%CI: 0.01, 0.70) higher lead levels in blood and urine, respectively, as compared to non-marijuana use. Our results suggest marijuana is a significant source of cadmium and lead exposure. Research regarding cannabis use and cannabis contaminants, particularly metals, should be conducted to address public health concerns related to the growing number of cannabis users.

Changes in Blood Pressure/Heart Rate after Cannabis use and the Relationship to Self-Reported Drug Effect and THC concentration

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Background: The relationship between acute cannabis use and change in blood pressure and heart rate (BP/HR) is well established. Studies show cannabis use acutely significantly increases heart rate and mildly increases blood pressure in the minutes following smoked or inhaled use of cannabis. Less is known about how frequency of use (i.e., tolerance) may affect the magnitude of the relationship, and how the physical effects of acute cannabis use relate to self-reported drug or intoxication effects, and the relationship to THC potency.

Aims: To analyze the relationship between changes in BP/HR (pre- to post- cannabis use), subjective intoxication, THC concentration, and explore by frequency of cannabis use.

Methods: BP/HR was measured at baseline and mean of 2.4 minutes post-cannabis smoking (or rest period for non-use control group). The ARCI-Marijuana scale and Visual Analog Scale (VAS)

were administered at both time points. Linear regression models were used to measure change in BP/HR between the following groups; daily (n=45) and occasional cannabis use (n=18), and non-use (n=8).
Results: There was a significantly higher HR after smoking in occasional and daily use groups as compared to the control group ($p<0.001$). Body tingling and feeling that the heart is beating faster were associated with higher HR ($p<0.01$). The difference in HR between occasional and daily use groups after smoking was not significant ($p=0.42$). Neither THC concentration nor VAS score was significantly associated with BP/HR.
Conclusions: These results indicate the cardiovascular physiological effects of cannabis consumption are not subject to tolerance or THC concentration in the product. Therefore, BP/HR might be a reliable predictor of recent use. This is a departure from other effects, such as cognitive or subjective drug effects, where tolerance to cannabis is well established.

Accuracy of Labeled THC Potency Across Product Types in Colorado

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Accurate labeling of THC potency in cannabis products is important to inform consumer purchasing decisions and dose titration. The present study aimed to independently test the accuracy of labeled THC potency in flower, concentrate, and other (e.g., tinctures, drinks, pills, etc.) cannabis products in Colorado. This study was a collaboration between MedPharm, a licensed cannabis testing facility, and a research team at the University of Colorado Boulder. Cannabis products were purchased from Colorado dispensaries by a designated member of the research team, who also recorded product label information and transferred the product to a blinded container. Triplicate analysis of cannabinoid potencies was then conducted by another member of the research team who was blinded to the label information. Observed THC potency was calculated using the industry standard equation Total THC = THC + (0.877 X THCA). Consistent with the state of Colorado standards that allow a 15% deviation between labeled and actual potency, products were classified as accurately labeled if observed THC was within ±15% of the labeled value, over-labeled if observed THC was more than 15% above the labeled value, and under-labeled if observed THC was more than 15% below the labeled value. A chi-squared test was used to evaluate the effects of product type on label accuracy, and Independent Samples T-tests were used to compare observed and labeled THC for each product type. One-hundred twenty-eight cannabis products were purchased, including 57 flower products, 57 concentrate products, and 14 other products. Mean observed THC potency was 20.6% (SD = 4.67) [Range: 11.7-33.0] for flower products, 71.5% (SD = 4.33) [Range: 58.3-80.0] for concentrate products, and 4.74mg (SD = 3.06) [Range: 0.19-10.31] for other products. Mean labeled THC potency was 23.4% (SD = 5.23) [Range: 8.92-39.0] for flower products, 73.6% (SD = 5.04) [Range: 59.5-82.4] for concentrate products, and 6.29mg (SD = 3.06) [Range: 1.25-10.0] for other products. Mean absolute difference between observed and labeled THC potency was 4.11% (SD = 3.99) [Range: 0.14-17.9] for flower products, 3.57% (SD = 2.81) [Range: 0.04-11.5] for concentrate products, and 2.37mg (SD = 2.10) [Range: 0.06-5.81] for other products. Label accuracy depended on product type ($X2(4, N = 128) = 39.04$, $p < .001$), with 52.6% of flower products accurately labeled (over-labeled: 40.4%, under-labeled: 7.0%), 98.2% of concentrate products accurately labeled (over-labeled: 1.8%, under-labeled: 0.0%), and 35.7% of other products accurately labeled (over-labeled: 50.0%, under-labeled: 14.3%). Observed THC potency was significantly lower than labeled potency in both flower ($t(112) = 3.02$, $p = .003$) and concentrate ($t(112) = 2.41$, $p = .02$) products, but no difference was observed in other products ($t(26) = 1.36$, $p = .19$). This study is ongoing, with additional cannabis products to be purchased and included in the analysis. These preliminary results found labeled THC to be higher than observed THC in both flower and concentrate products, but not in other products. Observed THC in both flower and other products were frequently outside of ±15% of labeled THC, while

close to 100% of concentrate products were within ±15%.

Cannabis Use Frequency is Linked to Altered Cardiac and Vascular Functioning

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Current efforts to federally legalize cannabis often aim to discredit the characterization of cannabis as a Class I drug by citing its lack of life-threatening health effects. While historically true, the physiological effects of cannabis, particularly of newer more potent strains and concentrates, are not yet fully elucidated. Of particular interest is cannabis' effects on the cardiovascular system. Cannabis intoxication is known to acutely mobilize cardiovascular processes, increasing heart rate and blood pressure during intoxication. Increased activation of the endocannabinoid system is linked to vascular disorders such as atherosclerosis. However, most of the research on how cannabis affects cardiovascular functioning comes from decades-only administration studies, static cardiovascular descriptive data, and emergency department samples. The present study contributes to the field by characterizing cardiovascular and substance use data obtained from 183 ostensibly healthy college students without a substance use disorder (SUD) diagnosis. Participants were part of an ongoing 2-year prospective study of how college lifestyle behaviors affect cardiovascular health. Heart rate variability (HF HRV), an index that correlates with parasympathetic nervous system (i.e.,g vagal) activity, was calculated from an ECG and log-transformed. Pulse wave velocity (PWV), an index of arterial stiffness, was calculated from the ECG and a continuous blood pressure finger cuff. Generalized linear models analyzed relationships between past 30-day cannabis use frequency and cardiovascular indices. For HF HRV, an interaction between past 30-day cannabis use frequency and sex was found. Higher HF HRV was significantly associated with more frequent use for females whereas lower HF HRV was associated with more frequent use in males (Estimate+SE=-0.0077+0.0036, p=0.0296). For PWV, a direct relationship with past 30-day cannabis use frequency was found (Estimate+SE=0.0134+0.004, p=0.0008) suggesting potentially more arterial stiffness in more frequent cannabis users compared to less frequent users. These initial results imply that the cardiovascular system may be altered with frequent use even in young, healthy samples. Moreover, neuroendocrine influences, i.e., sex differences, may further modulate the effects of cannabis on cardiovascular functioning, possibly due to its effects on endocannabinoid activity. These data suggest that chronic cannabis use habits, even among individuals without SUD, may alter resting cardiovascular set points.

Risks and Therapeutic Benefits of Cannabis among College Students Amidst the COVID-19 Pandemic

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More than half of the United States has legalized medicinal and/or recreational cannabis. The purpose of the study is to understand cannabis use and perceptions among college students – 21 years and older – in a legalized cannabis state. Participants included 203 college students, the majority identified as female (61.1%, n = 124) and Latinx/Hispanic (46.8%, n = 95). The online survey included demographic questions and questionnaires measuring cannabis consumption, cannabis use disorder, and quality of life. Participants answered open-ended questions about the negative, positive, and spiritual impact/s of cannabis on their life and health, and how the COVID-19 pandemic impacted their cannabis use. A paired-sample t-test indicated participants significantly found more relief using cannabis compared to non-cannabis treatments or medications. There was no significant correlation between quality of life and cannabis use disorder symptoms. Inductive content analysis of 112 written responses revealed perceived negative effects (e.g., anxiety/mental health issues) and positive effects (e.g., relaxation/stress reduction) from using cannabis. Most participants reported no spiritual benefits; however, some participants discussed cannabis use improving connection to self and self-awareness. Regarding the impact of the COVID-19 pandemic on use, most participants (27.8%) reported increased cannabis use, while some reported decreased cannabis use. These

findings reflect the importance of understanding the wide-range of benefits and risks perceived by college students who consume cannabis and how these results can inform prevention and wellness efforts.

Cannabis and College Students: Self-Perceived Mental Health Prior to, During, and After the Pandemic

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Iintroduction: College students demonstrated changes in levels of mental health as they and the world experienced new levels of stress and anxiety due to the COVID-19 pandemic. As access to healthcare became limited, students turned to alternative methods of coping, which included cannabis use.
Objective: To determine if an association between cannabis use and self-perceived mental health during the pandemic among college students exists.
Methods: Social media was utilized to invite respondents to the survey, as well as snowball recruitment. A paired samples t-Test was used to compare self-reported mental health at different times during the pandemic, a one-way ANOVA to compare self-reported mental health between respondents' cannabis use status, and a Tukey-Kramer post-hoc analysis was used to determine between group significance.
Results: Of 103 self-reported college students, the most significant differences in mental wellbeing were reported prior to and during the pandemic. It was discovered that the most significant differences between each of the college student groups derived from those students who entirely avoided cannabis use or cessation of use (highest rating), p=.018, as compared to those who initiated cannabis use prior to and during the pandemic (lowest rating) p=.045. Post pandemic mental health demonstrated a higher level of mental wellness among those who had some exposure to cannabis compared to those who avoided cannabis entirely.
Conclusion: It cannot be concluded that mental health was lower due to cannabis use. However, it is possible those with lower self-perceived mental health turned to cannabinoid use.

A Cannabis Beliefs Scale

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Cannabis has routinely been identified as one of the most frequently used illicit substances among adolescents, young adults, and the general adult population in the United States by large epidemiological studies. Recent policy changes in the legal status of cannabis have inspired calls for the replication of research and further exploration of the biopsychosocial relationships between cannabis use and outcomes. Theoretical psychological perspectives of behavior, such as outcome expectancies, substance-related social norms, and motivation, have routinely found success in explaining portions of why substance use occurs. However, this literature has been limited by focusing primarily on either college students or those actively using cannabis. This study sought to identify a more general method of evaluating beliefs about cannabis that would possess utility across a broad range of group identities. Two important types of validity for the new assessment measure(s) were their unique content area, distinguishing them from existing measures (i.e. discriminant validity) and the ability to predict scores on other assessment measures (i.e. predictive validity). We examined the relationships among cannabis-related beliefs in the context of social norms, expectancies, and motivation as well as the associations with indicators of cannabis use and related consequences. Results indicated that the proposed cannabis belief scales possess discriminate and predictive validity. Implications for future research opportunities were explored.

Differences in alcohol and cannabis motives among simultaneous, concurrent, alcohol-only, and cannabis-only users

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Substance use motives are strong predictors of alcohol and cannabis use and consequences among college students. Both simultaneous alcohol and cannabis (i.e., marijuana; SAM) and concurrent alcohol and cannabis (i.e., marijuana; CAM) use are associated with higher endorsement

of certain types of motives compared to single drug-only use, which may explain heightened risks for experiencing negative consequences evidenced by co-users. Understanding whether motives differ according to type of use could provide an important avenue for intervention efforts; however, research has not yet examined if motives differ between SAM and CAM users. Thus, the purpose of this study was to examine how SAM, CAM, and single drug-only users differ on alcohol and cannabis motives. Participants were 2295 college students (72.4% female, 50.6% white) from seven US universities who reported past-month alcohol and/or cannabis use (41.2% SAM, 12.4% CAM, 39.1% alcohol-only, 7.3% cannabis-only). Participants completed measures of alcohol and cannabis motives and past-month substance use frequency via online survey. Two multivariate analyses of covariance (MANCOVA) models were conducted to examine differences on cannabis motives (i.e., enjoyment, celebration, conformity, and coping) and alcohol motives (i.e., social, coping, enhancement, and conformity) separately by past-month user status, controlling for sex and frequency of use. The overall cannabis model was significant, with between-group effects on conformity ($F(2,1398)=3.90$, $p=.02$), coping ($F(2,1398)=6.96$, $p=.005$), and celebration ($F(2,1398)=5.83$, $p=.015$) motives. Pairwise comparisons utilizing a Bonferonni-corrected alpha ($p<.017$) indicated that SAM users endorsed greater coping ($p=.002$) and celebration ($p=.004$) motives than CAM users. Moreover, cannabis-only users held greater coping motives than CAM users ($p=.009$). SAM and cannabis-only users did not differ on any motives. The overall alcohol model was also significant, with between-group effects on all four alcohol motives. Pairwise comparisons indicated that SAM users endorsed greater social ($p=.012$), coping ($p=.003$), and enhancement ($p<.001$) motives than CAM users. Moreover, SAM users were higher on all four motives (all $ps<.01$) than alcohol-only users, and CAM users were higher on social motives ($p=.013$) than alcohol-only users. Results indicate that SAM and CAM users can be importantly differentiated by alcohol and cannabis motives, with SAM users reporting greater motives for use related to coping with negative mood and enhancing positive mood/celebrating for both substances. Interestingly, SAM users did not differ from single drug-only users on cannabis motives, though they uniformly reported greater alcohol motives. Given that SAM users reported stronger enhancement and coping motives than CAM users across both drugs, it is possible that college students may opt to combine their substances when they are predominantly motivated to use for mood-related reasons. Considering that SAM users only differed from single-drug users with regard to alcohol, but not cannabis motives, it may be that simultaneous use particularly enhances alcohol-related desirable outcomes, though not necessarily desirable cannabis outcomes. As such, intervention efforts designed to reduce SAM use may benefit from specifically targeting alcohol and mood-related motives. Moreover, research is needed to examine the within-person effects that motives may have on type of use.

Sleep-Related Cannabis Expectancy Questionnaire (SR-CEQ): Factor Analysis Replication, Reliability, and Validity

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Introduction: Cannabis is commonly used for sleep aid, despite mixed evidence for its sleep-promoting effects. Expectancies for the sedative effects of cannabis could influence the degree to which cannabis confers acute sleep-promoting effects and may exacerbate propensity to respond to sleep problems with cannabis use. Recently, the Sleep-Related Cannabis Expectancies Questionnaire (SR-CEQ; Goodhines et al., 2020) was developed to assess expectancies that cannabis use will benefit or harm sleep, and initial evidence for its 2-factor structure was obtained in a general college sample. However, the SR-CEQ's associations with sleep and cannabis use behaviors remain unknown, precluding assumptions of construct validity. This study aimed to replicate the two-factor structure and excellent internal reliability of the SR-CEQ, as well as provide incremental evaluation of construct validity among a sample of undergraduate college students.

Method: Cross-sectional online survey data was drawn from 287 college students (Mage=19.07±1.44 years, range 18-25; 47% assigned male at birth; 84% non-Hispanic White; 61% lifetime cannabis use) at a four-year university in the northeastern U.S. as longitudinal study of college health behaviors. Of the original 332 participants, 6 were excluded for missing data and 39 were excluded as multivariate outliers on positive/negative subscales. A two-factor confirmatory factor analysis (CFA) was conducted with oblimin rotation and ML estimation to test the hypothesized measurement model's fit to the data. Bivariate correlations assessed construct validity via associations with demonstrated demographic, mood, sleep, and cannabis risk indices. Independent sample t-tests explored whether SR-CEQ subscale scores differed as a function of sex, clinical insomnia severity, and/or hazardous cannabis use.

Results: CFA results demonstrated adequate fit of the two-factor measurement model to observed data (SRMR=0.08), with excellent internal consistency within both positive (α=.94) and negative (α=.91) subscales. Both subscales significantly correlated to the corresponding general expectancies subscale (rs=.59-.61, ps<.001). Positive sleep-related cannabis expectancies were correlated with mood (depression/anxiety, distress intolerance; rs=.20-.26, ps<.001), sleep (insomnia severity, pre-sleep arousal, diurnal impact; rs=.16-.28, ps=.001-.01), and cannabis use (frequency, hazardous use, sleep aid and solitary use, negative consequences; rs=.23-.48, ps=.001-.03). In contrast, negative sleep-related cannabis expectancies were not correlated with depression/anxiety, sleep, or hazardous cannabis use (ps<.05), but were associated with distress intolerance (r=.13, p=.04) and cannabis use (less frequency, sleep aid and solitary use, more consequences; r=-.18-.22, ps=.001-.03). Positive sleep-related cannabis expectancies were greater among students with clinical insomnia severity (t[285]=2.71, p<.01; d=.33) and hazardous cannabis use (t[284]=6.63, p<.001; d=0.91). No group differences were observed by sex or for negative sleep-related cannabis expectances (ps<.05).

Conclusions: This study extends psychometric validation of the SR-CEQ. Results replicated the two-factor structure and highlight distinct psychosocial correlates for positive (sleep problems, depression/anxiety, and hazardous cannabis use) and negative sleep-related cannabis expectancies (general cannabis use, but not hazardous use, sleep problems, or depression/anxiety symptoms). Findings further highlight positive sleep-related cannabis expectancies as a potential risk factor for insomnia and hazardous cannabis use. Continued research is needed to (a) assess generalizability to varied populations and (b) clarify predictive validity and test-retest validity through longitudinal designs.

Factors Related to Riding with a Drunk/Drugged Driver among US and Israeli Adults: Cannabis, Alcohol, Both, or Neither

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Background: Driving under the influence (DUI) of alcohol or cannabis is a public health concern. Prevalence of DUI in the US is over 4% for both alcohol and cannabis. DUI is associated with increases in automobile crashes, fatalities, and has numerous economic consequences. Despite prior research examining determinants of DUI, relatively little is known about the passengers in vehicles in which the driver is DUI.

Methods: Data were obtained from a cross-sectional online survey of US and Israel participants ages 18-45 (N=2,222; US: n=1,128; Israel: n=1,094) conducted in 2021. We used multinomial logistic regression to analyze the past 30-day odds of being a passenger in a vehicle after the driver had used: 1) alcohol only, cannabis

only, or both relative to neither alcohol or cannabis (referent); and 2) alcohol only or cannabis only relative to both, separately.
Results: Overall, 17.6% had been passengers in vehicles with a driver DUI of alcohol or cannabis in the past 30 days (4.2% alcohol only, 5.5% cannabis only, 7.9% both). Most individuals had used alcohol (54.0%) but not cannabis (16.7% in the past 30 days. Most people (36.6%) thought that driving after using cannabis was 'much less' or 'somewhat less' risky than alcohol; 33.9% thought there was no difference; and 29.6% thought that driving after using cannabis was "somewhat more" or "much more" risky than alcohol. Compared to not being driven by anyone DUI, statistically significant correlates of being alcohol only DUI passengers were being from the US (aOR=1.89), sexual minority (aOR=2.59), and past-month alcohol use (aOR=3.12); correlates of being cannabis only DUI passengers were younger age (aOR=1.03), less than a college degree (aOR=1.92), and lower perceived risk of DUI of cannabis versus alcohol (aOR=1.82), and past-month cannabis use (aOR=6.98); and correlates of being a DUI passenger where the driver had used both alcohol and cannabis were being from Israel (aOR=1.82), older (aOR=1.03), and past-month cannabis use (aOR=15.65). Compared to being driven by someone DUI of both alcohol and cannabis, correlates of alcohol only DUI passengers were being from the US and no past-month cannabis use; correlates of being a cannabis only DUI passenger were being from the US, lower education, no past-month alcohol use, and lower perceived risk of cannabis versus alcohol.
Conclusions: Country, age, perceived risk, and past-month substance use were associated with being a passenger in a vehicle while the driver was DUI. Prevention and intervention strategies to reducing DUI prevalence and related risk should include approaches aimed at the passengers in a vehicle, in addition to the drivers themselves.

