Abstracts from the 2025 Scientific Meeting of the Research Society on Marijuana July 18-20, 2025

Cannabis
2025, *8*(3), 116-225.

researchmj.org
10.26828/cannabis/2025.03.001

Special Section Editors:
Lauren Micalizzi, Ph.D.
Kyra Farrelly, M.A.
Stephanie Penta, M.A.

KEYNOTE ADDRESSES

Extending Reach: Technology-supported Cannabis Interventions in the Green Wave Era

Erin Bonar, Ph.D.
(University of Michigan)

Cannabis Legalization in Canada: The Good, the Bad and the Ugly

James MacKillop, Ph.D.
(Michael G. DeGroote Centre for Medicinal Cannabis, McMaster University)

All abstracts were peer-reviewed by (in alphabetical order): Sophie G. Coelho (York University), Bradley T. Conner (Colorado State University), Kyra N. Farrelly (York University), Lauren Micalizzi (Brown University), Jamie E. Parnes (Brown University; Bradley Hospital), Stephanie M. Penta (Toronto Metropolitan University), Kristina T. Phillips (Kaiser Permanente Hawaii, Center for Integrated Health Care Research; Kaiser Permanente Bernard J. Tyson School of Medicine, Department of Health Systems Science), Jeffrey D. Wardell (York University; University of Toronto; Centre for Addiction and Mental Health, Toronto). All abstracts below were approved and voluntarily submitted for publication in *Cannabis* by the presenting or contact author.

PAPERS & POSTERS

The Relationship Between Cannabis and Alcohol Use with Sexual Assault, Suicidal Behaviors, and Posttraumatic Stress Symptoms: A Network Analysis

Leslie A. Brick (Brown University)
Grisel García-Ramírez (Prevention Research Center)
Ruschelle Leone (University of Colorado)
Amanda K. Gilmore (Georgia State University)

Introduction. Cannabis remains a widely consumed substance and in tandem with the changing legal landscape surrounding its use, it has often been used to relieve symptoms of depression, anxiety, and posttraumatic stress disorder (PTSD). Elevated rates of cannabis use and dependence are consistently reported among individuals with trauma exposure and PTSD. One form of trauma exposure commonly experienced by young adults in college settings is sexual assault

(SA). SA is associated with more severe PTSD symptoms, higher levels of negative beliefs and emotions, and suicidal ideation and attempt. Self-medication with cannabis and other substances may serve to alleviate symptoms of stress and trauma, however, it can lead to biological changes in the stress response system. Thus, complex relations between traumatic stress and cannabis use may exist in which cannabis is used to reduce negative affect, relieve distress, and other symptoms, while disrupting the inhibitory role of the stress response system. We sought to test a theoretical model in which cannabis use is linked with maladaptive coping behavior (i.e., using to decrease negative mood) resulting in a dysregulation of the stress response (i.e., heightened arousal). Specifically, we hypothesized that, after controlling for the effects of alcohol use, SA severity, and suicidality, cannabis use would be associated with lower symptoms of negative mood and cognition, higher arousal, and higher suicidality. Methods. Undergraduate college students (n=2160; 68% women, 31% men; 42% White, 20% Black, and 15% Latinx) between the ages of 18-25 years old (M=20.08, SD=1.58) participated in a research study on alcohol and health risk behaviors. Participants reported on demographics, hours of cannabis use per week, number of alcoholic drinks consumed weekly, SA severity, suicidal behaviors, and posttraumatic stress symptoms. Gaussian Graphical Models were used to model the conditional relations between cannabis use, alcohol use suicidality, SA severity, and severity scores for the four PTSD clusters based DSM-5 (assessed using the PCL-8) (1.intrusions, 2.avoidance of trauma reminders, 3.negative mood and cognitions, and 4.arousal and reactivity). Non-parametric bootstrapping with 3,000 samples was used to evaluate the stability and accuracy of edge weights and centrality measures. Results. After bootstrapping, the estimated network revealed that PTSD clusters were positively correlated with each other, with the strongest edges between negative mood and cognitions, and arousal and reactivity as well as between avoidance and intrusion symptoms. Those who reported using cannabis more hours per week reported higher scores on suicidality, more severe arousal and reactivity symptoms, and less severe negative mood and cognition symptoms. Higher suicidality was associated with negative mood and cognitions. While drinks per week was associated with greater SA severity, the edges connecting these to the rest of the network were not robust during bootstrapping and they were not connected to any other variables. Conclusions. Findings were consistent with our hypothesized model, in which cannabis use was associated with lower severity of negative mood and cognitions (consistent with a model of self-medication) and was associated with and higher suicidality and higher arousal and reactivity symptoms (consistent with stress-dysregulation).