Comparing young adults' perceptions of and strategies related to driving under the influence of alcohol, cannabis, and Delta-8 THC: A mixed methods study

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Introduction: Alcohol and cannabis are the most commonly used impairing substances in the U.S. In 2018, the U.S. federally legalized several psychoactive cannabis products, including Delta-8 THC. Several thousand calls to poison control centers have been made related to Delta-8 THC use. Driving under the influence (DUI) of alcohol and cannabis are serious public health concerns: automobile crashes are a leading cause of death. Although the prevalence of DUI of Delta-8 THC has not been assessed, toxicology analyses of DUI cases indicate that DUI of Delta-8 THC may be increasing. Methods: Data were from an online survey administered to a convenience sample of U.S. adults aged 18-25 (59% male, 59% Non-Hispanic White) using Amazon MTURK in July–August 2022 (n=189). The following were quantitatively assessed and compared related to DUI of alcohol, cannabis, and Delta-8 THC: past-month frequency, likelihood of future use, and perceived risk. Participants were asked "Please list all the ways that driving while under the influence of marijuana and Delta-8 THC are [similar/different; two separate questions]" and "On the times you have driven while under the influence of a cannabis product (e.g., marijuana, Delta-8 THC etc.), what techniques (if any) did you use to reduce the potential risk?" Descriptive statistics and thematic analyses (qualitative) were conducted. Results: Regardless of the substance, most participants reported being 'somewhat unlikely' to DUI and thought DUI carried 'moderate harm'. Most individuals (58.78%) reported equal DUI likelihoods for all three substances, 20.95% reported being more likely to DUI of alcohol than cannabis and Delta-8 THC, and the remaining 20.28% were equally split in reporting higher likelihoods of DUI of Delta-8 THC (vs. alcohol and cannabis, 10.14%) or cannabis (vs. alcohol and Delta-8 THC, 10.14%). Additionally, 35.29% of participants reported DUI

of alcohol to be riskier than cannabis or Delta-8 THC, 33.99% had equal DUI risk perceptions for all three substances, 16.99% believed DUI of Delta-8 THC was the riskiest, and 13.73% believed that DUI of cannabis was the riskiest. Among those reporting use of each substance, past-month DUI occurred most frequently after using Delta-8 THC (22.03%, n=13/59), followed by alcohol (18.13%, n=29/160), and cannabis (10.32%, n=13/126). Qualitative results indicated that DUI of Delta-8 THC and cannabis were compared by discussing risk perceptions and potency, and most participants felt that DUI of cannabis was safer than Delta-8 THC. Participants also discussed how these substances may impact driving risk (e.g., slower reaction time, less focused, sedation, anxiety, calming). Strategies to reduce DUI risk fell into two categories: before driving (reduce amount used, wait after using to drive, have a designated driver) and during driving (drive short distances, drive slowly, avoid highways, turn off phone/radio). Discussion: This was the first study to examine and compare Delta-8 THC DUI perceptions alongside alcohol and 'traditional' cannabis. DUI interventions that are broad and focus on impairment, rather than substance-specific information, may be efficacious. Interventions should build upon existing strategies that individuals are already implementing to reduce their DUI harm (e.g., reducing the amount used, reducing distractions).

Event-level Associations among THC, CBD, Social Context, and Subjective Experience during Cannabis Use episodes

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Objective: Limited research takes the quantity and potency of cannabis products, as well as social context, into consideration while examining subjective experience of real-world cannabis use. This study aimed to examine the subjective experience as a function of THC/CBD dosages (quantity x potency) and social context during cannabis use episodes in an intensive longitudinal study with individuals using cannabis recreationally. Method: One hundred and two adults (55.4% female, 87.2% White, 90.2% Non-Hispanic, Mage = 35.67) reporting weekly cannabis use were recruited from the community. Participants completed a baseline self-report battery and then a 14-day ecological momentary assessment (EMA) protocol using their smartphones, during which they self-initiated a brief survey after each cannabis use episode. Participants reported the THC and CBD potency and quantity of the cannabis product, social context, and subjective experience (i.e., Like, Dislike, and High). A series of multilevel models with two levels were built with level 1 (event level: THC dosage, CBD dosage, social context, time since finishing use) and level 2 (person level: cannabis problems) predictors of subjective experience. THC and CBD dosages were person-mean centered. Results: At the within-person level, higher THC dosage (b = .15, p <.001; b = .35, p <.001) and CBD dosage than one's average (b = .09, p =.04; b = .11, p =.03), and social use (b = .20, p =.01; b = .34, p <.001) significantly predicted greater liking and feeling high, respectively. The higher the THC dosage than one's average predicted lower disliking (b = -.05, p =.03). A significant interaction effect of THC dosage and social context (b = .08, p = .02) was observed such that solitary use had a negative association between THC dosage and Dislike (b = -0.05, p = .03) and social use had a null association (b = .02, p = .25). Moreover, the quadratic effect of time since use was a significant predictor in all three outcomes, during which all three subjective experiences increased and then decreased with time since use. At the between-person level, individuals with greater cannabis problems reported lower liking (b = -.15, p =.04) and higher disliking (b = .08, p =.01), but not feeling high, on average, across the EMA protocol. Conclusion: Social context plays an important role in the subjective reward at the within-person level, even when THC/CBD dosages are controlled for. Future research could examine if social context is related to cannabis-related behaviors (i.e., use quantity, problems) to understand how it might be a risk/protective factor at the event level. Moreover, individuals with greater cannabis problems might experience less Like but more Dislike in general across use episodes. Interventions targeting cannabis problems could highlight this evidence to effectively challenge expectancies/motives of use.

Characterizing Cannabis Use in Rural College Students: The Novel Role of Belongingness and Negative Mood

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Introduction: Rates of young adult cannabis use in rural areas are not only steadily increasing but approaching levels seen in urban communities (14.7% in non-metro; 18.5% in small and large metro areas; SAMHSA, 2020). Despite comparable prevalence, rural youth may be at increased risk for cannabis-related harms such as driving while intoxicated. Rural communities therefore represent a notable risk group for cannabis use and associated vulnerabilities, potentially attributable to social isolation characteristic of these environments. Social isolation has been linked to serious health risks and higher rates of depression, anxiety, and suicide (National Academies of Sciences, 2020), which may confer risk for self-medication with cannabis. As such, community belongingness may be protective against affective sequelae of social isolation, and thus represent a critical modifiable intervention target for rural cannabis use. This study integrated distinct frameworks of substance use and belongingness to examine the novel interpersonal determinants of cannabis use in rural communities, specifically belongingness.
Method: Cross-sectional online survey data was drawn from 332 college students (Mage=19.03 years [SD=1.39, range 18-25]; 53% female; 84% White) at a four-year university in the northeastern U.S. as a longitudinal study of college health behaviors. Of the original 332, 5 were excluded due to missing cannabis data, resulting in an analytical sample of 327. Bivariate correlations of all study variables were examined to characterize rural college cannabis use and psychosocial correlates. A fully saturated cross-sectional path model explored the association of university belongingness with past-month cannabis use via past-month depression/anxiety symptoms after controlling for male sex, White race, and first-year class.
Results: Students endorsing past month cannabis use (57%; n=185) reported using 1-5 occasions in the past month, with 28% using at hazardous levels and 4 negative psychosocial consequences (M=4.25 [SD=4.34]) on average. Students endorsed more social use (M=4.06 [SD=1.78]) than solitary use (M=1.97 [SD=2.01]) on average over the past month. Past month cannabis use frequency was correlated with higher PHQ-4 mean scores (r=0.14,p=.01), but not university belonging (p>.05). Path analyses suggest that belongingness was significantly associated with negative mood (a path; ß=-.30, b=-0.11, SE=0.02, p<.001, 95% CI [-0.15, -0.07]), which was in turn associated with cannabis use (b path; ß=.18, b=0.44, SE=0.12, p<.01, 95% CI [0.14, 0.73]). After accounting for this indirect pathway, the direct belongingness-cannabis relationship was nonsignificant (c' path; ß=.04, b=0.04, SE=0.05, p=.45, 95% CI [-0.06, 0.14]). This suggests full mediation of the indirect pathway via depression and anxiety symptoms (b=-0.05, SE=0.02, 95% CI [-0.09, -0.01]).
Conclusions: The significant indirect pathway of belongingness to cannabis use via depression and anxiety symptoms in this dataset suggests a novel cannabis risk mechanism in rural young adults. This study contributes to an unfortunate paucity of literature on rural cannabis use. Future directions include continued characterization of rural cannabis use to assess replicability and generalizability across regions and time, as well as sociodemographic variability in perception and salience of belongingness. Continued exploration of interpersonal protective and risk factors novel to the rural environment, such as belongingness, may help identify intervention targets to inform clinical recommendations.

Cannabis Expectancies as Moderators of the Day-Level Association Between Cannabis Quantity and Driving Under the Influence of Cannabis

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Background: Driving under the influence of cannabis (DUIC) may negatively impact driving performance (Simmons et al., 2022) and increase risk of collision (up to 1.92 times that of unimpaired drivers; Asbridge et al., 2012). Therefore, understanding risk and protective factors is crucial. Individuals' expectations of cannabis's effects act as protective or exacerbating factors in individuals' risk of DUIC (Arterberry et al., 2013; Ewing et al., 2015; Huynh et al., 2022; King et al., 2020). For example, individuals expecting cannabis to have global negative effects or lead to cognitive and behavioral impairment may be less likely to drive. In contrast, individuals who expect cannabis to induce perceptual and cognitive enhancement may be at increased risk of DUIC. Research also suggests that greater cannabis use quantity may increase the risk of DUIC (Huynh et al., 2022). In the current study, we sought to further understand these factors by examining whether global negative effects, cognitive and behavioral impairment, and perceptual and cognitive effects expectancies moderate the within-person association between cannabis use quantity and participant reports of DUIC.
Methods: 31 individuals who reported smoking cannabis flower at least three days per week between the ages of 18 and 50 (M=24.32; SD=7.71) completed the Marijuana Effects Expectancy Questionnaire (Schafer & Brown, 1991) and reported daily cannabis use in grams and whether they engaged in DUIC over the past 21 days via timeline follow-back. Logistic multilevel models tested the moderating role of global negative effects, cognitive and behavioral impairment, and perceptual and cognitive effects expectancies on the association between grams of cannabis consumed on a given day and participant reports of DUIC across 718 days.
Results: Participants reported driving after smoking on 29.81% of days. On days when participants reported driving after smoking, they reported driving within two hours of smoking on 91.12% of days. Cognitive and behavioral impairment and global negative effects expectancies significantly moderated the association between cannabis quantity and DUIC (OR=4.22; 95% CI:[1.53, 11.67]; p=.006 and OR=37.55; 95% CI:[4.53, 311.54]; p=.001, respectively). However, findings suggested that individuals reporting greater cognitive and behavioral impairment or global negative effects were more likely to report DUIC on days when they reported smoking a greater amount of cannabis than usual, while those reporting lower cognitive and behavioral impairment or global negative effects were less likely to report DUIC after greater consumption. The interaction between perceptual and cognitive effects expectancies and cannabis quantity was not significant (OR=1.20; 95% CI:[0.35, 4.17]; p=.775).
Conclusions: Cognitive and behavioral impairment and global negative effects significantly moderated the association between cannabis quantity and the likelihood of DUIC, but the pattern of results was inconsistent with our hypotheses. Notably, our sample consisted of individuals reporting frequent cannabis use. It may be that individuals who frequently use cannabis accurately predict its effects. Individuals in our sample who endorsed greater cognitive and behavioral impairment and global negative effects expectancies may have done so due to prior experience engaging in risky behaviors, including DUIC, following heavier use; however, further work is needed to explain this effect.

The Impact of Personality Risk Factors on Motives and Cannabis Consequences in Emerging Adulthood

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Emerging adults (EAs; ages 19-29) have the highest rates of cannabis consequences relative to other age groups. Although motives (i.e., reasons for using cannabis) are an established predictor of cannabis consequences, less is known about how other factors (i.e., personality) interact with motives to further increase cannabis-related problems. Two personality risk factors have emerged as potentially relevant for predicting problematic cannabis use: anxiety sensitivity (i.e., fear of anxiety-related sensations and their connection to potentially negative consequences) and sensation seeking (i.e., desire for novel and stimulating experiences). Anxiety sensitivity has been linked to both cannabis consequences and motives, particularly negative reinforcement motives such as using cannabis for coping and

alleviation of social anxiety, however it is unclear how anxiety sensitivity impacts the relationship between these motives and cannabis consequences. In addition, where motives have been examined, they are typically explored at the trait level, despite motivational models highlighting motives as state-level constructs that impact cannabis use in real time. The purpose of the current study was to examine the moderating role of anxiety sensitivity on the relationship between coping and social anxiety motives and cannabis consequences using an ecological momentary assessment research design. Participants were 81 EAs who used cannabis regularly (Mage = 21.99; 57.3% female; 41.5% Caucasian; 72% enrolled in postsecondary education) and completed a short survey three times a day, reporting on their cannabis use, motives, and consequences over 14 days. Anxiety sensitivity and sensation seeking were assessed at baseline. Hierarchical linear modelling tested whether personality risk factors moderated the within-person relationship between motives and cannabis consequences. In general, EAs experienced greater consequences when they were higher in anxiety sensitivity (ß = .07; SE = .03; p = .02). In addition, cannabis consequences were higher when they were linked to episodes of cannabis use that were more highly motivated by coping (ß = .10; SE = .04; p = .03), and social anxiety (ß = .06; SE = .03; p = .006). Anxiety sensitivity moderated the within-person relationship between coping motives and cannabis consequences (ß = -.02; SE = .01; p = .003). The within-person relationship between social anxiety motives and cannabis consequences was consistently high for those who were higher on anxiety sensitivity. For those lower in anxiety sensitivity, the slope was positive; participants had greater consequences on episodes when they used cannabis for social anxiety reasons. These results offer insight into personality risk factors as important trait-level moderators of the state-level relationship between motives and cannabis consequences. Anxiety sensitivity emerged as an important risk factor to consider, especially at lower levels where the risk of experiencing cannabis consequence becomes greater when endorsing specific motives. Treatment and intervention approaches may benefit from targeting this subpopulation of EAs by addressing using cannabis to cope or for social anxiety reasons.

Comprehensive Characterization of Sexual and Gender Minority Cannabis Use Disparities among Emerging Adults

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Background: The proportion of emerging adults (aged 21-25) who identify as sexual and/or gender minority (SGM) has increased in the United States over the past decade. While sexual and gender minority (SGM) emerging adults use cannabis at disproportionately high rates, it is unclear if SGM cannabis use disparities generalize across various SGM identities, and across different cannabis products. The current study examined associations between diverse SGM identities and use of different cannabis products.

Methods: Data were from a prospective cohort, originally recruited from Los Angeles County high schools, who have since been digitally surveyed four times as emerging adults (ages 18-23) from 2019-2022 (N=2706). Past 30-day use frequency of five cannabis products (smoked flower, vaped, edibles, blunts, and concentrates, and number of polyuse products) were compared across four gender (cisgender female, cisgender male, non-binary, transgender) and seven sexual orientation identities (heterosexual, asexual, bisexual, gay/lesbian, pansexual, queer or other identity, and questioning) using time-varying contemporaneous associations after adjusting for sociodemographic factors (e.g., age, race/ethnicity, education enrollment, working status, financial status).

Results: Transgender (vs. cis-gender female) participants had higher past 30-day cannabis use frequency for combustible flower (Relative Risk (RR)=2.82, 95% CI=1.15-7.09), vaped (RR=2.96, CI=1.43-6.12), blunts (RR=2.92, CI=1.14-7.46), concentrates (RR=2.22, CI=1.16-4.25), and poly-product (RR=2.30, CI=1.19, 4.45). Non-binary (vs. cis-gender female) participants had higher

frequency of past 30-day use for 2 out of 5 cannabis products (RRs ranged from 2.32 to 2.59). Gay/lesbian (vs. heterosexual) participants had greater frequency of past 30-day cannabis use for combustible flower (RR=1.93, CI=1.44-2.60), vaped (RR=1.95, CI=1.35-2.81), edible (RR=2.00, CI=1.24-3.22), blunts (RR=1.61, CI=1.04-2.48), concentrates (RR=2.28, CI=1.25-4.19), and poly-product (RR=1.51, CI=1.24-1.85). Bisexual (vs. heterosexual) participants reported a greater frequency of past 30-day use for 4 out of 5 cannabis products (RRs ranged from 1.32 to 1.66), while participants identifying as queer or another identity (vs. heterosexual) reported a greater frequency of past 30-day use for 3 out of 5 cannabis products (RRs ranged from 1.91 to 2.31). Asexual vs. heterosexual respondents did not differ in cannabis use.
Conclusions: Emerging adults who identify as most, but not all, SGM identities may be at greater risk of more frequent use of various cannabis products, especially those identifying as transgender or gay/lesbian. Inclusive SGM measurement may aid in more precise identification of cannabis use disparities.

Does Marijuana Use Impact Other Drug Outcomes for Sober Living House Residents?

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Background: Sober living houses (SLHs) offer an abstinence-based environment for people in recovery. Increased legalization of marijuana for recreational use as well as use of marijuana for medical purposes has put SLH operators and managers in a difficult position regarding how to handle marijuana use among residents. Further complicating matters, harm reduction models highlight the potential for substituting marijuana for other drugs because people report less adverse side effects, a decreased likelihood of a relapse, and less concern about withdrawal. While a substitution strategy may work for some, research is needed on how this approach could impact the recovery of SLH residents.
METHODS: We used observational data from a longitudinal study conducted from 2018 to 2021 to look at 557 new SLH residents at baseline, six-month follow-up, and 12-month follow-up. The sample was predominately male (71%), had a mean age of 39.8 years, and 49% self-identified as nonwhite. Bivariate tests were conducted to examine differences between residents who had and had not used marijuana in the 6 months prior to baseline. Mixed models examined the associations between any self-report of marijuana use the 6 months prior to entering the SLH and other drug outcomes at 6- and 12-month follow-up: any use of drugs other than marijuana during the past 6 months, total days of drug use other than marijuana, number of DSM-5 substance use disorder (SUD) symptoms, and severity scores >0 on the Addiction Severity Index (ASI) Drug scale. Final models adjusted for age, sex, race/ethnicity, any substance use 30 days prior to baseline, past-month substance use treatment, and past six-month 12-step attendance. Logistic regression was used for the dichotomized outcomes and negative binomial regression was used for count outcomes. All mixed models adjusted for clustering at the SLH level with robust standard errors.
RESULTS: Bivariate tests for differences between residents who had and who had not used marijuana in the 6 months prior to baseline found significant differences ($Ps<0.05$) for race/ethnicity, any substance use for 30 days prior, number of days used in past 6 months, and number of 12-step meetings attended in past 6 months. Any past six-month cannabis use was related to significantly ($Ps<0.01$) higher odds of any past-6-months drug use other than marijuana (OR=28.74, 95% SE: 15.64); more days of drug use other than marijuana in the past 6 months (IRR=15.01, 95% SE: 6.29); DSM-5 SUD symptoms (IRR=2.39, SE: 0.41); and higher odds of any drug issues on the ASI (OR=90.55, SE: 63.76).
CONCLUSIONS: Marijuana does not appear to have a substitutional role for residents in SLHs; marijuana use was instead associated with an increase in other drug use and greater drug-related issues. These findings point to a higher overall risk to the recovery efforts of SLH residents who use marijuana.

Development and Initial Validation of the Safe Cannabis Consumption Identity Measure

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Previous research has suggested that observed factors of cannabis use including use patterns, motives, and consequences are mirroring the same factors for alcohol use. As the prevalence of cannabis continues to grow, the ambiguous nature of a popularizing substance calls for more empirical approaches toward treating cannabis-related problems. Narrowing in on a flexible state of identity as opposed to inflexible states of behaviors show to promote long-lasting behavior change. While implementing this context with interventions, measures regarding a healthy identity with cannabis have yet to be explored. A measure that quantifies the extent of a healthy identity with consuming cannabis was created, entitled the Safe Cannabis Consumption Identity Measure (SCCIM). A five-factor model based on previous literature was conceptualized. An Exploratory Factor Analysis along with a Confirmatory Factor Analysis was conducted on the baseline sample (n = 580), revealing a strong two-factor model. The two altering factors identified within the model were "Congruent Identity" and "Counter Identity". The measure demonstrated moderate concurrent and discriminant validity. Prospectively four weeks later, those that reported moderate cannabis use were recruited for a follow-up survey (n = 52), which was evaluated for test-retest reliability and predictive validity. The measure demonstrated sound test-retest reliability and predictive validity, predicting higher use of protective behavioral strategies and lower cannabis-related consequences and cannabis use altogether. By utilizing a psychometric model of identity toward cannabis use, the SCCIM aims to serve as a practical mechanism for cannabis use interventions.

College Adjustment, Rumination, Marijuana Coping Motivations, and Problematic Marijuana Use: A Path Model among Freshmen College Students

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Background: Problematic marijuana use is prevalent, particularly in young adults, with marijuana use disorder affecting 5.8%, or 2.0 million, of young adults (ages 18 – 25) in the United States alone (SAMHSA, 2020). Previous research has reported a significant association between poor college adjustment and later marijuana use (Welsh, 2019). Though existing research reports a significant association between poor college adjustment and marijuana use outcomes, the underlying mechanisms that could explain these associations are less clear. In support of negative affect regulation pathway models, prior research has found rumination (particularly problem-focused thoughts) and marijuana use coping motives to significantly mediate the relationship between poor negative affect and marijuana use problems (Bravo et al., 2019). However, research examining whether rumination and marijuana coping motives mediate the relationship between poor college adjustment and problematic marijuana use is limited.

Objective: The present study aimed to expand prior research by exploring the associations between college adjustment, problem focused thoughts, marijuana use coping motives, negative marijuana-related consequences, and cannabis use disorder symptoms among freshmen college students. Specifically, we hypothesized that poor college adjustment would relate to more negative marijuana-related consequences and cannabis use disorder symptoms via more problem focused thoughts and higher coping motives.
Method: Participants were 285 (59.6% female) U.S. college student freshman who consumed marijuana in the past month and completed measures of marijuana use patterns (i.e., frequency of use in a typical week), marijuana use consequences (Brief Marijuana Consequences Questionnaire; Simons et al., 2012), cannabis use disorder symptoms (Cannabis Use Disorder Identification Test, Adamson et al., 2010), marijuana use motivations (Marijuana Motives Questionnaire, Simons et al., 1998), college adjustment (College Adjustment Questionnaire, O'Donnell et al., 2018), and problem-focused thoughts (Ruminative Thoughts Style Questionnaire, Brinker & Dozios, 2008). To address study aims, two path analyses were performed to test the serial unique associations between college adjustment → problem focused thoughts → coping motives → negative marijuana related consequences/cannabis use disorder symptoms.

Results: Within our path models, we found significant double-mediation effects for both negative marijuana-related consequences (indirect ß = -.02, 95% CIs = -0.04, -0.01) and cannabis use disorder symptoms (indirect ß = -.02, 95% CIs = -0.03, -0.01) as outcomes. Specifically, we found that a higher endorsement of poor college adjustment was associated with more problem-focused thoughts, which in turn was associated with higher marijuana coping motives, which in turn was associated with more negative marijuana-related consequences and cannabis use disorder symptoms.
Conclusions: These findings provide support for the relevance of problem-focused thoughts and coping motives as potential factors in linking poor college adjustment to problematic marijuana use among freshmen college students. Clinically, these results lend support to targeting problem-focused thoughts and marijuana coping motives among freshmen transitioning to college in order to mitigate harms stemming from poor college adjustment and its impact on problematic marijuana use. Further, our preliminary findings encourage further exploration of these associations in longitudinal or experimental studies.

Risky Family Dynamics, Rumination, Marijuana Coping Motives, and Problematic Marijuana Use: A Cross-Cultural Examination

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Background: Problematic marijuana use is prevalent, particularly in young adults, with marijuana use disorder affecting 5.8%, or 2.0 million, of young adults (ages 18 – 25) in the United States alone (SAMHSA, 2020). Previous research has reported a significant association between poor family dynamics in childhood (i.e., family conflict) and development of substance use disorders (Skeer et al., 2009; 2011). Though existing research reports a significant association between childhood family conflict and substance use outcomes, limited research has examined the impact of childhood family conflict on marijuana use outcomes among college students, especially across differing cultures. Moreover, the underlying mechanisms that could explain these associations are less clear.
Objective: The present study aimed to expand prior research by exploring the associations between childhood family conflict, rumination subfacets (i.e., anticipatory thinking, counterfactual thinking, problem-focused thoughts, and repetitive thinking), marijuana use coping motives, and negative marijuana-related consequences among college students from seven countries. Specifically, we hypothesized that poor family dynamics (i.e., higher family conflict) would relate to more negative marijuana-related consequences via more ruminative thinking (specifically problem focused thoughts) and higher coping motives.
Method: College students from seven countries (U.S., Argentina, Canada, Uruguay, Spain, South Africa, and England) completed an online survey examining mental health and substance use outcomes. To test study aims, the analytic sample comprised of 1,559 (68.3% female) college students who consumed marijuana in the past month and completed a measure of poor family dynamics. Path analysis was performed within the whole sample testing the serial unique associations between poor family conflict → rumination subfacets → marijuana coping motives → negative marijuana-related consequences. Multi-group analysis was performed to determine if the proposed model was invariant across gender and countries.
Results: Within our comprehensive model we found that coping motives (indirect ß = .04, 99% CIs = 0.01, 0.07) and anticipatory thoughts (indirect ß = .03, 99% CIs = 0.01, 0.05) uniquely indirectly influenced the relationship between poor family conflict and negative marijuana-related consequences. Specifically, more family conflict was associated with more marijuana coping motives and anticipatory thoughts, which in turn were related to more negative consequences. Moreover, we found one significant double-mediation effect for problem-focused thoughts and coping motives (indirect ß = .01, 99% CIs = 0.01, 0.03) illustrating that more family conflict was associated with more problem-focused thoughts, which in turn was associated with higher marijuana use coping motives, which in turn was associated with more negative marijuana-related consequences. This model was invariant across countries and gender groups suggesting replicability and generality.

Conclusions: These findings provide support for the relevance of rumination and coping motives as potential factors in linking childhood family conflict to problematic marijuana use across nations. Our preliminary findings encourage further exploration of these associations in longitudinal and experimental studies and lends support to the therapeutic targeting of rumination and marijuana coping motives to mitigate harms stemming from poor childhood family conflict.

COVID-19 Stress, Ruminative Thinking, Marijuana Coping Motivations, and Problematic Marijuana Use: A Path Model among U.S. College Students

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"Background: COVID-19 destabilized life for college students and researchers are continuing to gather data to understand the impact COVID-19 has had on cannabis use among college students. In support of negative affect regulation pathway models, prior research has found rumination (particularly problem-focused thoughts) and marijuana use coping motives to significantly mediate the relationship between poor negative affect and marijuana use problems (Bravo et al., 2019). Focusing on COVID-19, a recent study found that marijuana use coping motives significantly mediated the relationship between increases in poor mental health symptoms due to the impact of COVID-19 and marijuana use problems among college students (Dunaief et al., 2023). However, whether rumination and marijuana coping motives mediate the relationship between COVID-19 related stress and problematic marijuana use is limited.
Objective: The present study aimed to expand prior research by exploring the associations between COVID-19 related stress, problem-focused thoughts, marijuana use coping motives, and negative marijuana-related consequences among U.S. college students. Specifically, we hypothesized that higher COVID-19 related stress would relate to more negative marijuana-related consequences via more problem-focused thoughts and higher coping motives.
Method: Our sample consisted of 485 undergraduate students (58.1% cis woman) who consumed marijuana in the past month and completed measures of COVID-19 related stress, rumination, marijuana coping motives, and negative marijuana-related consequences in the Spring of 2022. To address study aims, a path model was conducted (COVID-19 related stress → problem-focused thoughts → marijuana coping motives→ negative marijuana-related consequences) using PROCESS Macro (Hayes, 2013) in SPSS.
Results: Within our path model, we found that coping motives (indirect ß = .05, 99% CIs = 0.004, 0.10) uniquely indirectly influenced the relationship between COVID-19 related stress and negative marijuana-related consequences. Specifically, higher COVID-19 related stress was associated with more negative marijuana-related consequences via higher marijuana use coping motivation. Moreover, a significant double-mediation effect for problem-focused thoughts and coping motives was found (indirect ß = .01, 99% CIs = 0.004, 0.03). Specifically, we found that higher COVID-19 related stress was associated with more problem-focused thoughts, which in turn was associated with higher marijuana use coping motives, which in turn was associated with more negative marijuana-related consequences.
Conclusions: Our preliminary findings suggests that college students reporting high COVID-19 related stress and who tend to engage in ruminative thinking (particularly problem-focused thoughts) are turning to marijuana to alleviate their struggles; however, this increased motivation to use marijuana to cope is associated with more experiences of negative marijuana-related consequences. Taken together, providing resources for substance-free coping strategies to manage the stress related to COVID-19 may be extremely useful for this population (particularly those engaging in ruminative thinking). Moreover, our preliminary findings encourage further exploration of these associations in longitudinal studies to examine the long-term effects of COVID-19 on marijuana outcomes among this population.

Sensitivity to both reward and non-reward as predictive of subjective mood ratings to delta-9-tetrahydrocannabinol (THC) among young adults

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Background: Rates of cannabis use have increased in young adults, an age group particularly susceptible to problematic use and developing cannabis use disorder. Positive subjective response following drug use is an important indicator of substance use maintenance and potential problematic use. It is possible that differences in subjective response to single doses of delta-9-tetrahydrocannabinol (THC) predict future cannabis use, but little research has examined this question. Further, it is not clear what factors predict differences in subjective response to THC. The current study examined sensitivity to reward and non-reward, known risk factors for problematic substance use, as predictors of subjective response to a single dose of THC in young adults who use cannabis.
Methods: In a within-subject, randomized, double-blind, placebo-controlled design, 24 young adults ingested either placebo or 7.5mg oral THC (dronabinol) and completed subjective mood ratings of positive and negative affect at regular intervals throughout the visit. Linear regression analyses examined whether measures of sensitivity to reward and non-reward (BIS/BAS scales) collected at study baseline were associated with positive and negative mood ratings during peak intoxication (120-180 minutes after drug administration).
Results: Young adults with higher BAS total scores demonstrated lower positive mood ratings to THC (versus placebo), β= -.54, p=.006, even after controlling for sex and lifetime cannabis use frequency. When BAS subscales were examined in separate models, BAS-drive was the only significant predictor of positive mood ratings, β= -.48, p=.02, indicating higher BAS-drive scores were related to lower positive THC mood ratings. BAS-fun seeking and BAS-reward responsiveness subscales were not significantly associated with positive mood ratings to THC (p-values < .05). For the BIS scale, young adults with higher BIS total scores showed greater positive mood ratings to THC (versus placebo), β= .42, p=.04, and this effect trended toward significance after controlling for sex and lifetime cannabis use frequency. In terms of negative mood, no BIS or BAS scores were related to negative mood ratings to THC (versus placebo; p-values < .05).
Conclusions: These findings revealed that both sensitivity to reward and non-reward were related to subjective positive mood, but not negative mood, ratings to THC among young adult cannabis users. Our results suggest that those more sensitive to rewards more generally are likely to report lower subjective positive mood after THC, and those more sensitive to non-rewards are more likely to report higher subjective positive mood after THC. This pattern of findings supports evidence that general sensitivity to rewards and general sensitivity to non-reward in one's environment may each be dissociable risk factors for substance use maintenance and problematic use.

College Marijuana Beliefs, Marijuana Motives, Protective Behavioral Strategies, and Cannabis Use Disorder Symptoms: A Path Model among U.S. College Students

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Background: Marijuana is one of the most often used drugs among college students and excessive use is linked to numerous negative consequences. The degree to which marijuana use is ingrained in students' social life and sense of self may be reflected in their perception of how vital marijuana is to the college experience (Pearson et al. 2017), which has the potential to be a significant predictor of symptoms of cannabis use disorder among college students (Nielsen et al., 2019). In examining mechanisms linking the perceived importance of marijuana to the college experience (herein called college marijuana beliefs) to marijuana outcomes, one study found that higher college marijuana beliefs were associated with more negative consequences via lower use of marijuana protective behavioral strategies (Bravo et al., 2019). However, limited research has investigated what factors link college marijuana beliefs to lower use of protective behavioral strategies (PBS) and in turn more negative marijuana-related consequences.
Objective: The present study aimed to examine the connections between college students' perceived value of marijuana to their college experience (i.e., college marijuana beliefs), their reasons for using marijuana (i.e., marijuana use motivations), marijuana PBS use, and their symptoms of cannabis use disorder. Specifically, we hypothesized that higher college marijuana beliefs would relate to more cannabis use disorder symptoms via higher marijuana use motives

(specifically enhancement and coping motives) and less use of PBS.
Method: Participants were 485 (58.1% cis woman) U.S. college students who consumed marijuana in the past month and completed measures of marijuana use patterns (i.e., frequency of use in a typical week), cannabis use disorder symptoms (Cannabis Use Disorder Identification Test, Adamson et al., 2010), marijuana use motivations (Marijuana Motives Questionnaire, Simons et al., 1998), marijuana PBS use (Pedersen et al., 2017), and college marijuana beliefs (Perceived Importance of Marijuana to the College Experience Scale, Pearson et al., 2017). To address study aims, five path analysis models were performed (one for each marijuana motive; enhancement, social, coping, conformity, and expansion) to test the serial unique associations between college marijuana beliefs → marijuana use motives → PBS use → cannabis use disorder symptoms.
Results: Within our path models, we found significant double-mediation effects for both enhancement motives (indirect ß = .006, 95% CIs = 0.002, 0.01) and coping motives (indirect ß = .005, 95% CIs = 0.001, 0.01). Specifically, we found that higher college marijuana beliefs were associated with more enhancement and coping motives, which in turn was associated with fewer marijuana PBS use, which in turn was associated with more cannabis use disorder symptoms.
Conclusions: These findings provide support for the relevance of marijuana use motives (particularly enhancement and coping) and lower PBS use as potential factors in evaluating marijuana's perceived importance to the college experience and cannabis use disorder symptoms. Clinically, the results of this study may influence the development of targeted interventions that seek to reduce cannabis use disorder symptoms among college students by promoting PBS use and reducing cannabis use motivations, especially among students endorsing high college marijuana beliefs.

Predicting Positive Outcomes: An Operant Conditioning Framework for Cannabis Use

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Concerns about negative impacts due to cannabis use are well documented on both individual and public health levels. Extensive research has identified several indicators (i.e., age, male, use frequency) of cannabis-related negative outcomes. Operant conditioning suggests positive outcomes serve as the reinforcing aspects of use; however, no studies have investigated if common predictors of negative outcomes are also associated with positive outcomes. Moreover, research has identified different facets of positive consequences (i.e., social, mood, perceptual, and sexual enhancement). Given the increasing availability of cannabis, there is a growing need to identify indicators of positive outcome facets and their salience, as these outcomes likely serve to promote use over time. Since there is a dearth of research in this area, the present study examined exploratory associations between age, sex, and cannabis use frequency with different facets of positive outcomes. College students (N=615; 68.3% female; age M=19.98, SD=1.97) completed several self-report questionnaires, including participant demographic characteristics, cannabis use frequency, and positive outcomes of use. We used path analysis to examine unique associations between model predictors (i.e., age, sex, use frequency) and each positive outcome facet (i.e., social, mood, perceptual, sexual enhancement). Use frequency was measured as the typical number of use periods each week (i.e., 12am-4am, 4am-8am, 8am-12pm, 12pm-4pm, 4pm-8pm, 8pm-12am; range=0-42) over the past three months. We evaluated two models: one predicting positive outcome frequencies and another predicting positive outcome valences. Results indicated consistently significant, positive relationships between cannabis use and both frequency and valence of each positive outcome facet, the strongest of which was perceptual enhancement outcomes. Both frequency and valence of social outcomes decreased significantly with age. Findings further indicated the predictors accounted for the most variance in perceptual outcomes (14% frequency; 11% valence), followed by mood (11% frequency; 8% valence), social (6% frequency; 6% valence), and sexual enhancement (6% frequency, 3% valence). Sex was not associated with any positive outcome facet. Consistent with an operant conditioning framework, these findings suggest cannabis use

frequency is a strong indicator of positive outcome frequency and valence. Notably, cannabis use frequency was the lone significant predictor of perceptual outcomes, which showed the largest amount of variance explained by predictors. Thus, positive perceptual outcomes from use may serve as a particularly strong reinforcer toward ongoing cannabis use relative to other outcomes. Regarding age, younger students in the sample reported greater positive social outcomes from use, which may reflect differences in the contexts or motives for use between younger and older individuals (e.g., use becoming more private for older individuals). Taken together, these findings provide an initial step toward identifying salient indicators for reinforcing aspects of cannabis use. Future research is needed to determine the extent of shared versus unique indicators between positive and negative outcomes.

Blunt Smoking Initiation, Progression, and De-Escalation among Youth and Young Adults: A 3-State Markov Model of Panel Data

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Objective. To characterize and compare transitions in blunt smoking behavior among a diverse cohort of youth and young adults observed between Spring 2019 and Fall 2021.
Methods. We analyzed six (6) waves of panel data from n=2,608 youth and young adults, collected via the Texas Adolescent Tobacco and Marketing Surveillance (TATAMS) system. Data were collected from Spring 2019 through Fall 2021. We applied a three-state Markov model to compare differences in the transition across three categories of blunt smoking: (a) never; (b) ever, non-current; and (c) current. Our first Markov model estimated differences in transitions across these three categories by Race/Ethnic category. Next, we conducted a series of stratified Markov models to identify common and unique predictors of blunt smoking transitions among each race/ethnic category. Covariates were sex, age, language spoken at home, depression, alcohol use, tobacco cigar smoking.
Results. Demographically, our sample was 37.5% Latino, 31.7% non-Hispanic White, 14.7% non-Hispanic Black, and 16.0% non-Hispanic ""Other."" Our first Markov model found that progression to ever (HR: 2.09; 95% CI: 1.15 – 3.81) and current (HR: 1.64; 95% CI:1.15-2.34), from never blunt smoking, was more likely among non-Hispanic Black youth, relative to non-Hispanic White youth. Among current blunt smokers, de-escalation was less likely among NH-Black (HR: 0.59; 95% CI: 0.43–0.81) and NH-""Other""(HR: 0.53; 95% CI: 0.38–0.74), relative to NH-White youth. No differences were observed between NH-Whites and Latinos. The second Markov model found that depression and alcohol use were each strong, consistent, longitudinal predictors of blunt smoking initiation, progression, and sustained use among all race/ethnic categories.
Conclusions. In this diverse cohort, blunt smoking initiation, progression, and de-escalation varied by race/ethnic category, though predictors of transitions did not. Depression and alcohol are important, temporal risk factors for blunt smoking; consistent with cross-sectional findings from national, surveillance estimates. Efforts to prevent and reduce blunt smoking will require extensive research to further understand the transitions of blunt smoking initiation and sustained use among youth.

Insomnia Symptoms, Cannabis Protective Behavioral Strategies, Cannabis-related Problems and Suicide Ideation among U.S. College Students

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Both insomnia symptoms and cannabis use have been linked to suicide ideation and attempts. However, the mediators of this relationship are not fully understood. In this study, we investigated whether protective behavioral strategies for cannabis use (PBSC) and cannabis use related problems mediated the relationship between insomnia symptoms and suicide ideation

(SI). Specifically, we hypothesized that higher insomnia symptoms led to lower use of PBSC and more cannabis use related problems, which then increased SI. Study participants were 5044 college students recruited from 10 universities in the U.S. Students participated in an online survey with assessments of insomnia symptoms, cannabis use, protective behavioral strategies, and SI. Insomnia symptoms refer to problems falling asleep, problems staying asleep, and early morning awakening. These symptoms were measured by the Insomnia Severity Index (ISI) (Morin, Belleville, Bélanger, & Ivers, 2011), Sleep Problems Questionnaire (Jenkins, Stanton, Niemcryk, & Rose, 1988) and Sleep Disorders Questionnaire (Douglass et al., 1994). Protective behavioral strategies for marijuana were measured by the Protective Behavioral Strategies for Marijuana scale (PBSM) (Pedersen, Huang, Dvorak, Prince, & Hummer, 2017). Cannabis-related problems were measured by the Brief Marijuana Consequences Questionnaire (B-MACQ). SI was measured the Columbia Suicide Severity Rating Scale (Posner et al., 2011). All analyses controlled for gender, age and race. Data were analyzed by structural equation modeling. In the measurement model, ISI, SPQ and SDQ loaded significantly onto the latent variable, insomnia symptoms (standardized factor loadings of ISI: .81, p<.001; SPQ: .92, p<.001; SDQ: .85, p<.001). In the structural model, higher insomnia symptoms predicted lower PBSC (ß=-.10(.04), p<.01) and higher cannabis related problems (ß=.09(.03), p<.05). Higher cannabis related problems significantly predicted increased SI (ß=.09(.02), p<.001). Cannabis related problems significantly mediated the relationship between insomnia symptoms and SI (95% asymmetric confidence interval: .002, .018, p<.05). Higher insomnia symptoms also had a significant direct effect on cannabis related problems (ß=.29(.02), p<.001). More frequent use of PBSC predicted fewer cannabis related problems (ß=-.34(.02), p<.001). However, PBSC did not predict SI. We will discuss the implications of these findings on understanding the variables that mediate the relationship between insomnia symptoms and SI among college students. A major limitation of the study is its cross-sectional design, preventing us to drawing any conclusion about temporal or causal relationships among the variables. Thus, the model presented here need to be replicated in other studies, especially studies that collects longitudinal and/or experimental data.

Characterizing Prenatal Cannabis Use Patterns in People's Own Words

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Pregnant people rely on anonymous forums to educate themselves about prenatal cannabis use (PCU), some due to mistrust of healthcare providers and fear of negative repercussions. These resources contain misinformation that can lead individuals to make decisions about their PCU that are detrimental to their own health and to the health of their child. Understanding the timing and patterns of PCU, as well as motivations for quitting, can inform health effects of PCU and windows for intervention. Objective: This study evaluated statements about the duration/patterns of PCU (i.e., trimesters of use) and quitting that were posted to a public PCU form with >47,000 current members. Methods: A qualitative analysis was conducted on a random sample of ten threads per month from June 2020 to May 2021 (n=120). Posts were analyzed if they contained information about cannabis use during pregnancy or lactation and timing and/or quitting PCU. Two independent coders used thematic analysis to codify information about PCU timing, such as the trimester(s) in which PCU occurred, and if/when people changed their pattern of use. Coders then met to discuss and finalize consensus codes. Results: Most individuals reported using cannabis throughout their entire pregnancy. When quitting was referenced, it occurred during the second or third trimester, and quitting was often motivated by fears of child protective services involvement. Conclusions: Interventions should target early PCU, but should also be offered throughout pregnancy, as those who use cannabis in pregnancy tend to continue to use it for the duration of their pregnancy. Further research is needed on the relationship between trimester(s) of PCU and trimester-specific effects on maternal-fetal health, and non-stigmatizing

PCU prevention and intervention efforts should be prioritized.