Cannabidiol vs Placebo for Persistent Post-Surgical Pain Following Total

Knee Arthroplasty (Cannabis TKA): A Multicentre Randomized Pilot Trial

Jason W. Busse (McMaster University)
Breanne Flood (Research Institute of St. Joseph's Hamilton)
Kim Madden (McMaster University)
Behnam Sadeghirad (McMaster University)
Vahid Ashoorion (McMaster University)
Emmanuel Olaonipekun (Royal College of Surgeons in Ireland)
Amit Atrey(St. Michael's Hospital)
Vickas Khanna (McMaster University)
Anthony Adili (McMaster University)

Background: Total knee arthroplasty (TKA) is a common surgery for end-stage knee osteoarthritis that typically provides improvement in function and pain; however, 1 in 4 patients develop persistent post-surgical pain (PPSP). Higher peri-operative pain and anxiety is associated with a greater risk of PPSP. Cannabidiol (CBD) is a non-psychoactive cannabinoid that has shown anti-inflammatory and anxiolytic properties. We conducted a pilot trial to assess the feasibility of a definitive randomized trial of oral CBD to prevent PPSP after TKA, which we prospectively registered on clinicialtrials.gov (NCT03825965). Methods: We conducted a two-centre, concealed, blinded randomized pilot study of patients undergoing TKA. We used central randomization to allocate patients to receive MPL-001 (an oral 25:1 CBD:THC formulation in oil [50mg/mL CBD: 2mg/mL THC]; donated by MediPharm Labs) or placebo, in addition to standard care, and followed for 6-months. Patients were instructed to take study medication for 4 weeks before surgery, titrating from 25mg/day up to a maximum of 125mg/day based on individual response, and 6-weeks after surgery. Patients experiencing pain at 6-weeks had the option to continue their study treatment for up to 6-months post-surgery. The goals of our pilot study were to determine if we could recruit 40 patients over 6-months, have 75% of patients comply with 75% of their study doses, and follow ≥85% of enrolled patients at 6-months. Our secondary outcomes were PPSP, opioid use, pain interference, physical and emotional function, return to functioning, sleep, and adverse events (AEs). Results: Following an initial set-up period during which we enrolled 10 patients, we successfully recruited 29 additional participants from two sites in Hamilton and Toronto Canada over 6 months. Two patients were not eligible for surgery and were excluded post-randomization, leaving 37 participants in the analysis. Three participants decided against use of the study drug and withdrew before surgery, two withdrew after surgery (1 cited study burden, 1 did not want the study drug), and two participants were lost to follow-up. The mean age of enrolled participants was 66 (SD 9.4), most were female (76%) and had never used cannabis (81%). At baseline, 49% met criteria for moderate to severe insomnia, 19% for depression symptoms, and 43% for anxiety symptoms. Of patients randomized to CBD, 53% took ≥75% of study doses, and of patients randomized to placebo, 35% took ≥75% of study doses. Follow-

up ranged from 89% at the post-operative visit to 81% at 6-months. At 3-months follow-up, 41% in the placebo arm (7 of 17) reported CPSP, and 13% in the CBD arm (2 of 15). At 6-months follow-up, 19% in the placebo arm (3 of 16) reported CPSP, and 14% in the CBD arm (2 of 14). There were 18 treatment-related AEs in the CBD group (in 11 patients) and 21 in the placebo group (in 12 patients), most of which were gastrointestinal. Discussion: Our results suggest that modifications to our study protocol will be required to ensure feasibility of a definitive, multi-centre trial of CBD versus placebo to reduce CPSP among TKA patients. For the definitive trial, we will expand participant recruitment to additional centres and implement strategies to optimize participant adherence to the study treatment and follow-up. For example, switching from oil drops to a capsule formulation.