Protocol for Sensitivity to Cannabis Effects and Cue Reactivity as Markers of a Developing Disorder in Adolescents

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Cannabis use disorder (CUD) is a significant public health concern with origins in adolescence. Cannabis use escalates during the teenage years, and early cannabis use predicts the development of later problems. Leading etiological theories suggest that repeated cannabis use as the brain develops produces changes in reward systems. Over time, these instrumental brain changes alter cannabis effects and increase the incentive salience of cannabis cues, ultimately conferring risk for CUD. This upcoming longitudinal study pairs ecological momentary assessment (EMA) in the natural environment and a gold-standard human laboratory (HLAB) paradigm to monitor changes in subjective cannabis effects, cue reactivity, and CUD symptoms across the formative adolescent years. Leveraging smartphone (EMA) reports in natural settings allows for studying adolescents' reactions to the typically higher potency THC products and varied formulations (e.g., oils, edibles) favored by teenagers. The use of an accelerated longitudinal design allows for charting development from ages 13 to 19 through multicohort assessments completed in a shorter timeframe. We aim to recruit 224 adolescents (ages 13 to 16 at study outset, n = 56 per age cohort) who endorse cannabis use in the past month. Adolescents will complete a baseline HLAB protocol with follow-ups at 1, 2, and 3 years. Each yearly assessment point will also include a 28-day measurement burst of EMA in daily life. Multiple domain latent growth curve modeling will: (Aim 1) characterize age-related changes in sensitivity to rewarding cannabis effects over adolescence (ages 13 to 19); (Aim 2) test prospective relations of CUD symptom progression with change in sensitivity to rewarding cannabis effects; and (Aim 3) test prospective relations of CUD progression with responses to cannabis cues in the natural environment and HLAB. The upcoming longitudinal study extends the investigative team's prior research showing cross-sectional associations of CUD severity with subjective cannabis effects and cue reactivity among adolescents. In this study, well-defined etiological CUD constructs will be assessed across adolescence in real-world and laboratory settings. Disaggregating individual differences in change from overall age trends through an accelerated longitudinal design is a sensitive approach that is distinctively innovative. This work aims to support efforts to prevent the progression of an incubating or emerging CUD by enhancing scientific understanding of the trajectory to more severe harms. We aim to provide new empirical evidence of malleable processes that can serve as targets of preventative interventions.

THC-O-Acetate: Understanding Consumer Experiences with a Novel Semi-Synthetic Cannabinoid

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Introduction: There is a growing interest in and consumer demand for semi-synthetic cannabinoids. The addition of an acetate group to THC, the primary psychoactive component in cannabis, is thought to increase the potency of THC-O-acetate, colloquially known as THCO. The need for understanding these substances and the consumers who chose to use them takes on new urgency, as THCO will likely transition to the unregulated black market due to the U.S. Drug Enforcement Agency's February 2023 statement on the Schedule I status of cannabinoid acetates.
Methods: Researchers conducted the first known survey to examine consumer experiences with THCO. A survey was posted to novel cannabinoid-specific online forums in mid-2022 and included measures from previous studies on the medical use of cannabis and cannabis products and addressed a broad range of issues, including administration methods, use frequency, experiential properties of THCO, other cannabinoids used, health and medical conditions treated, drug substitution, adverse experiences,

and sources of information on THCO. The survey content was also informed by comments in social media discussions of THCO users.
Results: Participants (N = 267) primarily consumed THCO by vaping concentrates or extracts (71%) and edibles (49%), most (66%) used THCO once a week or more frequently. Most respondents (66%) used THC-O-acetate once a week or more, 88% inhaled heated/combusted THC-O-acetate, which may result in exposure to toxic ketene gas. Experiential properties generally resembled those of THC, though with a greater latency of effects. Most participants also used other novel cannabinoids such as HexahydroCannabidiol (HHC, 73%), Cannabinol (CBN, 58%), and Cannabigerol (CBG, 55%), some simultaneously with THCO. About a third (36%) of participants used THCO to treat a health or medical condition, most commonly for mental health issues such as anxiety or panic attacks (26%), depression or bipolar disorder (20%), and stress (15%). About a quarter (24%) of participants reported drug substitution, most commonly for sleep aids (11%), pain relievers (10%), alcohol (9%), and antidepressants (9%). Only 4% of respondents received information on THC-O-acetate from their primary care provider, only 14% reported that their primary care provider knew they used THC-O-acetate, and 54% were not at all confident in their primary care provider's ability to integrate medical cannabis into their treatment. Internet discussion forums (85%) and websites (82%) were the predominant sources of information on THCO, and a third (34%) of participants desired to receive information from their primary health/medical care provider.
Conclusions: All policies and practices should be informed by empirical evidence. People use THC-O-acetate users for recreational and medical use, reporting THC-like effects and effective substitution for other drugs. This use is generally separate from mainstream healthcare. Although the legal environment is increasingly restrictive for THCO, consumer demand and medicinal use may result in continued use, likely through unregulated markets. There is a continuing need for harm reduction efforts, such as lowering the risk of exposure to toxic ketene gas.

THC-O-acetate: Examining Consumer Attitudes and Beliefs Related to the Risks of Consuming the Semi-Synthetic Cannabinoid THCO

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Introduction: Semi-synthetic, or artificial, cannabinoids are a class of compounds that are typically manufactured with hemp derived concentrates, some of which have been found in the cannabis plant. Semi-synthetic cannabinoids such as Delta-8 or 9 THC-O-Acetates, commonly known as THCO, have gained attention for several reasons. Consumer interest in the alleged increased potency of this substance; combined with researchers identifying a link heating these substances and Ketene formation. As semi-synthetic cannabinoids face increasing scrutiny the importance of identifying health antecedents and consequences of using semi-synthetic cannabinoids in comparison to Medical Marijuana and Recreational Cannabis becomes increasing important, given the recursive relationship of these markets.
Methods: As part of a structured questionnaire exploring consumer attitudes and experiences surrounding THCO and other semi-synthetic cannabinoids administered across a variety of cannabinoid-related forums on the social media platform Reddit, participants were asked a series of open-ended questions designed to elicit responses on a variety of topics from research design to health concerns. Researchers reviewed each open-ended question answer to code responses for key themes that would help identify patterns surrounding research priorities and health concerns.
Results: Respondents [n=209] were most interested in the active drug and health effects as well as the mechanisms of action associated with different types of THCO products (35%) followed closely by product safety, quality, and testing reliability (30%) These types of posts had positive, negative, and neutral sentiments about THCO and reflect the nascent status of market, science, and regulations surrounding these kinds of

substances. Significantly, 16% of respondents were explicitly interested in the medical potential of THCO, noting its potential benefit as an analgesic agent. When asked what health concerns were greatest, 36% of respondents (n=143) indicated Lung Related Injuries including comments about EVALI and Ketene formation as well as Lipid Pneumonia and Cannabinoid Hyperemesis.

Conclusions: Consumers are increasingly relying on self-regulation to navigate the complex landscape of products and regulations that structure market access. This self-regulation has emerged most notable in a desire for research on the health effects and mechanisms of actions associated with the substance THCO. Awareness of risks associated with consuming THCO, specifically the formation of Ketene is a positive indication that online communities may be able to support harm reduction practices surrounding the use of emergent psychoactive substances like semi-synthetic cannabinoids. Despite the clear schedule status of THCO, it is imperative that researchers continue to explore the antecedents and consequences of the use of this substance.

The Moderating Effect of Campus Climate on the Relation between Loneliness and Cannabis Use

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Cannabis use is highly prevalent on college campuses in the United States, second only to alcohol use and occurring at higher frequency than tobacco use (North & Lukas, 2021). In a campus climate, cannabis misuse is associated with missing classes, lower grade point average, and other negative outcomes (Shashwath et al., 20187). Rankin defines campus climate as "the current attitudes, behaviors and standards of faculty, staff, administrators and students concerning the level of respect for individual needs, abilities and potential" (Rankin, 2023). A number of studies have identified variables that are positively associated with cannabis use, including loneliness (Rhew, et al., 2021). Loneliness, typically defined as the perception of being alone and isolated, is associated with poorer mental and physical health outcomes (Russell, 1996). Furthermore, other studies have found that campus climate operates as a protective factor for college student physical and mental health (Woodford et al., 2015). Given this, it is important to identify both variables that predict cannabis use and those that buffer against it. To date, no published studies have examined relations between loneliness and campus client and their effect on cannabis use. The present study investigated whether loneliness predicted cannabis use frequency in a nationally representative dataset from college students, and whether campus climate moderated this relation. Data come from the American College Health Association National College Health Assessment (ACHA-NCHA) III, a national sample of college students in undergraduate and graduate/professional programs. This project includes student data from the third iteration of the questionnaire that spans the Spring semester of 2019 through the Spring semester of 2022. During this time, 461 institutions and 301,183 students participated in the ACHA-NCHA III survey. The ACHA-NCHA III questionnaire includes a series of questions on multiple aspects of campus climate as it relates to student wellbeing. Responses were measured using a Likert scale ranging from 1= “strongly disagree” to 6= “strongly agree”. The ACHA-NCHA III survey includes the UCLA 3-item Loneliness Scale as the measure of self-reported loneliness in college students (Hughes et al., 2004). Response options ranged from 1= “hardly ever” to 3= “often”. Cannabis use frequency is measured as “When, if ever, was the last time you used cannabis/marijuana? Please include medical and non-medical use” and was measured as within the last 2 weeks, ,more than 2 weeks ago but less than 30 days ago, more than 30 days ago but within the last 3 months, more than 3 months ago but within the last 12 months, more than 12 months ago, never. Results indicated that loneliness significantly positively predicted cannabis use frequency ($p < 0.001$). Further, the results confirmed that campus client significantly negatively predicted cannabis use ($p < 0.001$). Finally, campus client moderated the relation between loneliness and cannabis use frequency ($p < 0.001$), indicating that campus climate acts as an intermediary factor against the effects of loneliness on cannabis use. These findings might offer an intervention point for individuals who are experiencing loneliness and who use cannabis, preventing misuse and subsequent negative outcomes.

Preliminary Psychometric Testing of the Treatment Self-Regulation Questionnaire for Assessing Motivations for Responsible Cannabis Use: An Application of Self-Determination Theory

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Cannabis use protective behavioral strategies (PBS) are cognitive–behavioral strategies used before, during, and/or after cannabis use to reduce cannabis use and related problems. Self-determination theory (SDT) provides a potentially useful framework to understand motivations for responsible cannabis use, which is operationalized in the present study as cannabis PBS use. The Treatment Self-Regulation Questionnaire (TSRQ) has been used previously to assess types of motivation per self-determination theory (SDT) for responsible drinking (Richards et al., 2017, 2021). Initial support for good psychometric properties of the TSRQ has been found, including measurement invariance across subgroups of college student drinkers. In the present study, we examined the relation of motivations for responsible cannabis use, as assessed by the 15-item Treatment Self-Regulation Questionnaire (TSRQ), with cannabis PBS use and other cannabis-related outcomes. Participants (N = 408) were college students who reported past-month cannabis use recruited from a multisite study. Consistent with SDT and previous studies of the TSRQ for drinking responsibly, we found support for a 4-factor structure of the TSRQ via Exploratory Structural Equation Modeling (CFI=.974, RMSEA=.047). Introjected regulation ("Because I would feel guilty or ashamed of myself if I did not use cannabis responsibly") was positively associated with cannabis PBS use (ß=.37, p<.001). External regulation ("Because others would be upset with me was negatively associated with cannabis use (ß=-.26, p<.001). Unexpectedly, autonomous motivation ("Because I personally believe it is the best thing for my health," ß=.14, p=.092) and amotivation ("I really don't think about it," ß=-.01, p=.842) was not significantly related to cannabis PBS use. Our overall model (motivation-PBS use-cannabis use-consequences/severity) accounted for a substantial portion of the variance in cannabis-related outcomes including frequency of cannabis use (R-square=.301), negative cannabis-related consequences (R-square=.189), and cannabis use disorder symptoms (R-square=.441). The present study provided initial psychometric support and validation of a version of the TSRQ for assessing motivations for responsible cannabis use. Consistent with SDT, more self-determined motivations (autonomous motivation and injected regulation) were protective factors (associated with higher PBS use and lower cannabis use/problems), whereas less self-determined motivations (external regulation and amotivation) were risk factors (associated with lower PBS use and higher cannabis use/problems. Overall, our results partially support the predictions of SDT, suggesting the need for further development and refinement of the TRSQ.

Identifying Profiles of Cannabis Users Based on Their Motivations to Use Cannabis Responsibly: An Application of Self-Determination Theory

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Self-determination theory (SDT; Ryan & Deci, 2000) provides a useful framework for understanding motivations for responsible cannabis use. Research indicates college students' motivation to use alcohol responsibly varies in the quality and quantity of motivation (Richards et al., 2021). Further, person-centered approaches like latent profile analysis has been used to identify subgroups of individuals based on their motivational profile (Richards et al., 2020), including 3 classes: a High Quantity class (i.e., self-determined), a High Quantity class (relatively high on all types of motivation), and a Low Quantity class (amotivated). The objective of the present study is to identify unique subpopulations of college students based on motives to use cannabis responsibly per SDT using latent profile analysis. College students

from one of ten universities were recruited to participate in an online survey study (N=1856). Our analyses are limited to past month cannabis users who also completed the required measures (N=386). The 5-class solution had high classification precision (relative entropy = .953). Using the automatic BCH method, we examined the differences between each of the 5 classes on cannabis-related variables including cannabis PBS use, cannabis use, negative cannabis-related consequences, and cannabis use severity. For the sake of parsimony, we focus on the differences between the self-determined class (i.e., expected to have the best outcomes based on SDT) and the amotivated class (i.e., expected to have the worst outcomes based on SDT). As expected, the amotivated class reported significantly lower cannabis PBS use (M=3.64) than the self-determined class (M=4.44), p<.001; significantly higher cannabis use (M=14.76) than the self-determined class (M=9.77), p=.008; and significantly higher cannabis use severity (M=12.31) than the self-determined class (M=9.10), p=.017. However, there were no significant differences in the experience of negative cannabis-related consequences (p=.25). Previous research on motivations to drink (alcohol) responsibly has supported a 3-class solution, whereas our results supported a finer-grained 5-class solution. As predicted by SDT, the amotivated class reported the lowest cannabis PBS use, highest cannabis use, highest consequences, and highest cannabis use severity. As expected, the self-determined class reported the highest cannabis PBS use, lowest cannabis use, lowest cannabis use disorder symptoms.
Given our limited sample size (n<400), our results should be considered preliminary, and replication of our class solution is needed. Additional work is needed to examine how these classes may differ on other SDT-based constructs (e.g., satisfaction of psychological needs), and how profiles predict outcomes prospectively over time.

Profiles of Ethnic Experiences among a Hispanic College Students and Cannabis-Related Outcomes

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Cannabis is the most widely used substance among college students and is associated with several deleterious academic and developmental outcomes (Volkow, 2014). Of particular concern is the potential for college students to develop cannabis use disorder (CUD); in fact, roughly 10% of first-year college students met the criteria for a CUD in a previous sample (Caldeira et al, 2008). One group at risk for developing CUD are Hispanic college students. Historically, Hispanics use substances including cannabis at lower rates than non-Hispanic White individuals. However, cannabis use incidence rates among Hispanic youth has significantly increased over the previous ten years (Marzell et al, 2017). Several factors including discrimination, identity, and acculturative stress were identified as correlates of cannabis use among Hispanic young adults (Yokey et al., 2020). Yet, little is known regarding the outcomes associated with cannabis use among Hispanic college students. Therefore, our study sought to identify profiles of ethnic experiences and cannabis use outcomes among college Hispanic college students reporting current cannabis use. The current study utilized data from a large multi-site study focused on substance use among college students (n=5494). The Scale of Ethnic Experience (SEE) was utilized to assess domains of ethnicity-related cognitive constructs including Ethnic Identity, Perceived Discrimination, Mainstream Comfort, and Social Affiliation. Cannabis use outcomes including CUD symptoms (CUDIT-R), frequency of cannabis use (Marijuana Use Grid), consequences of cannabis use (Brief Marijuana Consequences Questionnaire), and protective behavioral strategies (Protective Behavioral Strategies for Marijuana) were assessed using validated measures. We conducted a series of latent profile analyses modeling 1- to 6-profile solutions using Mplus. We considered the following to determine the optimal profile solution: goodness-of-fit indices (i.e., Akaike Information Criterion [AIC], Bayesian Information Criterion [BIC]), classification diagnostics (i.e., relative entropy), the Lo-Mendell Rubin adjusted likelihood ratio test, substantive interpretation of profiles, and consistency of the profile solution across samples. The AIC, BIC, and sample-adjusted BIC continued to improve for each k+1 solution,

however the 4-profile solution was the only solution with an entropy greater than 0.8 (entropy=0.805). Based on fit statistics and interpretability, we selected a 4-profile solution as optimal: Profile 1 (low mainstream conflict; 49.1%), Profile 2 (high mainstream conflict/low social affiliation; 5.0%), Profile 3 (low ethnic identity/low social affiliation; 4.0%), Profile 4 (high ethic identity/high social affiliation; 41.9%). Profile 1 reported the greatest number of CUD symptoms (M=5.38, SE=0.3), marijuana use frequency (M=7.00, SE=0.8), and marijuana use consequences (M=4.21, SE=1.2). Profile 2 reported using the highest use of protective behavioral strategies (M=4.49, SE=0.3) and the least amount of consequences (M=0.76, SE=0.5). Preliminary findings may suggest that targeting factors including mainstream conflict and social affiliation may serve as key points for developing interventions to reduce CUD and cannabis consequences among this population.

Examining Associations Between Cannabis Hangover Symptoms and Protective Behavioral Strategies Used

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Background: Past research has been mixed or inconclusive involving the next day residual effects of cannabis making research on it even more critical. Limited survey studies indicate some endorsement of hangover symptoms such as "brain fog" or fatigue and the acute and residual effects of cannabis use often are reported as mild to moderate impairments in learning, memory, processing speed, and executive functioning. These are promising targets for measuring post-acute impairment and may suggest mechanisms by which cannabis use leads to decreased performance and overall well-being. Importantly, little to no research has examined the correlation between hangover symptoms endorsed and how they relate to protective behavioral strategies toward marijuana (PBSM). Thus, the present study aimed to examine whether there were any correlations between PBSM and cannabis hangover symptoms endorsed in a sample of college student reporting cannabis use. We hypothesized that endorsement of more cannabis hangover symptoms would be positively correlated with the PBSM endorsement.

Method: Participants were 292 college students from a large public university in the United States who reported using cannabis more than 10 times in their lifetime and reported experiencing some next day residual effects from cannabis, or a cannabis "hangover". Participants completed an online survey that assessed several factors such as current cannabis use patterns, cannabis hangover symptoms experienced (17 items, yes/no lifetime experience), PBSM (36 items, 1 = never to 6 = always scale), and consequences of cannabis use. A descriptive summary of reported PBSM was conducted, and then we examined correlations between the number of PBSM reported and number of hangover symptoms experienced. Exploratory analyses were conducted examining relationships between PBSM and subscales of cannabis hangover symptoms (i.e., physical, cognitive, affective).

Results: The most commonly endorsed PBSM were related to marijuana possession-related concerns. On average, participants reported experiencing 9.65 (SD = 6.69) hangover symptoms. PBSM was not associated with overall hangover symptoms ($r = -.104$, $p =$ ns), but was a negative correlation between mean PBSM score and the Cognitive ($r = -.100$, $p < .01$) and Affective ($r = -.175$, $p < .001$) cannabis hangover symptoms subscales.

Discussion/Purpose: These preliminary results suggest use of PBSM may be associated with fewer residual effects of cannabis use; this information may be effective to encourage adoption of PBSM to reduce the negative consequences of cannabis use. As such, cannabis hangover symptoms may be a relevant short-term adverse consequence that effects decision-making and may motivate harm reduction strategies, such as engaging in PBSM. Future directions include examining relationships between specific PBSM and cognitive/affective hangover symptoms. Numerous reports of hangover symptoms on social media and news sites, displays the need to better examine cannabis hangover and its effects empirically.

The Impact of Chronic and Non-chronic Cannabis Use on Overall Quality of Life

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Objective: Since cannabis legalization has increased in the United States, usage has also increased (Meier, 2021). Previous studies have focused on the cognitive effects of cannabis, but few have investigated life outcomes (Borque & Potvin, 2021). The World Health Organization's Quality of Life (WHO-QoL) measure is commonly used to assess QoL for individuals who frequently use alcohol (Srivastava & Bhatia, 2013); however, there remains a gap in the literature measuring QoL and overall life functioning (OLF) among frequent cannabis users. Therefore, this study aimed to measure OLF of chronic cannabis users (CCU; 3.5+ days per week for at least one year) and non-chronic cannabis users (NCCU). A functional composite variable operationalized OLF outcomes across four domains (physical health, mental health, social relationships, and environment), modeled from the WHO-QoL (Kirouac et al., 2017).

Methods: Participants included 333 cannabis users (M=31.1 years old, range 18-64; 52.3% male; 43.7% people of color) who completed questionnaires including demographics, cannabis usage, and impact of use on different areas of daily functioning. A between-groups one-way analysis of variance (ANOVA) compared OLF between CCU (n=194) and NCCU (n=140). Pearson's bivariate correlation assessed the relationship between OLF, age, and duration of current usage rate (i.e., days per week, grams per day). A three-way univariate ANOVA examined the effects of the primary reason for cannabis usage (medicinal, recreational, or both) on OLF.

Results: There was no significant difference in OLF between CCU and NCCU ($F(1, 331 = [2.017]$, $p = .175$). OLF positively correlated with older age ($r(331) = .11$, $p = .045$) and a longer duration of current usage ($r(331) = .123$, $p = .024$), though these two variables were also highly intercorrelated ($r(333) = .41$, $p = .000$). There were no significant group differences in OLF based on the reason for current use or initial use (p's >.05); however, medicinal users had slightly higher OLF compared to recreational and both users.

Conclusion: Results indicated no difference in OLF among CCUs and NCCUs. The findings highlight that CCUs were able to obtain QoL similar to NCCUs, suggesting that more frequent use might not negatively impact OLF. These results contradict those found in a meta-analysis of studies examining the correlation between alcohol use and QoL, which identified chronic alcohol use and longer duration of chronic use negatively impacts OLF (Levola et al., 2014). Reasons for currently using and initiating cannabis use did not influence OLF, suggesting that recreational users' OLF is not significantly more impacted by CCU than medicinal users. Therefore, future studies may investigate other factors that may contribute to cannabis users' OLF, such as personality traits, life stressors, or route of administration. Further, being older and using cannabis at the same rate for a longer period of time had a positive effect on OLF. This suggests that older people may be able to use cannabis more responsibly, with a less negative impact on their life.

Disentangling the Association Between Personality Traits and Cannabis Use and Disorder in People of European Ancestry

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Introduction: Lifetime cannabis use (CU) and cannabis use disorder (CUD) are becoming increasingly prevalent and are associated with poor health and behavioral outcomes. Individuals with low levels of conscientiousness and openness, and high levels of agreeableness are at increased risk for CU and CUD. Twin studies estimate the heritability of CU and CUD to be 61% and 78% respectively, and genome-wide association studies (GWASs) have also found some single-nucleotide polymorphisms (SNPs) to be associated with CU and CUD. Although personality traits and cannabis involvement are heritable, a GWAS has identified only one overlapping SNP to be associated with conscientiousness. The current study investigated shared polygenic effects between personality, CU, and CUD. We hypothesized that agreeableness and conscientiousness, and their respective polygenic scores (PGSs), would be negatively associated, but openness and its respective PGS would be positively associated with CU and CUD.

Methods: Data were from Wave IV of the National Longitudinal Study of Adolescent to Adult Health; variable n's ranged from 4461 to 4514. The sample

was 47.05% male, and the mean age was 28.90 (SD=1.74). CU was operationalized by asking if participants had ever used cannabis (0=no, 1=yes). CUD was dichotomized based on DSM-5 criteria (0=participant endorsed 0 or 1 symptom; 1=participant endorsed 2+ symptoms). Personality was measured using the Mini-International Personality Item Pool, and items corresponding to each personality factor were averaged to create a composite score. Polygenic effects were evaluated using PGSs that were created using summary statistics provided by GWASs for personality, CU, and CUD, which used the top ten-thousand SNPs due to the restriction of publicly accessible data. Hypotheses were tested using path analysis in Mplus to account for direct and indirect effects of personality PGSs while controlling for age, sex, income, and the first ten genetic principal components.

Results: We found that higher scores on the agreeableness PGS were associated with lower odds of CU (ß[95% CI]= -0.07[-0.12,-0.02], OR=0.93) and CUD (ß[95% CI]= -0.06[-0.11,-0.01], OR=0.94). Similarly, higher scores on conscientiousness were associated with lower risk for CU (ß[95% CI]= -0.08[-0.13,-0.03], OR=0.89) and CUD (ß[95% CI]= -0.10[-0.15,-0.04], OR=0.87). Higher scores on openness were associated with greater odds of CU (ß[95% CI]=0.17[0.13,0.21], OR=1.33) and CUD (ß[95% CI]=0.10[0.05,0.15], OR=1.18). Higher scores on agreeableness were also associated with a greater likelihood of CU ([95% CI]=0.06[0.01,0.10], OR=1.10). There was limited evidence of indirect PGS effects via personality, as well as direct effects on respective personality phenotypes.

Discussion: The current study provides evidence supporting the application of PGSs to understand the liability for CU and CUD. The limited predictive utility of the agreeableness PGS combined with the partial support of our hypotheses regarding personality traits, as evidenced by the direct effect of the PGS on CU and CUD, but not on the agreeableness phenotype, underscores the need for future, more powerful, GWASs of cannabis and personality traits using multivariate approaches. Future studies should also explore if these results might be attributable to the use of different personality inventories to assess the phenotypes and to create the PGSs.

Theoretical Correlates of Cannabis Use and Intentions among US and Israeli Adults

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Background: Several countries have legalized adult non-medical (i.e., "recreational") cannabis use. In the US and Israel, cannabis remains illegal at the national level; however, in the US, 21 states, 3 territories, and the District of Columbia legalized non-medical cannabis at the state/jurisdictional level. Cross-country research may elucidate differences in correlates of cannabis use, which may be impacted by social/legislative contexts.

Methods: In Fall 2021, we conducted a cross-sectional survey among US (n=1,128) and Israeli (n=1,094) adult online panelists (ages 18-45, Mage=32.19, 50.3% female). Descriptive and bivariate analyses (Chi-square for categorical variables; t-tests/ANOVA for continuous variables) were used to describe the sample and examine differences in the outcomes and correlates of interest based on country. Multivariable logistic and linear regression analyses were utilized to examine potential correlates of: (1) past-month cannabis use (Yes/No), (2) next-year use intentions (1=not at all - 7=extremely), and (3) likelihood to use in the home or near children if non-medical cannabis use was legal (1=not at all - 4=very).

Results: In bivariate analyses, US (vs. Israeli) participants were more likely lifetime (49.9% vs. 22.5%) and past-month users (22.0% vs. 11.2%, ps<.001) and perceived lower risk (addictiveness and harm to health) and greater social norms (acceptability and use within social networks; ps<.05). US (vs. Israeli) lifetime users reported younger age at first use, and greater proportions using primarily recreationally (vs. primarily for medical purposes), obtaining from retailers (vs.

illegal sources), and using via smoking without tobacco, vaping liquid, dabbing, and edibles (vs. smoking with tobacco or vaping dried leaves/herbs) (ps<.05). US (vs. Israeli) past-month users indicated more days of use (M=15.09, SD=12.29 vs. M=9.66, SD=9.67, p<.001). In multivariable analyses, correlates of past-month cannabis use included being male, being sexual minority, lower cannabis-related perceived risk, and more positive perceived social norms (ps<.05); country was not associated. Correlates of greater use intentions and greater likelihood to use in the home or near children if legal included being Israeli, male, lower cannabis-related perceived risk, more positive perceived social norms, and past-month cannabis use (ps<.05).
Conclusions: Findings suggest differences in cannabis use and use intentions based on cannabis-related risk perceptions and social norms, primary reasons of use, mode of use, and access/source. Moreover, findings indicate differences in these factors across countries. As cannabis legislation and attitudes evolve, regulatory and prevention efforts must be informed by global surveillance of its use.

State Requirements for Cannabis Retail Personnel among States with Legal Adult Non-medical Cannabis Markets in the US

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Introduction: As of April 2023, 20 US states have legalized adult non-medical (i.e., 'recreational') cannabis use, allowing the establishment of a rapidly expanding retail market. However, states' requirements for personnel working in cannabis retail stores (i.e., 'budtenders') have not been examined. Given that cannabis retail personnel are often used as sources of cannabis-related information among consumers and play a key role in product safety, it is important to assess the requirements of retail personnel, including permits, background checks, and/or types of training (if any). Methods: Two independent coders extracted and summarized information on the 20 states' cannabis retail personnel requirements from Vangst.com, a website providing state-specific information regarding cannabis-related careers. Links to external sources (i.e., state licensing boards) were visited to ensure data accuracy and to obtain details regarding training among states that required it. Results: The age requirement for retail personnel was ≥21 years old in seventeen states; the other three (Connecticut, Missouri, Virginia) require retail personnel to be ≥18. Two states (Virginia, Washington) had no application/licensing requirements, and Missouri only required prospective employees to complete an online application assessing basic information. The other seventeen states (all but Missouri, Virginia, and Washington) required background checks, with fingerprinting also required in eight states (Arizona, Colorado, Illinois, Maine, Maryland, Montana [every three years], Nevada, New Jersey [if personnel in an alternative treatment center]). Of the seventeen states requiring background checks, eight (Alaska, Arizona, Maine, Maryland, Montana, Nevada, New Jersey, Oregon) specified that felony convictions would prevent employment, with the type of conviction and when the conviction occurred being state-specific. In some states, how background check results impacted employment was decided by the employer (California), could be overruled by the state cannabis board (Michigan, New York), or could be petitioned to be exempt (Rhode Island). In Colorado, felony convictions did not automatically disqualify applicants. Four states (Connecticut, Illinois, Massachusetts, New Mexico) did not specify how the findings from background checks would impact employment. Six states (Alaska, California, Michigan, New Mexico, New York, Oregon) had no additional requirements outside of background checks and/or fingerprinting. Other states required completing an application form, payment of fees, and/or training. Thirteen states (all except California, Maryland, Michigan, New Mexico, New York, Virginia, Washington) required applicants to pay fees to receive a cannabis retailer permit, ranging from $25 (New Jersey) to ≥$150 (Arizona). Some form of training was required in six states (Alaska, Illinois, Montana, New Jersey, New Mexico, Oregon). The nature of the trainings varied in terms of content, timing, frequency, and assessment of knowledge acquisition (i.e., testing). Discussion: The requirements for cannabis retail personnel varied widely across these 20 states, with strict requirements in some states (Montana) and almost no requirements in other states (Missouri, Virginia). It is critical to

evaluate the impact of such requirements, for example, the impact of application fees and employment being contingent on background checks on social inequities, as well as the quality and impact of personnel training on their interactions with consumers, safe cannabis handling practices, and other outcomes.

A Web Intervention to Prevent Alcohol and Cannabis-impaired Driving among Adolescents in Driver Education

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Alcohol and cannabis are the most commonly used substances among adolescents in the U.S. The consequences related to using both substances together are significantly higher relative to use of either substance alone. Teens' propensity to engage in risky driving behaviors and their relative inexperience with the timing and duration of cannabis' effects puts them at heightened risk for experiencing harms related to driving under the influence. Targeting novice teen drivers prior to licensure is thus an ideal time for prevention efforts focused on reducing alcohol and/or cannabis initiation, use, and impaired driving. In this presentation, we will describe our webCHAT pilot study that evaluates the efficacy of a single web-based intervention to prevent impaired driving in the context of driver education. Teens aged 15.5-17 years in driver education are randomly assigned to driver education with and without the webCHAT intervention. The presentation has two goals. First, we will describe our intervention adaptation results where we conducted focus groups (n=11) and interviews (n=6) with adolescents 15.5-17 years to assess their feedback on the intervention. Second, we will present preliminary baseline data (N=85) from our pilot study describing sample characteristics including rates of alcohol and cannabis use and risk behaviors (e.g., driving under the influence, riding with an impaired driver). We will describe our study design and share lessons learned to date to help inform future trials in this area.

Comparing Youth In and Out of Recovery who Resolved Cannabis Use Problems

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Background and Significance: Many people consider themselves to have resolved a serious problem with substances, but do not identify as being "in recovery." Recovery identity is a new concept and some representative adult studies exist that have compared problem resolvers and individuals in recovery. However, little is known about youth who either resolve problems or enter recovery during high school. Building off our prior work showing heterogeneity in recovery definitions among youth, this is the first study to examine differences in adolescents who have resolved problems with cannabis and identify as either being in recovery or not.
Methods: Data were from the 2022 Illinois Youth Survey (IYS), a school-based survey designed collecting information on various health and social indicators, especially substance use and related prevention measures. The IYS typically yields representative statewide data that includes respondents from 8th to 12th grades. We subset the sample to youth (n=1552, 1% of n=146,780) who answered yes to the question "Did you used to have a problem with cannabis but no longer do?" We then compared the demographic characteristics, patterns of poly-substance use, behavioral health outcomes, and CRAFFT scores of two groups: 1) youth who had resolved cannabis use problems and were in recovery (PIR, n= 645 (42%), M[SD] age= 16.4[1.15], 53.0% female, 55%White) and youth who had resolved cannabis use problems but were not in recovery (PNR, n=907 (58%), M[SD] age=16.4 [1.16], 43.9% female, 64.4% White).
Results: Youth in the PIR group reported lower past-year cannabis ($p<0.01$), alcohol ($p<0.01$), and cigarette ($p<0.001$) use compared to those in PNR, but there was no difference in past-year e-cigarette use ($p=.67$). PIR youth also reported lower past 30-day cigarette use ($p<0.001$), but no differences existed for other substances in the past 30-day period. CRAFFT scores were significantly higher among youth in the PIR group (M=3.30, SD=2.04) compared to the PNR group (M=2.78, SD=1.93) ($p<0.001$). However, on average, youth in both groups met clinical

thresholds for probable substance use disorder (i.e., scores ≤ 2). In terms of behavioral health outcomes, PIR reported a higher likelihood of having suicidal thoughts ($p<0.001$) and depressive symptoms ($p<0.001$) in the past year compared to PNR.
Conclusion: This novel study investigated differences between youth who resolved problems with cannabis and reported different recovery statuses. Similar to one large representative adult study, only four in ten youth who resolved a serious problem with cannabis reported being in recovery (i.e., Do you consider yourself to be in recovery?). Both groups had some elevated substance use risks, but youth in recovery had more severe problems on some measures. Additional research is needed to further understand the needs and trajectories of youth who resolve problems with cannabis during high school.

Public Awareness Campaign Metrics for Public Health in Legalized Adult-Use Cannabis States

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Background: Twenty-two US states have enacted adult-use cannabis laws, allowing adults aged 21-years or older to purchase, possess, and consume cannabis for nonmedical adult-use ("recreational") purposes. Public awareness campaigns (PACs) are key public health interventions that multiple legalized states implemented to prevent adverse effects of legalization. As outlined in the enabling legislation St. 2017, c. 55, An Act to Ensure Safe Access to Marijuana, the Massachusetts Cannabis Control Commission ("Commission") and the Department of Public Health (DPH) jointly implemented the More About Marijuana PAC, consisting of two sub-campaigns: 1) Responsible use awareness campaign for Massachusetts adults ages 21 years old and older ("responsible use campaign") and 2) a youth prevention campaign targeting parents ("parent campaign"). The effectiveness of PACs for cannabis harm mitigation is not well-known.
Methods: This quasi-experimental, cross-sectional design study used a logistic regression analysis of pre-implementation and post-implementation surveys of Massachusetts residents to examine whether there were changes in cannabis knowledge in four key PAC message domains: 1) knowledge of age legal to use, 2) driving behaviors, 3) youth risks, and 4) cannabis storage, and whether there were differential effects based on the two sub-campaign surveys (n=2,500).
Results: We found that 51% of survey respondents reported seeing at least one PAC message. Survey participants reported seeing campaign messages on the internet (38.2%), TV (38%), social media (36%), highway billboards (35%), and public transit (22%). The post-campaign survey responses were associated with greater odds of reporting that individuals aged 21 and older were old enough to try cannabis. Respondents who reported seeing either PAC components or the two specific youth campaign components had greater associated odds of reporting that people are old enough to use cannabis at 21 compared to 18. Post-campaign survey responses were associated with greater odds of reporting that cannabis-use is either more dangerous or just as dangerous as driving after alcohol use. Respondents who saw the PAC were more likely to report that cannabis has greater risk for youths than adults, and those who saw the parent campaign were even more likely to agree with this statement. Those who saw the parent campaign were also more likely to report that they would store cannabis in a locked storage area compared to those who reported not seeing the campaign.
Conclusion: Further research is needed to assess knowledge obtained and changed behaviors, however, based on a preliminary assessment of Massachusetts's PAC, there is evidence that educational public health mechanisms can promote responsible adult and medical cannabis use.

Development of an Adaptive Ecological Momentary Intervention for Simultaneous Alcohol and Marijuana Use

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Simultaneous alcohol and marijuana (SAM) use, defined as using both substances at the same time

with overlapping effects, is common among young adults. SAM use can lead to more negative consequences than use of either substance alone. Currently, there are few brief interventions specifically designed for SAM use and even fewer designed for community populations (i.e., not specifically designed for college students).

Recent technological advancements, including smartphones, provide a unique opportunity to bring intervention content to a person in real time when they need it. Further, intervention content can be tailored to a person's specific use patterns and goals. Adaptive ecological momentary interventions (a-EMIs) and just-in-time adaptive interventions (JITAIs) take advantage of technological advancements by delivering intervention components in real time. The benefits of these state-of-the-science interventions are vast; however, one challenge for researchers is to determine what content to deliver and with what frequency.

This poster presents key aspects of a Stage I treatment development project of an a-EMI titled "Smartphone App for Effectively Reducing Risk (SAFERR)." Grounded in self-regulation and social cognitive theories, SAFERR will include intervention content focused on protective behavioral strategies and craving reduction exercises that individuals can use in the moment to reduce SAM use or single use of alcohol or marijuana and associated negative consequences. A critical component of the development and testing of SAFERR is varying the frequency of delivery of the intervention content from one time per day to multiple times per day. In addition to intervention content delivered in real-time, participants will receive psychoeducation, personalized feedback, and goal setting intervention components.

To test which components of SAFERR are the most effective, the project will utilize the Multiphase Optimization Strategy (MOST) framework and an innovative fractional factorial experimental design. This project will include two stages, a pilot stage and a small randomized clinical trial. In the pilot stage, participants will be randomly assigned to one condition such that each intervention component is pilot tested by at least one person. We will solicit feedback on the content and frequency of the messaging and use this feedback to refine the methodology for the randomized clinical trial. In the trial, diverse young adults who report SAM use will be recruited from primary care clinics in Hawai'i and randomly assigned to one of eight groups.

This presentation describes the development of the research design and testing of the SAFERR a-EMI in young adults recruited from primary care clinics who engage in SAM use and may not be seeking treatment.

Cannabis Retailer Communication about Cannabis Products, Health Benefits, and Risks: A Mystery Shopper Study of Retailers in 5 US Cities

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Significance. Despite increases in legalization of cannabis for recreational use in the US (21 states, 3 territories) and rapid increases in US cannabis retail sales, little is known regarding retailer practices, especially related to product health claims and risks. Documenting personnel communication with consumers may elucidate problematic implications (e.g., low perceived risk of use) or regulatory noncompliance (e.g., making prohibited health claims) and ultimately inform regulatory and enforcement efforts. The current study used a mystery shopper approach to examine regulatory compliance and personnel communication regarding product recommendations, health benefits, safety, and/or risks among cannabis retailers in 5 US cities with recreational cannabis sales.

Methods. In Spring 2022, recreational cannabis retailers in 5 cities in different US states with recreational cannabis sales (Denver, Colorado; Seattle, Washington; Portland, Oregon; Las Vegas, Nevada; Los Angeles, California) were identified from state regulatory agencies and screened for having a current operational brick-and-mortar retail storefront. We randomly selected ~30 locations/city. In Summer 2022, mystery shoppers (2 student research staff) participated in a 2-day training before completing assessments. Mystery shoppers coded store type (recreational, recreational-medical), contextual

factors (bars/pubs/clubs, schools, parks/playgrounds, public transit within 2 block radius), age verification, and onsite consumption. Using a soft script with store personnel, mystery shoppers coded product availability and suggestions (for someone new to cannabis, whether they could sample products for free/cheaply); health claims and warnings (regarding use for anxiety/insomnia, pain, pregnancy-related nausea, cautions for cannabis use [impacts on behavior or driving]); and other products including CBD and synthetic THC (availability of products at store, safety, reasons for use). Descriptive and bivariate analyses characterized the retailers overall and across cities.

Results. In this sample of 140 retailers (61.4% recreational only, 38.6% recreational-medical), several were within 2 blocks of bars/pubs/clubs (30.0%), schools (14.3%), public transit (14.3%), and parks/playgrounds (7.9%), particularly in Los Angeles. Additionally, 90.6% asked for age verification immediately upon entry and 2.9% later during the visit; 6.5% never asked (most frequently in Portland). There were incidents of seemingly intoxicated patrons (8.6%) and outdoor on-premise use (5.0%) across cities, excluding Los Angeles. Common product recommendations for new users included bud/flower (56.4%), edibles (38.6%), and pre-rolled joints (37.9%); 8.6% offered free/inexpensive ways to sample products. Over 93% of store personnel verbally endorsed cannabis use for anxiety, insomnia, and pain, respectively, and only 26.4% warned against use during pregnancy (least common in Denver). Regarding use-related warnings, 23.6% indicated that most people are not greatly impacted by cannabis use, but 52.1% warned against driving after use (least common in Las Vegas). Almost all (>90%) sold CBD products and endorsed their health benefits and safety, but few (<10%) sold or endorsed synthetic THC (all in Los Angeles).