Exploring Cannabis Use Motivation when Controlling for Sensation Seeking Personality Type across Mental and Physical Health Concerns - Endometriosis Sexual Health Highlighted

Brenna A. Carter (Colorado State University)
Bradley. T. Conner (Colorado State University)

The inaccessibility of treatment for mental and physical health concerns in the United States has prompted an increase in self-medication in general adult populations, particularly in conjunction with growing legal markets for cannabis products, leading to increased interest in the underlying motivations for cannabis consumption among individuals actively experiencing mental and physical health concerns. Prior literature has identified a link between sensation seeking personality types with multiple cannabis use motives. However, prior research evidence is limited by a lack of exploration around delineating the role of non-impulsive sensation seeking personality traits from the associated motivational factors in adult populations due to sample focus on adolescents and emerging adults. This set of analyses explored initial distinction between sensation seeking as a personality trait and underlying motives for cannabis use among a variety of mental and physical health concerns with the goal of establishing additional future directions among these domains in adult populations. This is a secondary data analysis of an adult community sample evaluating cannabis and alcohol co-use, collected via Prolific. This dataset was selected due to its extensive list of mental health and physical health concerns included. Initial analyses were a series of chi-square dependency tests between the Marijuana Motives Questionnaire (MMQ) and past 12-month experience of all included mental and physical health concerns surveyed. All pairings that yielded a significant dependency pattern were rerun as a zero-inflated Poisson multiple regression including the Sensation Seeking Personality Type Scale (SSPT) to control for the influence of personality. In the majority of pairs, the introduction of SSPT sufficiently controlled for the dependency pattern between the

health concern and MMQ. Select analysis pairs maintained significance even with the control, suggesting that the underlying motive did have a unique relationship with the health concern. The only remaining significant predictions of health concerns after SSPT inclusion were coping motives predicting anxiety concerns and enhancement motives predicting endometriosis. The remaining significant associations were found in the two control conditions, with the mental health control group maintaining a significant coping motivation and the physical health control group maintaining a significant socialization motive when controlling for SSPT. The results also replicated severe multicollinearity between sensation seeking personalities and both expansion and enhancement motives. While the relationship between anxiety and coping motives have been well-documented in the literature, the relationship between endometriosis and enhancement motives may be an interesting direction for further research. Established literature linking the two has primarily focus on cannabis's role in coping with the chronic pain and uterine symptoms, highlighting the relationship between endometriosis, gut microbiome, and the endocannabinoid system. However, our analyses suggest that there may also be a link between experiential enhancement alongside those same mechanisms. Given consideration of enhancement motives and experiences of sexuality, exploring the role of cannabis in a dual coping-enhancement motivation structure within a condition known to induce painful sexual experiences may be a fruitful avenue of inquiry on leveraging the endocannabinoid system's functioning within individuals diagnosed with endometriosis to promote sexual health and comfort.

Psychosocial Correlates of Transitions from Single-Substance to Polysubstance Use Among Adolescents: Results from a National Survey

Grace Chung (University of New Mexico Health Sciences Center) Lillian Walker (University of New Mexico Health Sciences Center) Eunice Kim (University of New Mexico) Sam Swift (University of New Mexico Health Sciences Center) Laura Nellums (University of New Mexico Health Sciences Center) Verlin Joseph (University of New Mexico Health Sciences Center)

Background: Adolescents are particularly vulnerable to polysubstance use, with studies indicating that early cannabis initiation increases the likelihood of later polysubstance use. There is mixed research with respect to parental involvement and adolescents' mental health and, relatedly, behavioral outcomes, such as cannabis and polysubstance use. Some adolescent groups appear to benefit from greater parental involvement, while others appear to benefit from less. In the context of adolescents who use cannabis, it is unclear whether greater or lesser parental involvement promotes or prevents the transition from cannabis use to polysubstance