Conclusions. Findings highlight concerns regarding cannabis retailer regulatory compliance, particularly related to health claims. While some differences across cities reflected regulatory variation, other differences did not, potentially pointing to implementation and enforcement gaps – which are critical to address as cannabis markets expand. Current results also underscore the need for surveillance methods that capture various dimensions of the retail environment.

Building an Academic-community Partnership to Facilitate Federally-funded Cannabis Research in a Tribally-owned Clinic

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Background: American Indian/Alaska Native (AI/AN) people are disproportionally affected by chronic pain. Despite growing acceptance of cannabis for pain management, scant research exists to evaluate its palliative effects. A Tribally-owned clinic contacted Washington State University and Northwest Indian College researchers to investigate the use of cannabis as medicine in their community. The goal of this poster is to describe methods used to create, fund, and implement a study developed in partnership with a Northwest Tribe. Materials/Methods: Initial meetings included key stakeholders to plan a competitive research proposal for federal funding. The project used decolonization methodologies that prioritized the needs of the tribe. AI/AN health science students and research personnel were recruited to ensure the project maintained an AI/AN-centered approach. Permissions were obtained to designate a single Institutional Review Board and create a data sharing agreement. The Tribe's legal representation was included to assure that contracts maintained Tribal Sovereignty. Weekly videoconference meetings facilitated team-building while specifying roles and study

procedures. Results: Funding was secured from the National Institutes of Health for a 4-year prospective longitudinal observational study. Two in-person meetings joined Western and Eastern Washington team members to foster relationship-building and trust. Implementation of recruitment and data collection began November 2022 with the goal of 350 participants. Qualitative data collection includes interviews structured to center AI/AN voices and experiences. Conclusion: Intentional collaboration between project stakeholders led to successful proposal development and launch of study protocols. In-person meetings allowed for questions and issues to be resolved in real-time.

Prevalence of Other Cannabinoids in Product Advertising among Brick-and-Mortar Retailers

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In recent years, there has been an increase in the availability of CBD products the United States (US). This is a direct result of the passage of the Agriculture Improvement Act of 2018, commonly known as the Farm Bill, which made hemp-derived products containing less than .3% THC content legal. Hemp has over 100 cannabinoids in addition to CBD. While much attention has focused on CBD, little is known about the availability of other hemp-derived cannabinoids in the US market and how they are marketed to consumers. We sought to document the types of new hemp-derived cannabinoid products advertised in brick-and-mortar retailers in three states with disparate state cannabis policies (CO, MD, NC). Two trained data collectors documented advertisements in 150 randomly selected retailers using wearable imaging technology between December 2021 and April 2022. Advertisements were content analyzed for type of cannabinoid present (e.g., CBD, CBN, Delta-8). We also documented the presence of claims prohibited by the United States Food and Drug Administration (FDA), including unapproved new drug claims. Unapproved drug claims imply the product can diagnose, treat, cure, mitigate or prevent a disease or other condition, despite not having explicit approval from the FDA. We documented 1948 advertisements about cannabinoids; 831 for CBD and 918 for other hemp-derived cannabinoids. Advertisements for other cannabinoids were more frequently found in NC (352) and MD (408) compared to CO (158). The most frequently advertised other hemp-derived cannabinoids were CBN, CBG, CBC, Delta-8, Delta-10 and THC-V, which made up 74% of the advertisements for other hemp-derived cannabinoids. While advertisements for CBN, CBG, CBC and THC-V were documented at similar frequencies in the three states, Delta-8 advertisements were less frequent in CO (n=8) compared to NC (n=177) and MD (n=145). No Delta-10 ads were documented in CO; 27 were documented in NC and 26 in MD. Unapproved drug claims were documented for all six most frequently advertised other hemp-derived cannabinoids and were found in all three states. Unapproved drug claims were most frequently documented in advertisements for CBC (81.3% of ads), THC-V (71.4% of ads), CBN (60.0% of ads) and CBG (47.8% of ads), compared to Delta-10 (11.3% of ads) and Delta-8 (9.4% of ads). We documented frequent advertising for many different hemp-derived cannabinoids. We identified prevalent unapproved drug claims in the marketing of these hemp-derived cannabinoids. This is of public health concern because these poorly characterized products are growing in popularity and consumers may be influenced to delay treatment or switch from approved medicines for these products. Continued documentation of advertisements for hemp-derived cannabinoids is warranted.

Ease of Access to a Medical Cannabis License Among Adults in a Permissive Medical Cannabis Policy Environment: Associations with Demographic Factors and Cannabis Use Disorder

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Background: Oklahoma is one of the few medical cannabis states that does not require a qualifying condition to obtain a medical cannabis license

(MCL) and has the most dispensaries per capita of any state in the U.S. Consequently, cannabis may be perceived as easy to access. This may be particularly relevant to sub-groups with higher rates of cannabis use, like males, racial/ethnic minorities, younger individuals, and those with lower income and educational attainment. Passage of medical cannabis laws and ease of access to medical cannabis is frequently associated with problematic cannabis use. We examined the associations of perceptions of ease of access to a MCL with sociodemographic factors and the likelihood of cannabis use disorder (CUD). Methods: The sample (N=1203) included adults (≥18 years) from Oklahoma with an MCL issued by the Oklahoma Medical Marijuana Authority, who were recruited into a larger repeated cross-sectional online survey. Measures included sociodemographics (age, sex, race/ethnicity, income, education, employment, health insurance), CUD diagnosis using the brief Cannabis Use Disorder Identification Test (CUDIT-R), and perceived ease of access to obtaining a MCL (1=very difficult to 5=very easy). ANOVA tests examined associations of sociodemographics with ease of access, using Tukey post-hoc for multiple group comparisons. A logistic regression model assessed the association between ease of access and the likelihood of a CUD, controlling for sociodemographics correlated with the outcome using backward step selection (sex, age, race/ethnicity, employment). Results: The sample was primarily non-Hispanic White (67.3%), female (53.0%), and in middle adulthood (M=36.96, SD=14.01). Participants' average ease of access score was 3.45 (SD=1.19), indicating that most perceived it was neither easy nor difficult to attain a MCL. In ANOVA tests, perceived ease of access differed by race/ethnicity, age, education, employment, and sexual minority status (p's<.05). Specifically, Hispanic respondents (vs NH White), individuals ages 18-24 (vs ages 35-44, ages 45-54, and ages 65+), those with less than a high school diploma (vs some college or technical school education), and those who were employed (vs unemployed) reported greater difficulty obtaining an MCL. In the logistic regression, easier perceived access to an MCL was associated with lower likelihood of a CUD (AOR=0.87, 95% CI=0.78-0.97, p=.01). Discussion: Socially vulnerable groups reported greater difficulty obtaining a MCL, with the exception of unemployment being associated with easier MCL access. Unemployed individuals may seek out information to receive a MCL because they may use medical cannabis rather than traditional medical care to offset expenses of emergency room and primary care visits. Unexpectedly, easier MCL access was associated with lower odds of CUD symptoms. Those who easily obtain a MCL may be more likely to use it for medical reasons, and less likely to misuse it. The groups that reported difficulty in obtaining a MCL are also known to report the highest rates of cannabis use in the literature. Perhaps medical cannabis policies are protective for those who are more susceptible to problematic use. Longitudinal observations of MCL access and cannabis use patterns are needed to better understand the dynamics between policy and individual use.

Deriving an Objective Best Practices Rate of Budtenders in New Mexico: Validation of a Pseudo Patron Protocol

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With legalization and commercialization of cannabis in the state of New Mexico for adults ages 21 and older, there is a pressing need to develop optimal training programs that help to ensure that budtenders comply with state laws/regulations and recommended best practices. Effective budtender training programs can help to mitigate potential cannabis-related harms ranging from underage use, driving while intoxicated, addiction, among others. As a first step toward developing an effective training program, we must first identify the level of compliance with state laws/regulations and recommended best practices. We employed a pseudo-patron protocol focused on identifying the degree to which cannabis dispensaries and 'budtenders' working at cannabis dispensaries in the state of New Mexico are complying with recommended and/or required best practices. Although data analysis is ongoing (current n = 47), the overall best practices rate across all domains that have been coded to date is 54.5%, highlighting the need for improved responsible budtending training. For Domain A (Cannabis and the Body), the best practices rate was 40.0%, which reflects a weighted average of very low best

practices rates on the subdomain of discussing chemovars (7.14%), low best practices rates on the subdomain of effects of CBD (28.5%), and a moderate-to-high rate on individual differences of the effects of cannabis (78.6%). For Domain B (Knowing the Laws), the best practices rate was 75% overall, with a high best practices rate regarding the daily purchasing limits (86%), but a complete absence of discouraging out of state transport of cannabis products (0%). For Domain C (Verifying Age and Identity), we observed the highest best practices rate (96.7%) with ID being requested 100% of the time from our underage-appearing pseudo patron, 100% of the time from our intoxicated-appearing pseudo patron, and 90% of the time as part of other pseudo patron protocols. For Domain D (Recognizing Problem Cannabis Users), the best practices rate was 25%, reflecting a low level of awareness of the symptoms of cannabis hyperemesis syndrome. For Domain E (Reducing Cannabis-Related Harms), the best practices rate was 77.2%, reflecting high best practices rates regarding starting with a low dosage (82%) and waiting significant amount of time to observe effects (77.3%). Taken together, these pilot data demonstrate that the pseudo patron protocol successfully detects variability in budtenders' engagement in best practices, and can serve as a highly precise, sensitive outcome measure for responsible budtender training.

Directly Observing (Responsible) Budtending Practices in New Mexico: A Qualitative Examination of Budtenders in New Mexico

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In states with cannabis dispensary operating to legally sell cannabis products, budtenders could play an important role in mitigating cannabis-related harms ranging from preventing underage use, decreasing driving while intoxicated, curbing problematic cannabis use, and preventing negative acute cannabis-related problems. The present study used a pseudo patron protocol such that trained pseudo patrons asked questions of budtenders either as a naïve user or a problem user. These interactions were transcribed and coded for the degree to which information provided is correct and/or consistent with best practices. Under the naïve user protocol, the pseudo patron asked questions regarding the difference between sativa and indica, purchasing limits, the time course of intoxication from different edible products, and what dose one should take of edibles. We observed a wide range in the quality of information shared by budtenders with some providing very careful and comprehensive dosing information (consistent with 'start low, go slow' recommendations), and others providing very little guidance, or markedly false information. In the problem user protocol, the pseudo patron expressed experiencing the symptoms of cannabis hyperemesis syndrome (i.e., vomiting from cannabis use), and asked for advice from the budtender. On most occasions, budtenders recommended alternative products (e.g., edibles, 'indica', 'wax'), but excellent advice of stopping cannabis use immediately was provided at one dispensary along with very accurate information regarding the etiology, course, and resolution of the condition. We explore each response to the questions of the pseudo patrons and rank these responses in terms of quality. In certain cases, we compare real responses to 'ideal' responses that are focused on minimizing negative cannabis-related harms while maintaining compliance for current laws/regulations. We discuss the implications of prevalent myths held by budtenders, and how interventions could target myth reduction. Acknowledging the primary objective of budtenders (i.e., sell products), we believe improved training of budtenders can help to mitigate cannabis-related harms.

Alleviating Cancer-Related Symptoms with Cannabis: A Systematic Review

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Introduction: Research about cannabis use among cancer and HIV populations is limited. Experimental research is even more scarce. The current systematic review sought to describe existing experimental research testing efficacy of cannabis to alleviate symptoms among individuals diagnosed with cancer and/or HIV.
Methods: The literature was systematically combed for peer-reviewed articles published between 2017-2022 about cannabis use among HIV and cancer populations. The search was

completed in October 2022. We entered terms such as "HIV", "cancer", "medical cannabis", "pain", and "depression" into Medline, CINAHL, Embase, and PsycInfo databases. We identified 1825 peer-reviewed articles and reviewed each in Covidence, a software for managing systematic reviews. Eligibility criteria included studies (1) involving individuals over 18 years old who have been diagnosed with cancer or HIV, (2) testing the efficacy of cannabis use, (3) including at least one disease-related symptom as an outcome measured, and (4) using the experimental study design. Study protocols, reviews, and conference abstracts were excluded. Duplicates were removed (n = 87). After abstract screening remained 142 papers for full-text review. Nine studies remained; data was extracted and synthesized.

Results: The final nine studies pertain to cannabis efficacy among cancer patients; no studies with HIV patients met our criteria. Four studies were quasi-experimental; five were randomized control trials. Four studies tested administration of an oro-mucosal spray, four tested an oral capsule or tincture, and one tested a variety of administration routes (e.g., inhalation, oral). Sample sizes ranged from 17-399. Regarding primary outcomes, five studies assessed changes in pain levels, two studies assessed changes in weight or nutritional symptoms (e.g., anorexia), one study assessed safety of the treatment, and one study assessed symptoms of peripheral neuropathy. Six studies yielded findings indicating efficacy of cannabis treatments: three resulted in pain improvement ($p < .001$), two resulted in increased weight ≥10% from baseline or caloric intake ($p < .041$), and one yielded significant results indicating safety of cannabis use among cancer patients ($p < .042$). Two studies yielded non-significant results: primary endpoints included changes in peripheral neuropathy and pain. One study yielded non-significant results in an unexpected direction, such that greater pain improvement was reported in the placebo group ($p=.274$). Treatment effects included: 3/17 patients reached the endpoint of gaining ≥10% body weight from baseline; survival after one year was 83% among treatment and 44% among the placebo group ($p < .042$); and treatment effect of a cannabinoid-medication on pain reduction for treatment vs. placebo was 5.39% ($p < 0.038$).

Conclusion: Nine experimental studies testing cannabis efficacy in cancer populations were systematically reviewed. Results indicate an overall treatment effect of cannabis on symptoms of pain and anorexia. Cannabis was deemed safe to use in this group. The range of sample sizes is relatively small, suggesting that replication of these findings in larger samples may yield different results. Furthermore, future cannabis treatment studies should employ a randomized control trial design. Overall, results from the current systematic review suggest that cannabis is a potentially efficacious treatment for pain and anorexia symptoms in cancer populations.

Emergency Department Visits for Cannabinoid Hyperemesis Syndrome in California from 2016 to 2021

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Background and Methods: Cannabinoid hyperemesis syndrome (CHS) is a condition characterized by cyclical vomiting, nausea, and abdominal pain following heavy and prolonged cannabis use. Increases in cases of CHS have been reported in legal cannabis states following legalization, though the scope of the issue is not well characterized. This analysis examines cases of CHS presenting to California emergency departments (ED) from 2016 to 2021 among individuals aged 10 and older. Data are from the California Department of Healthcare Access and Information (HCAI) ED visits and admissions datasets. No commonly agreed-upon case definition of CHS has been described in the literature. For the purpose of this analysis we chose to maximize the inclusion of potential cases and so we defined CHS as ED encounters with any cannabis-related ICD-10-CM code (ICD-10-CM F12 or T40.7) and persistent vomiting (ICD-10-CM R11).

Results: Between 2016 and 2021 ED visits involving CHS increased by 200 percent from 5,039 visits in 2016 to 15,161 visits in 2021. ED visits involving CHS increased by 100 percent or greater across all adult age groups, with the largest increases among 26- to 34-year-olds (260 percent) and 18- to 20-year-olds (236 percent). Among youth aged 10 to 17, CHS related ED visits increased 140 percent from 418 in 2016 to 1,005 in 2021. There was a greater increase in CHS ED

visits among females (245 percent) than males (166 percent) from 2016 to 2021. Among females the greatest increases were among those aged 26 to 34 (314 percent) followed by those aged 18 to 20 (310 percent). Among males the greatest increase was among those aged 26 to 34 (219 percent), followed by those aged 35 to 49 (174 percent). Among youth 10 to 17, there was an increase of 181 percent among females and 97 percent among males, which may reflect increasing cannabis use among adolescent females.
Conclusions: ED visits for CHS have increased substantially in California since cannabis was legalized in 2016. This may be due to an increasing prevalence of cannabis use and/or to changing patterns of cannabis use behavior among adults and youth. Prevention messaging and education aimed at cannabis users and youth is needed to raise awareness of this potentially serious consequence of regular cannabis use.
Disclaimer: The findings and conclusions in this article are those of the author(s) and do not necessarily represent the views or opinions of the California Department of Public Health or the California Health and Human Services Agency.

Cannabis Use among the Breast Cancer Patients in the United States: A Systematic Review

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Background: Cannabis use interest continues to grow among patients with cancer and several studies support the efficacy of cannabis for various cancer and treatment-induced symptoms. Yet, there is little data available on cannabis use among breast cancer patients.
Objectives: Our aim was to identify and evaluate the scientific evidence of cannabis use among breast cancer patients in the United States.
Method: PubMed and PsychINFO databases were scanned to include studies that focused on breast cancer patients who were using cannabis. Independent reviewers screened and extracted data on study design characteristics, recruitment methods, and cannabis use. We used the Kappa coefficient to assess inter-rater agreement between reviewers. A narrative synthesis was generated by using PRISMA 2015 guidelines.
Result: The database search retrieved 1,162 citations. After the removal of duplicates, 330 articles were included in abstract screening, and 45 articles were taken into consideration for full-text review. We identified 9 relevant studies (5 longitudinal and 4 cross-sectional studies) which included 870 (34.5%, 870 of 2,515) breast cancer patients. The kappa coefficient was 0.86. Included study participants' data collection ranged from 2014 to 2020. A total of 4 studies collected retrospective data from electronic health records and 4 studies used the online survey method. Various forms of cannabis such as capsules, oral sprays, vaporizers, lotion, powder, and lozenges were used. The most common cause of the use of cannabis was for symptoms management (such as pain, anxiety, sleep, depression, appetite, numbness, nausea, vomiting, and diarrhea) of the breast cancer patient. The main reason for discontinued cannabis use was cost and societal stigma. The adverse effect of cannabis use reported was impaired mental functioning, dry mouth, or lack of energy.
Conclusion: Although our study contributes to the literature on the use of cannabis among breast cancer patients, there were only a limited number of eligible studies, several of which included small sample sizes of breast cancer patients. Exposure and outcome parameters varied, and the generalizability of their results was limited.
Policy and implication: This review may guide healthcare providers or policymakers in designing future tailored cannabis intervention programs in breast cancer management. Clinicians must assess and manage cannabis-induced cognitive impairment at different stages of breast cancer chemotherapeutic treatment.

Effects of Unmet Medical Treatment Need and Medical Cannabis License on Cannabis Use Behavior among Adults Living in a Permissive Medical Cannabis State

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Background: Medical cannabis was legalized in Oklahoma in 2018. Plausibly, individuals with a medical cannabis license (MCL) may use cannabis

as an alternative to traditional medical treatment given its availability and affordability. This could result in not seeking traditional medical care when needed and more problematic cannabis use behavior. This study examined differences between those with and without unmet treatment need on demographics, mental health, and cannabis use behavior (e.g., past 30-day use and cannabis use disorder), and the main and interactive effects of unmet treatment need and MCL status on cannabis use behavior.
Methods: A secondary analysis was conducted using online survey data collected from 3,588 adult Oklahomans (70.4% non-Hispanic White, 54.0% female, M age=41.8). Participants reported on their income (dichotomized to <$30k vs ≥$30k), health insurance coverage (dichotomized to any/none), past 30-day cannabis use, depression (Patient Health Questionnaire-2), anxiety (Generalized Anxiety Disorder-2), cannabis use disorder (CUD; brief Cannabis Use Disorder Identification Test), and if they were issued an Oklahoma MCL. Unmet treatment need was assessed by asking: "In the past 12 months, was there ever a time when you needed to see a medical specialist about a health issue but did not get it?" (yes/no). Bivariate analyses examined differences between those with and without unmet treatment need on demographics, cannabis use behavior, and depression and anxiety. Logistic regression models examined the main and interactive effects of unmet treatment need and MCL on past 30-day cannabis use and likelihood of a CUD, controlling for survey wave, demographics, anxiety, and depression.
Results: A third of the sample reported past 30-day cannabis use (33.3%), and 23.6% had an MCL. Twenty percent reported having no health insurance, and the majority had depression (58.6%) or anxiety (59.7%). Bivariate tests showed that a significantly greater proportion of individuals with unmet treatment need (vs. met treatment need) were female (57.5% v. 52.6%), had income <$30,000 (43.6% v. 37.9%), had no health insurance (22.3% v. 18.6%), had an MCL (34.6% vs. 19.3%), reported past 30-day cannabis use (49.6% v. 27.6%), and endorsed depression (80.7% v. 50.0%), anxiety (83.4% v. 50.3%), and a CUD (49.2% v. 32.9%; all ps<0.05). An interaction of MCL and unmet treatment need was significant on past 30-day cannabis use (p=.001), but not on CUD (p=.260). In stratified analyses, the association between having an MCL and any past 30-day cannabis use was greater among those with met treatment need (aOR=28.97, p<.001) than with unmet treatment need (aOR=13.70, p<.001). There were significant main effects for MCL (aOR=2.65) and unmet treatment need (aOR=1.48) on likelihood of a CUD; ps<.001.
Conclusion: Separately, MCL and unmet treatment need predicted greater likelihood of a CUD. MCL and unmet treatment need together predict decreased odds of current cannabis use, suggesting adults with an unmet treatment need may not find treatment needs met by cannabis. Those with met treatment need may have the financial means to obtain an MCL and thus use cannabis. Future studies should examine the impact of cannabis legalization on healthcare access and symptom management.

Unregulated and Regulated Cannabis Market Trends in Massachusetts, 2019-2021

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Aim: To examine patterns of cannabis sourcing and rationale in unregulated and regulated markets in Massachusetts to understand the scope of the unregulated market.
Background: Currently, 22:50 U.S. states have legalized adult-use cannabis, and 13:22 have adult-use retail cannabis stores, including Massachusetts. An aim cited for cannabis legalization and retail implementation is to curb activity in unregulated markets and provide constituents access to safe, regulated products. Still, the unregulated market for cannabis continues to operate and, in some states, appears to be larger than the regulated market. This phenomenon can present dangers to public health and safety as unregulated market products are often untested and may not be fit for consumption. Monitoring the scope of the unregulated market presents a challenge as it is designed to be untraceable.
Methods: This quasi-experimental study used data from the International Cannabis Policy Study (ICPS), waves 2019-2021 (N = 6,446), from a sample of Massachusetts residents aged 16-65 (Mage = 44.04 years; 69% Woman, 29% Man, 1% Other). We used summary statistics to assess the scope of the unregulated market in Massachusetts

through sourcing and rationale metrics, including: 1) Overall, how much of the marijuana that you used in the past 12 months was purchased from legal/authorized sources?; 2) "Overall, about what percentage (%) of the [mode] that you used in the past 12 months came from legal/authorized sources?"; 3) "In the past 12 months, have you gotten any type of marijuana from the following sources?"; 4) "What were the main reasons you bought from unauthorized sources instead of authorized sources?"

Results: Results suggest purchasing behaviors have transitioned towards the legal market. Respondents (N = 6,446) reported that 76% of their cannabis products were legally sourced in 2021, compared to 61% in 2019. Increases in legal purchasing were pronounced among 21–25-year-olds, who reported purchasing 74% of their cannabis from legal sources in 2021 compared to 48% in 2019. We also observed differences in sources with reports of store purchases increasing by 59%, and reports of dealer purchases decreasing by 21%. We further probed differences in the percent of legal purchases by product, where flower shifted heavily to the legal market from 2019 (46.5%) to 2021 (66.3%). The purchase of vaporizers also shifted towards the legal market from 2019 (59.3%) to 2021 (77.8%), perhaps in part due to the EVALI crisis.

Finally, we investigated respondents' reasons for sourcing from the unregulated market. We observed evidence that legal sources are becoming more accessible, with reports that stores were 'Too far away' decreasing from 15% to 7%, and reports that stores were 'less convenient' decreasing from 22% to 16%. Although the unregulated market remains a concern, results suggest consumer purchasing behaviors have shifted towards safer products available from regulated sources.

Medical Cannabis Program Resilience in the Era of Adult-Use Cannabis Legalization: A Tale of Three Medical Programs

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Aim: To assess medical program activity in three U.S. states after the enactment of adult-use legalization and implementation of retail stores to better understand medical program sustainability alongside adult-use legalization.

Background: As of April 2023, 22 U.S. states have legalized adult-use cannabis, with 13 of these states having both medical and adult-use cannabis retail establishments ("retailers"). While adult-use retailers provide safe access to the general population for cannabis use, medical programs often present safer, more affordable, and more diverse product options for patients' unique medical needs. Despite the importance of medical programs, growing evidence suggests that medical program activity decreases following adult-use retail implementation (i.e., adult-use market preeminence). This decreased activity suggests a decreased sustainability of these programs after adult-use implementation, which may be highly detrimental to patients who are more likely to be low-income, older, and in poorer health than the general population. To better serve medical patients, it is critical for medical programs to be designed for sustainability and operationalized alongside adult-use programs to ensure these programs do not become artifacts of adult-use cannabis legalization.

Methods: We conducted a quasi-experimental, cross-sectional study using cannabis regulatory data to compare outcomes in three states with both medical and adult-use cannabis programs and retailers (Colorado, Massachusetts, Oregon). Linear regression analyses were conducted to assess three outcome measures: 1) medical-use retail sales, 2) adult-use retail sales, and 3) number of registered medical patients in all fiscal quarters after adult-use retail sales were implemented in each state to September 2022.

Results: Medical program sales and patient registrations only increased in Massachusetts despite adult-use sales increasing in all three states after adult-use retail was implemented. Over the time since implementation, medical sales were not available for Oregon and decreased non-significantly in Colorado, while patient registrations decreased significantly in both Colorado and Oregon. Over the first three years of adult-use retail, patient registrations dropped by 22% in Colorado and 55% in Oregon but increased by 51% in Massachusetts.

Conclusions: Study results indicate that medical cannabis programs undergo critical changes after the implementation of adult-use retail store policy provisions. Data demonstrates that medical cannabis markets are not inherently dismantled by the co-operating of adult-use markets. Rather, results suggest that specific aspects (i.e., provisions, priorities, functionality) of a medical program assist in its sustainability, a phenomenon that additional research may help isolate for future policy. Key policy differences, such as program design and regulatory differences in the implementation of adult-use sales, may have differential impacts on medical programs. For continued patient access, it is critical that future research assesses the differences within and between states' medical-use and adult-use program design (i.e., policy and regulation) that permit medical program sustainability alongside adult-use legalization and implementation.

Provider Review: Evaluating Individual Criteria To Support Cannabis Use Disorder

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Evaluating Individual Criteria to Support Cannabis Use Disorder Diagnosis is an exploratory qualitative survey pilot study aimed to evaluate the current criteria for diagnosing Cannabis Use Disorder (CUD) by utilizing the DSM-V (2013) criteria and current research to establish an inclusive assessment of cannabis use. The Cannabis Assessment Reliability and Validity Evaluation (CARVE) provides a single, uniform data source as a cohesive and functional tool that can assess for appropriate and inappropriate cannabis use. Study participants were limited to healthcare providers licensed to diagnose CUD. The study aimed to answer the following research questions: 1) Could inappropriate and appropriate cannabis usage be measured and differentiated? 2) Did the criteria covered in the survey provide a complete assessment of cannabis use and cannabis use disorder? Results show a generalized agreement that inappropriate and appropriate cannabis usage can be measured and differentiated. Healthcare providers also agreed that the CARVE survey provides a complete assessment of cannabis use that could be utilized to assist in diagnosing Cannabis Use Disorder. These research study findings can be potentially used to establish future diagnostic criteria, policy development, and increase quality outcomes.

Keywords: cannabis use disorder, endocannabinoid system, diagnostic and statistical manual of mental disorders, marijuana use and abuse, cannabis education, cannabis addiction, medical marijuana, medical cannabis, recreational marijuana, recreational cannabis, NCSBN guidelines, cannabis nursing.

Longitudinal Transitions between Combustible, Non-combustible, and Poly-cannabis Product Use from Adolescence to Young Adulthood and Intersections with Nicotine Use

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Understanding transitions between non-use, exclusive use, and poly-use of cannabis products and how it intersects with nicotine use in young people is important for informing etiology and prevention. This study examined transitions across combustible and non-combustible cannabis use and poly-use from adolescence to young adulthood and the role of nicotine use in transitions. Applying Markov multistate transition modeling to data collected from 3,298 adolescents (baseline mean[SD]=16.1[0.4] years) across nine semi-annual survey waves, we estimated adolescent short (two-wave) and long-term (nine-wave) transition probabilities across five cannabis states: never use of any product, prior use with no past 6-month (P6M) use of any product, P6M exclusive non-combustible, P6M exclusive combustible, and P6M poly product use (non-combustible+combustible). Sizable direct transition probabilities from prior and exclusive non-combustible and combustible cannabis use to poly cannabis product use were observed in short (10.7%-38.9%) and long-term (43.4%-43.8%) analyses. P6M nicotine use were associated with

increased risk of transitioning from never and prior use to non-combustible and combustible cannabis use. Cannabis use in any form, even temporary use in mid-adolescence, was associated with later poly cannabis product use. Nicotine use may amplify probability of future cannabis use onset or recurrence.

Beyond Frequency and Quantity of Cannabis Consumption: Context of Using Cannabis

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Due to little knowledge regarding the contextual factors related to cannabis use, we aimed to provide descriptive statistics regarding contextual factors related to cannabis use and examine the predictive ability of contextual factors. We included college student participants (n = 5700; male = 2893, female = 3702, other gender identities = 48, missing = 57; See Table 1 for descriptives) from three multi-site studies in our analyses. We examined the means and standard deviations of 34 contextual factors related to cannabis use (subjective intoxication factors, purchase locations, use locations, the forms of cannabis consumed, routes of administration, and social contexts of consumption). Additionally, we tested the predictive ability of the contextual factors on cannabis use consequences (Marijuana Consequences Questionnaire; MACQ), protective behavioral strategies (Protective Behavioral Strategies for Marijuana Scale; PBSM), and severity of cannabis use disorder (Cannabis Use Disorder Test- Revised; CUDITR), via exploratory machine learning models (random forests and neural networks).

College students endorsed a wide range of contextual use factors. On average, participants reported using a plant material via a joint they did not purchase, at home, with their friends. For a full list of the descriptive statistics of each contextual factor by study, see Table 2. We split the data into training (75% of available data) and testing (25% of available data) datasets to conduct machine learning analyses where only contextual factors were entered as predictors. Training datasets were used to fit the model, and testing datasets were used to test model predictions. We used the mean absolute error (MAE), the root mean squared error (RMSE), and the proportion of variance explained (R2) as indices of model fit based on testing dataset predictions. The neural network model for the MACQ (MAE=0.71, RMSE=0.937) and CUDITR (MAE=0.61, RMSE=0.82) performed better than their relative random forest model (MACQ; MAE=2.54, RMSE=3.46; CUDITR; MAE=2.89, RMSE=4.07). The random forests achieved higher R2 than the neural network models, possibly indicating overfitting by the random forests. For the PBSM, the neural network (MAE=0.75, RMSE=0.96, R2=0.15) and random forests (MAE=0.71, RMSE=0.93, R2=0.23) models performed relatively equally. We extracted the relative importance of the variables from the random forests models and used Garson's algorithm to extract relative importance from the neural networks. In all six models, money spent on cannabis in the past month was in the top three most important predictors.

Contextual factors of cannabis use warrant further exploration, especially considering the difficulty in assessing dosage when individuals are likely to consume in a group context. We propose measuring contextual factors along with use in the past 30 days and the consequences of use. Precise doses of cannabis consumed are challenging to collect outside of a laboratory. Measuring contextual factors alongside validated scales may provide additional variance explained beyond the scales. Additionally, measuring contexts of use within theoretical frameworks could provide pertinent information on how the environment affects cannabis use in different contexts.

Cannabis Use Disorder and Eating Disorder Symptoms among Male and Female College Students

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College students are at risk for heavy cannabis use and cannabis use disorder (CUD), with rates of CUD highest among the young adult population. Heavy use in young adulthood can lead to subsequent physical and cognitive health

problems. Also prevalent in young adulthood, and among college students in particular, are eating disorders, which typically emerge in early young adulthood and can have lasting detrimental impacts on physical and mental health. Though some work has examined the co-occurrence of heavy alcohol use, alcohol use disorder symptoms, and eating disorder symptoms among college students, very little work has addressed the co-occurrence of cannabis use, CUD symptoms, and eating disorders symptoms in this population, with even less attention paid to sex-specific differences between male and female students. In this study we examined the association between cannabis use frequency, CUD symptoms, and symptoms of eating disorders (i.e., positive versus negative screens for an eating disorder using the SCOFF questionnaire) among a sample of 471 college students recruited for a study addressing heavy drinking. Participants completed an online survey assessing past 30 day use of cannabis, CUD symptoms on the Cannabis Use Disorder Identification Test, and the SCOFF (score of 2+ out of 5 on the SCOFF indicated a positive screen for an eating disorder). Participants reported using cannabis on a mean of 5.8 days in the past 30 days (6.9 days for males, 5.3 days for females). Seventy-four participants (15.3%) screened positive for CUD (21.4% of males, 12.9% of females), while 157 participants (32.4%) screened positive for an eating disorder (19.5% of males, 40.1% of females). Using two linear regression models with outcomes of cannabis use days and CUDIT scores, we found that cannabis use days and CUDIT scores were significantly predicted by sex (males had greater use and CUD symptoms) and SCOFF screening status (positive screen associated with greater use and CUD symptoms). There was a significant interaction effect for sex and SCOFF screens, such that males with positive screens for an eating disorder reported the greatest level of CUD symptoms, whereas for females, similar levels of CUDIT scores were observed regardless of eating disorder screens. These findings provide new insights into the associations between cannabis use and eating disorders among college students. Prevention and intervention efforts in young adulthood are needed to address both CUD and eating disorders during this vulnerable period. While continued efforts should focus on female students, there are growing concerns about eating disorders among male students, and these findings suggest more attention to male students is needed.

Cross-Cutting Disorder Domains and Method of Cannabis Administration in a Community Sample

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Introduction: We have extensive records of predisposing factors acting as a catalyst for substance use and similar evidence concerning cannabis use as a form of self-medication across multiple disorder domains. Given interest in cannabis method of administration (MacCallum & Russo, 2018) and cannabis use comorbidity with diagnoses (Arias et al.,2013), research into the different factors surrounding self-medicating cannabis use is required. Since the speed and intensity of cannabis effects are dependent on dosage and method of administration, evaluation of any association between method of administration and specific disorder domains warrants further investigation. This study looks at the association between cannabis method of administration and cross-cutting diagnostic indicators with the hopes of evaluating if further research should be conducted concerning the influences of culture and diagnoses on the method of cannabis administration for specific factors of self-medication.
Methods: This will be a secondary-data analysis using a community sample of 410 adults using Prolific Data Collection cannabis and alcohol co-use survey. We will be conducting chi-square analyses to determine dependency between the variables of interest.
Anticipated Results: We hypothesize that our cross-cutting DSM diagnostic scale will be significantly associated with method of cannabis administrated.
Discussion: Should our hypotheses be supported, results will be interpreted to determine differential risk associated with specific methods of administration (e.g., higher potency products associated with more negative consequences of cannabis use) and mental health diagnoses.

Do Beliefs About Cannabis' Moderating Impact on Alcohol Effects Predict Simultaneous Alcohol and Cannabis Use and Related Consequences?

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Background: Simultaneous alcohol and cannabis use is common during young adulthood and is associated with negative consequences. While some researchers have examined beliefs about effects from simultaneous use (e.g., Waddell et al., 2022), the extent to which individuals expect that cannabis can alter specific alcohol effects has received limited attention. Theoretically, young adults may be motived to engage in simultaneous if they expect that cannabis will reduce negative alcohol effects (e.g., negative-arousal effects such as aggression; negative-sedation effects like intoxication/impairment), and enhance positive alcohol effects (e.g., positive arousal effects such as sociability; positive-sedation effects like relaxation). The present study examined if young adults' beliefs about these moderating effects of cannabis predict simultaneous use and related consequences over and above alcohol expectancies alone.
Method: Data came from a larger longitudinal study of young adults (N=150 19–25-year-olds; 57.9% female) who reported simultaneous use of cannabis and alcohol (i.e., using both in the same two-hour period). Alcohol expectancies (AEs) were measured using the Anticipated Effects of Alcohol Scale (AEAS; Morean et al., 2012) which assesses alcohol expectancies along valence and arousal dimensions (i.e., positive or negative arousal and sedation). Participants also completed an adapted version of the AEAS assessing whether they believe that using cannabis makes each alcohol effect more or less intense (cannabis moderation expectancies; CMEs). Responses were scored along the same four dimensions as the AEAS. Participants then completed a 21-day burst of daily surveys assessing previous day alcohol use, simultaneous use (i.e., using both alcohol and cannabis in the same two-hour period), and positive and negative substance-related consequences. Four outcome variables were derived from the daily data: number of alcohol-only days, number of simultaneous use days, and number of positive and negative consequences across a) simultaneous use days and b) alcohol-only days. For each outcome, a separate negative binomial regression was run with each CME scale as a predictor (controlling for the parallel AE scale, age, sex, and other relevant covariates).
Results: Unexpectedly, number of simultaneous use days was predicted only by positive-sedation AEs (B=0.28, SE=0.11, p=0.008), and not by any of the CME scales. Further no AEs or CMEs predicted number of alcohol-only days. On simultaneous use days, greater negative-sedation CMEs (B=0.40, SE=0.15, p=0.009) and positive-arousal AEs (B=0.33, SE=0.16, p=0.041) predicted greater negative consequences. Conversely, on alcohol-only days, negative-arousal AES (B=0.57, SE=0.22, p=0.010) and negative-sedation AEs (B=0.54, SE=0.25, p=0.031) predicted greater consequences. Finally, positive-arousal AEs predicted greater positive consequences on alcohol-only days (B=0.43, SE=0.19, p=0.027), but neither CMEs nor AEs predicted positive consequences on simultaneous use days.
Conclusions: Beliefs about cannabis' moderating impact on alcohol effects appear to be less relevant than alcohol expectancies themselves for predicting simultaneous use frequency. However, specific CMEs did predict substance use consequences on simultaneous use days. These findings may reflect a self-fulfilling prophecy whereby beliefs that cannabis increases alcohol's negative intoxication/impairment effects lead to more negative consequences when using cannabis with alcohol. The findings may have implications for expectancy-based interventions among young adults who engage in simultaneous use.

Motives, Patterns of Use, and Mental Health Symptoms among Young Adult Who Co-Use Nicotine and Cannabis

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Background: Co-use of nicotine and cannabis products is increasing among young adults, and may pose greater risks to mental and physical health than use of either substance alone. Little is known about how rates of co-use relate to co-use

motives, psychopathology, and types of products used (e.g., vaporizers, combustibles). The present study evaluated self-reported cannabis and nicotine use, motives, and mental health symptoms in a sample of young adults.
Methods: Participants aged 18-29 were recruited for a longitudinal study of nicotine and cannabis co-use. Data were collected in Illinois following legalization of recreational cannabis use. Participants completed an online screening survey and a phone interview to assess eligibility; inclusion criteria included cigarette and/or e-cigarette use on at least 15 days in the past month, combustible and/or vaporized cannabis use on at least 8 days in the past month, and cannabis use on at least 2 days in the past week. Eligible participants completed a baseline questionnaire that assessed cannabis and nicotine use rates, co-use motives, frequency of different product use (e.g., vaporizer, combustible), and symptoms of depression, anxiety, and attention-deficit/hyperactivity disorder (ADHD).
Results: To date, 52 participants have completed baseline measures (28.8% women, 53.8% men, 13.5% non-binary/nonconforming, 3.8% transgender; 67.3% White, 17.3% Hispanic/Latino or Spanish, 9.6% Asian, 9.6% Middle Eastern or North African, 5.8% Black or African American, 1.9% Native Hawaiian/Pacific Islander). The past-month average smoking rate was 11.83 days/month (SD = 13.19), and past-month nicotine vaping averaged 19.54 days/month (SD = 12.97). Participants reported using cannabis on an average of 26.94 days per month (SD = 6.45). Co-use motives related to improved buzz/high, increased pleasure/satisfaction, improved cognitive performance, and coping were rated highest. The most common patterns of administration for co-use were using a tobacco/nicotine product while using cannabis (63% of participants) and vaping nicotine before/after using cannabis (52% and 50% of participants, respectively). The overall sample displayed high depression symptoms (CES-D-10 M = 10.42, SD = 6.18) and mild anxiety symptoms (GAD-7 M = 7.48, SD = 5.61). Participants endorsed an average of 3.02 symptoms on an ADHD screening measure (ASRS). Depression and anxiety symptoms were each positively correlated with cannabis coping motives and nicotine negative affect (NA) expectancies, but not with co-use coping motives. ADHD symptoms were not associated with cannabis, nicotine, or co-use motives. Cannabis coping motives were positively associated with nicotine NA expectancies and co-use coping motives; however, nicotine NA expectancies and co-use coping motives were not related.
Conclusions: These findings characterize the motives, types of products, and mental health symptoms of young adults who co-use nicotine and cannabis. Co-use was most commonly reported as simultaneous use of nicotine and cannabis or vaping nicotine before/after cannabis use. Depression and anxiety symptoms were associated with using cannabis and nicotine individually to cope with low mood but were not associated with co-use coping motives, suggesting that motives for single product use vs. co-use may differ.

Adverse Childhood Experiences and Poly-use of Alcohol, Tobacco, and Cannabis: An exploration of 2020 Hawai'i Behavioral Risk Factor Surveillance System (BRFSS) data

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Introduction: Approximately 60% of U.S. adults have endured at least one adverse childhood experience (ACE). ACEs are defined as potentially traumatic negative experiences that occur before the age of 18 and can take the form of abuse, neglect, and household dysfunction. Approximately 16% of U.S. adults have experienced four or more ACEs. Previous research suggests that specific demographic groups are more likely to experience at least one ACE, including Native Hawaiians and Whites, those with lower educational attainment and lower annual household income. ACEs are also associated with a number of health conditions and high-risk behaviors. Others have found a positive correlation between ACEs and nicotine, cannabis and alcohol use; yet, few have examined the relationship between ACEs and co/poly-use of these three substances. Our research objective was to explore the association of ACEs with co- and poly-use of alcohol, cannabis, and/or tobacco/nicotine in Hawai'i.
Methods: Utilizing data from the 2020 Hawai'i BRFSS (N=7,754) we examined the prevalence of self-reported current alcohol, tobacco/nicotine,

and cannabis use with nine ACEs. Using four regression models, we quantified the association between ACEs and use of each individual substance (quasi-Poisson) and between ACEs and single-, co-, and poly-substance use (multinomial logistic). All analyses were adjusted for complex sampling design.
Results: Self-reported past 30-day alcohol, cannabis, and current tobacco/nicotine use was 46.8%, 9.8%, and 17.1%, respectively. Single use for either alcohol, cannabis, or tobacco/nicotine was 40.5%, 12.4% for some combination of co-use and 2.6% for poly-use of all three. All ACEs were significantly associated ($p<0.05$) with current use of cannabis and tobacco/nicotine, with the strongest association with the cannabis outcome. However, only the following ACE items were associated with any current alcohol use: (1) living with someone who was mentally ill, (2) parents separated or divorced, and (3) parents/adults in home who swore or insulted the child. Similarly, all ACEs were associated with higher odds of co- and poly-use relative to no current use, with the highest odds for poly-use, followed by co-use. Only the three ACE items associated with current alcohol use were associated with single use.
Discussion: The occurrence of ACEs tends to predict a greater prevalence of co-/poly-use of all three substances. This evidence draws attention to the need for further screening in light of others who have found poly-use related to greater negative consequences. ACEs are associated with increased odds of poly-use, which necessitates the integration of ACEs screening with substance use prevention efforts. Understanding ACEs in Hawai‘i also contributes to new knowledge in the existing field of research on ACEs and substance use by potentially providing insight into the role of community, family structure, and cultural values in the prevention and treatment of ACEs and substance use.

Effects of Simultaneous Alcohol and Marijuana Use Frequency on Depression, Anxiety, and Stress in Male and Female College Students

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Simultaneous use of alcohol and cannabis is common among college students. There is evidence that simultaneous alcohol and marijuana/cannabis use (SAM) is associated with greater consumption rates and more severe consequences than alcohol or cannabis alone, as well as concurrent use (CAM; use such that effects of each substance do not overlap). SAM may be uniquely associated with mental health outcomes, especially in college students who engage in SAM use at high rates. More research is needed to assess impacts of SAM on distinct mental health symptoms and how this may differ across sexes. The present study ($N_{total} = 377$) aimed to examine whether individuals who engage in SAM use more than once per month (NSAM+ = 126) differ on scores of the Depression, Anxiety and Stress Scale (DASS) subscales compared to individuals that engage in SAM use less than once per month (NSAM- = 251). The overall sample consisted of 249 (66.0%) AFAB individuals, with 68 (18.0%) identifying as Hispanic or Latino/a/e/x, 324 (85.9%) identifying as White, 4 (1.1%) as American Indian or Alaska Native, 8 (2.1%) as Asian, 4 (1.1%) as Black or African American, 3 (0.8%) as Native Hawaiian or Other Pacific Islander, and 34 (9.0%) chose not to respond. A multigroup path analysis was conducted using Mplus to simultaneously regress the DASS symptom domains (Depression, Anxiety, and Stress subscales) onto a dichotomously coded SAM group variable, with sex assigned at birth as the grouping variable, with age and past 30-day cannabis and alcohol frequency as covariates in the model. Results indicated that the effects of monthly or more SAM on each DASS subscale did not differ significantly across sexes (p's < .05), but different patterns of effects were observed for each sex. Specifically, SAM use significantly predicted depression ($p = .002$), anxiety ($p < .001$), and stress ($p < .001$) in males, but only depression ($p = .013$) in females. These preliminary results indicate that greater frequency of SAM use is significantly associated with anxiety and stress symptoms for males but not for females. Programs aimed at reducing mental health outcomes should assess for patterns of substance use like SAM, because different substance use patterns appear to relate to differences in mental health outcomes, possibly in a differential manner across sex. Future research should directly assess whether sex differences exist in the effects of SAM on mental health outcomes, as well as the directionality of these relationships, i.e., whether SAM use is resulting in mental health symptoms or whether

individuals are engaging in SAM to cope with mental health problems/self-medicate.

Impulsivity, Mood, and Unplanned Alcohol and Cannabis Use in Young Adults: An Ecological Momentary Assessment Study

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Background: Unplanned use of cannabis and alcohol is a risk factor for heavier use and greater harms than planned use, but the factors contributing to unplanned use among co-users of cannabis and alcohol require further study. Although positive and negative mood have an impact on substance use, findings are mixed for the relationship between mood and unplanned use specifically. It is possible that the link between heightened positive or negative mood states and unplanned substance use may be stronger for those with greater impulsivity, but the role of impulsivity in these associations has not been examined. This study examined the moderating role of impulsivity in daily associations between mood and unplanned alcohol and cannabis use among young adult co-users.
Methods: Data came from young adults (N=155; 59.4% Female, mean age = 22.09) who participated in a larger Ecological Momentary Assessment (EMA) study of alcohol and cannabis co-use. Participants completed surveys each morning for 21 days assessing the previous day's alcohol (standard drinks) and cannabis (grams) use, and the maximum amount of each substance they intended to use over the next 24h. Unplanned use of cannabis and alcohol was defined in two ways: 1) reporting use when no previous intention to use was indicated, and b) reporting using more than the maximum intended amount. Twice daily, randomly timed surveys captured momentary mood states and impulsivity traits were assessed at baseline using the UPPS-P Impulsive Behavior Scales.
Results: Compliance with the daily morning surveys was 89%. Fifty percent of the 600 alcohol use days were unplanned, and 27% of the 1008 cannabis use days were unplanned. Multilevel models showed significant daily-level relationships of increased positive mood and decreased negative mood with greater likelihood of unplanned vs. planned drinking and decreased negative mood with consuming fewer standard drinks than intended. Decreased boredom was associated with increased likelihood of unplanned cannabis use at the day level. Several impulsivity traits moderated relationships between specific mood variables and unplanned alcohol use, such that mood changes were more predictive of unplanned use among those low vs. high in impulsivity. Impulsivity did not moderate associations between mood and unplanned cannabis use.
Conclusion: We found that daily mood changes were linked with unplanned use of alcohol and cannabis among young adult co-users, although this relationship appeared stronger for alcohol than for cannabis. Results suggest that unplanned use may be more likely on days when young adults experience more pleasant and fewer unpleasant moods, perhaps reflecting spontaneous decisions to use in social or celebratory contexts, although future work is needed to better understand the role of context. Further, high impulsivity appeared to reduce the impact that daily deviations in mood have on unplanned alcohol use among co-users, suggesting that unplanned use is as likely as planned use across a range of mood states for impulsive individuals. Findings can inform harm reduction interventions by identifying risk factors for unplanned alcohol and cannabis use in a population at risk for harms from co-use.

Food Restriction on Simultaneous Alcohol and Marijuana Use Days: Exploring Motivations and Consequences Among College Students

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Simultaneous alcohol and marijuana use (SAM) and food restriction on days when students intend to drink are associated with an increased risk of substance use-related consequences. However,

the negative outcomes associated with food restriction on substance use days as they relate to substance use have been studied mostly in alcohol-only use contexts. Moreover, little is known about the combination of SAM use and food restriction behaviors. Therefore, the current study investigated substance use-day food restriction frequency, food restriction motivations specific to substances, and substance use consequences in college students who use alcohol and marijuana simultaneously (N = 901). Hierarchical regression analyses tested the relations between alcohol and marijuana use patterns and food restriction on substance use-related consequences. Results indicated that, for individuals who used alcohol and marijuana simultaneously in the past month, SAM use frequency significantly predicted greater alcohol and marijuana use consequences. Alcohol and marijuana use quantity on SAM use days also predicted greater alcohol and marijuana use consequences, respectively. Finally, the interaction between food restriction and marijuana use quantity on SAM days significantly predicted greater marijuana use consequences. When asked why participants restricted food on substance use days, several core themes emerged. Prominent restriction motivations included "calorie compensation," "expedited intoxication," "sickness prevention," "lack of appetite," "forgetting to eat," and "previously diagnosed eating disorder." These results provide the basis for further exploration of food restriction and SAM use, as well as targeted interventions among at-risk populations.

Cannabis Use and Alcohol Outcomes among Sober Living House Residents in California

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Background. Some studies suggest that cannabis may be used as a safer substitute for other drugs, e.g., alcohol. Historically, sober living houses (SLHs) have been abstinence-based environments designed for individuals in recovery to live with others in recovery. However, the evolving social, legal, and medical landscapes around cannabis have left SLH operators and managers in a difficult position regarding policies related to its use among residents. Data are urgently needed regarding cannabis' potential impacts in this population. Thus, this study examines how cannabis use is related to alcohol use and related outcomes among SLH residents.
Data. Baseline, 6-month, and 12-month data were collected from 557 SLH residents living in 48 houses in Los Angeles, CA from 2018-2021.
Methods. Longitudinal multilevel regressions tested associations between any past six-month cannabis use and alcohol outcomes: past-month any drinking, past-month number of drinking days, past six-month number of drinking days, any past six-month alcohol problems, and current DSM-5 alcohol use disorder (AUD). Final regressions adjusted for resident age, sex, race and ethnicity, past-month substance use treatment, past six-month 12-step attendance, percent of social network using drugs/alcohol heavily, and psychiatric symptoms. Logistic regression was used for dichotomous outcomes and negative binomial regression was used for count outcomes. All regressions adjusted for clustering at the SLH level.
Results. At baseline, 107 (19.2%) of residents reported having used cannabis use in the past six months. At 12 months, 80 (17.5%) of residents reported having used cannabis use in the past six months. Any past six-month cannabis use was related to significantly (Ps<0.001) higher odds of any past-month alcohol use (OR=4.84, 95% CI: 3.11, 7.53); more drinking days in the past month (IRR=2.77, 95% CI: 2.03, 3.66); more drinking days in the past six months (IRR=1.81, 95% CI: 1.44, 2.27); and higher odds of any alcohol problems (OR=3.05, 95% CI: 1.98, 4.72). Past six-month cannabis use was not significantly (Ps<0.05) related to current DSM-5 AUD.
Conclusions. A considerable number of individuals residing in California sober living houses report having used cannabis in the past six months. Past six-month cannabis use was related to worse alcohol outcomes, suggesting that cannabis does not work as a substitute for alcohol in this population. Future research should examine whether cannabis use is related to other outcomes as well as how frequency and quantity of cannabis use impact alcohol use outcomes among SLH residents.

Cannabis and Other Recreational Drug Use among Psychoactive Prescription Medication Users

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Use of recreational cannabis is common in the United States, with more than 31 million past-month adult users (SAMHSA, 2019). In addition, 58 million US adults report past-month tobacco use and nearly 140 million report past-month alcohol use. Much research has examined cannabis co-use with alcohol and nicotine; however, there has been less attention on cannabis co-use with prescription medications. Cannabinoids have been shown to inhibit and be metabolized by the cytochrome P450 (CYP) enzyme pathway (Antoniou et al, 2020; Doohan et al., 2021), which can affect the plasma concentration of various medications. Concurrently, mental health diagnoses (e.g., anxiety and depression) and prescription rates for psychoactive medications (e.g., antidepressants, benzodiazepines, stimulants, narcotics) continue to increase. Currently, there is limited research on the cannabis and other recreational drug use habits of people who are prescribed psychoactive medications. This poster will assess the prevalence of self-reported cannabis, alcohol, and nicotine in individuals who are and are not prescribed medication. This is a secondary analysis of survey data from 277 college students (64% female) who participated in a 2-year longitudinal study on the effects of college health behaviors on cardiovascular function. Thirty-seven (13%) participants reported using psychoactive prescription medication. Among the prescription users, 54% also reported using cannabis in the past 30 days. This rate of cannabis use was not significantly different compared to the prescription non-users. In addition, 30% of prescription users reported nicotine use and 80% reported alcohol use in the past 30 days. These rates were also not significantly different between the prescription groups. These findings suggest that prescription medication use does not substantively interrupt cannabis and other recreational drug use habits. This has clinical implications for how physicians should communicate with patients when prescribing psychoactive medication. Adverse drug-drug interactions should be taken into account not only between different prescription medications but also between prescription medications and recreational drugs. For cannabis in particular, physicians should consider how its effects on CYP enzymes may necessitate changes to prescription dose regimens.

Anxiety Symptoms, Delaying Gratification, Substance Use Coping Motives, and Problematic Substance Use: An Examination among Co-Users of Alcohol and Marijuana

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Background: Multiple theories/models (e.g., stress-dampening model; tension-reduction model; self-medication hypothesis) posit that individuals engage in substance use because they expect that using that substance provides immediate coping benefits by alleviating their negative affect. In support of these theories, studies among college students have found substance use coping motives to mediate the associations between negative affect and both alcohol (Bravo & Pearson, 2017) and marijuana (Farris et al., 2016) outcomes, including among co-users of alcohol and marijuana (Bravo et al., 2019). However, limited research has investigated what factors link poor mental health to higher coping motives and in turn more negative substance use consequences.

Objective: The present study aimed to expand prior research by exploring the associations between generalized anxiety disorder symptoms, delaying gratification, alcohol/marijuana use coping motives, and negative alcohol/marijuana-related consequences among U.S. college students who consumed both alcohol and marijuana in the past month. Specifically, we hypothesized that higher anxiety symptoms would relate to more negative alcohol/marijuana-related consequences via lower delaying gratification and higher coping motives.

Method: College students were recruited from Psychology Department Participant Pools at ten universities across ten U.S. states to participate in an hour-long online survey examining substance use and mental health outcomes. For the present study, we limited our analytic sample to students who consumed both alcohol and marijuana in the previous month and completed a measure of generalized anxiety disorder symptoms (n = 616; 72.6% female). A path analysis model was conducted testing the serial

unique associations between anxiety symptoms → delaying gratification → alcohol/marijuana coping motives → negative alcohol/marijuana-related consequences. Multi-group analysis was performed to determine if the proposed model was invariant across gender and co-use status (co-use vs simultaneous use).
Results: Within our comprehensive model, we found two significant double-mediation effects for both alcohol (indirect ß = .01, 99% CIs = 0.000, 0.02) and marijuana (indirect ß = .01, 99% CIs = 0.001, 0.03) negative consequences. Specifically, we found that higher anxiety symptoms was related to lower levels of delaying gratification, which in turn was associated with higher alcohol/marijuana use coping motives, which in turn was associated with more negative alcohol/marijuana-related consequences. This model was invariant across co-use status and gender groups suggesting replicability and generality.
Conclusions: Our findings suggest that delaying gratification is important to understanding the relationship between negative affect (i.e., higher anxiety symptoms) and problematic alcohol and marijuana use. Interventions aimed at reducing problematic substance use among individuals endorsing high anxiety symptoms may benefit from targeting delaying gratification which may in turn reduce motivations to use alcohol/marijuana to cope. Our preliminary findings encourage further exploration of these associations in longitudinal and experimental studies and lends support to the therapeutic targeting of delaying gratification and alcohol/marijuana coping motives to mitigate substance use harms stemming from mental health struggles among college students.

Desire to Quit Smoking and Lifetime Cessation Attempts among Cigarette-only Smokers and Cigarette-cannabis Co-users: Examining Differences across Health Disparity Groups

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Background: The co-use of cannabis and cigarettes is common, particularly among vulnerable populations, like racial and ethnic minorities, those with lower income, and sexual and gender minorities (SGM). While co-use is associated with worse smoking cessation outcomes and greater nicotine dependence in the general population, few studies have examined differences in smoking cessation behaviors across vulnerable sub-groups. This study examined differences in desire to quit smoking and lifetime cessation attempts among cigarette-only smokers and cigarette-cannabis co-users across race/ethnicity, income, and SGM identification.
Methods: This study focused on N=720 adults aged ≥18-years from Oklahoma who reported past 30-day cigarette smoking. Participants provided information on demographics [sex; age; race/ethnicity, non-Hispanic (NH) White, NH Black, Hispanic, NH American Indian, NH Other (Asian, Native Hawaiian, more than one race)]; income [<$20k vs. ≥$20k]; and SGM vs. heterosexual identity), past 30-day cannabis use, and past 30-day alcohol use. Participants provided information on number of lifetime tobacco quit attempts and ranked desire to quit smoking cigarettes (1=don't want to stop to 7=really want to stop in the next month), where higher scores indicated greater desire. Participants were categorized as past 30-day cigarette-only users or cigarette-cannabis co-users. Bivariate tests assessed demographic differences between cigarette-only and co-users. Analysis of covariance (ANCOVA) tests examined the main and interactive effects of co-use status (cigarette-only vs. cigarette-cannabis co-use) and race/ethnicity, income, and SGM identification (in separate models) on desire to quit smoking and number of lifetime tobacco cessation attempts (as the outcomes), controlling for relevant covariates. Outliers for number of tobacco cessation attempts were capped at the 95% percentile.
Results: Thirty-five percent of the sample were cigarette-cannabis co-users. A higher proportion of co-users (versus cigarette-only users) were racial/ethnic minorities (NH African American, Hispanic, NH American Indian), had an income <$20k (33.3% vs. ≥$20k: 24.9%), were male (55.7% vs. female: 43.4%), and reported past 30-day alcohol use (66.7% vs. no alcohol use: 55.1%). There were no differences by SGM status. There was a significant co-use X race/ethnicity

interaction on desire to quit ($p<.05$). Simple effects revealed that NH Other co-users reported significantly lower desire to quit (Madjusted=3.21) than NH Other cigarette-only users (Madjusted=4.96), $p<.05$. Furthermore, there were racial/ethnic differences on desire to quit among cigarette-only users, where Hispanic cigarette-only users (Madjusted=2.25) reported lower desire to quit compared to NH Black (Madjusted=3.69) cigarette-only users, and NH Other cigarette-only users reported the greatest desire to quit (Madjusted=4.96) compared to all other racial/ethnic groups of cigarette-only users (NH White, NH Black, NH American Indian, and Hispanic) ($ps<.05$). No other significant main or interactive effects were found.
Conclusion: Differences in desire to quit smoking among NH Other co-users and cigarette-only users could be explained by higher prevalence of mental health and substance use disorders (SUD) and cultural differences among NH Other populations. Whereas prior research has shown higher SUD among NH Hawaiian and Pacific Islanders, Asian Americans report greater desire to quit smoking. Future research should further examine desire to quit cannabis use among NH Other co-users and cigarette-only users.

Differences in Substance Use Patterns and Correlates among Polysubstance Use Groups

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Introduction: Polysubstance use continues to be a concern in young adults and on college campuses. Previous research suggests strong links between alcohol use, cannabis use, and prescription drug misuse. The prevalence of prescription drug misuse in young adults has been steadily increasing since the early 2000s. Concurrently, there has been a rise in the co-use of alcohol and cannabis among college students in recent years. The strong association between prescription drug misuse and the use of other substances complicates the identification of specific risk factors and consequences. Given the prevalence of polysubstance use and the importance of identifying unique risk factors and consequences of prescription drug misuse, further research on substance use patterns and correlates among college students is warranted.
Method: This study evaluated group differences in alcohol use, cannabis use, alcohol and cannabis co-use, alcohol consequences, impulsivity, demographics, and internalizing symptoms among college students who: a) endorsed only past-month alcohol use b) endorsed past-month alcohol and past-year cannabis use c) endorsed past-month alcohol, past-year cannabis use, and past-year co-use and d) endorsed past-month alcohol use, past-year cannabis use, past-year co-use, and past-year prescription drug misuse. The data were obtained from an online survey study about substance use and psychopathology in college students at a southwestern university. The sample included 843 undergraduate students who were enrolled in an introductory psychology course and who endorsed past-month alcohol use.
Results: Among the participants, 14.8% fell into the alcohol-only group (n=125), reporting past-month alcohol use without past-year cannabis use or prescription drug misuse. The alcohol and cannabis group comprised 8.3% of the sample (n=70), reporting past-month alcohol use and past-year cannabis use without past-year co-use or prescription drug misuse. 59.7% of the sample reported past-month alcohol use, past-year cannabis use, and co-use use without prescription drug misuse (n = 503). Lastly, 17.2% reported past-month alcohol use, past-year cannabis use, co-use, and past-year prescription drug misuse (n=145). Significant group differences were found in substance use patterns, alcohol consequences, internalizing symptoms, and impulsivity, with the highest rates observed in the prescription drug misuse group. Planned contrasts indicated that the prescription drug misuse group exhibited significantly greater alcohol consequences, internalizing symptoms, and impulsivity compared to the co-use group.
Conclusions: Findings support the prevalence of polysubstance use on college campuses and highlight the potential heightened risks of consequences and mental health problems. Prevention efforts should prioritize targeting protective strategies that are effective in addressing multiple forms of substance use.

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