use. As such, we aimed to understand the prevalence of exclusive cannabis, tobacco, or electronic nicotine products (ENP) use and identify psychosocial predictors of transitions to polysubstance use. Methods: Data are from Wave 5 (December 2018-November 2019) and Wave 6 (March 2021-November 2021) of the adolescent cohort (ages 12-17) from the Population Assessment of Tobacco and Health Study. Adolescents reporting past 30-day use of combustible tobacco, ENP, or cannabis at Wave 5 were included in the analysis. Weighted proportions at Wave 5 were calculated for exclusive past 30-day combustible tobacco, ENP, and cannabis use. Weighted logistic regression was used to identify predictors associated with transitions from exclusive tobacco or ENP use at Wave 5 to polysubstance use (tobacco/ENP and cannabis) at Wave 6, including demographics, having a weekend curfew, and mental health. Results: The proportion of exclusive combustible tobacco use was 6.4% (20/343), the proportion of exclusive ENP use was 45.1% (150/343), and the proportion of exclusive cannabis use was 21.3% (78/343). The transition to polysubstance use occurred among 17.9% (4/20) of tobacco-only users, 21.8% (31/150) of ENP-only users, and 15.4% (11/78) of cannabis-only users. Adolescents reporting worse mental health (OR = 2.43, 95% CI: 1.08-5.45) compared to 12 months ago were significantly more likely to transition from exclusive tobacco or ENP use to polysubstance use than those reporting improvements. Adolescents with a weekend curfew had significantly reduced odds of transitioning from exclusive tobacco or ENP use to polysubstance use (OR = 0.39, 95% CI: 0.16-0.95), compared to adolescents without a weekend curfew. Conclusions: Adolescents who initially used only ENP or tobacco often transitioned to polysubstance use (cannabis combined with ENP or tobacco), with notably higher rates observed among ENP-only users. We found that poor mental health was associated with an increased likelihood of transitioning to polysubstance use, suggesting the need for addressing youth mental health as a preventive measure. Additionally, weekend curfews were identified as a potential protective factor against polysubstance use. Further research examining the interplay between adolescent substance use, mental health, and preventive policies is warranted.

Advancing Assessment of Delta-9-Tetrahydrocannabinol (THC) and Cannabidiol (CBD) Use Across Different Forms of Cannabis With Ecological Momentary Assessment

Sophie Coelho* (York University)
Sergio Rueda (Centre for Addiction and Mental Health, University of Toronto)
Matthew T. Keough (York University)
Jeffrey D. Wardell (York University, Centre for Addiction and Mental Health, University of Toronto)
**Student Award Winner*

Background: There is a critical need for methods of assessing cannabis use that quantify consumption of delta-9-tetrahydrocannabinol (THC) and other cannabinoids (e.g., cannabidiol [CBD]), in turn permitting aggregation across

cannabis products of varying forms and potencies. This paper describes the development of a novel ecological momentary assessment (EMA) approach to assess total THC and CBD consumption across different forms of cannabis, which permits calculation of standard (five-milligram) THC units consumed. Further, we examine the feasibility of this approach and provide preliminary data on the predictive validity of THC use estimates by examining their associations with acute cannabis-related consequences. Method: Participants (N = 42; mean age 25 years, 59.52% women) were young adults (ages 18-34 years) who reported using THC-containing cannabis three or more times per week and using two or more forms of cannabis in a typical week. Participants attended a baseline study visit with a research assistant (via videoconference), during which they were oriented to the EMA protocol and trained in reporting cannabis quantities and cannabis THC and CBD contents. Following the study visit, participants completed a 14-day EMA protocol, which involved completing surveys immediately prior to cannabis use that assessed the quantities, THC content, and CBD content of various forms of cannabis to be used in the current session. Items used form-specific units for quantities and cannabinoid content, with units selected to match those typically displayed on the labels of cannabis products available through the legal cannabis market. Participants also uploaded photos of the cannabis product labels when available. Surveys were also administered at fixed times throughout the day (85% completion rate) to assess acute cannabis-related consequences. Results: Participants completed a total of 786 pre-cannabis surveys, of which 79.39% and 77.35% contained sufficient information to calculate total THC and CBD (in milligrams), respectively. High agreement was observed between participant-entered THC and CBD contents and those shown in corresponding photos of cannabis product labels. Aggregating across all products used, participants reported using an average of 141.41 (SD = 224.62, range = 0.00Å -2000.00) milligrams of THC (i.e., 28.28 standard units) and 7.53 (SD = 34.87, range = 0.00-484.22) milligrams of CBD per day. Multilevel models revealed that participants were more likely to report acute negative consequences following sessions when their estimated THC use was higher than their typical THC use. At the between-person level, participants reporting more THC use on average across sessions were less likely to report negative consequences overall. Conclusions: Results support the feasibility of this novel EMA approach for measuring THC and CBD consumption, which involves administering items that are tailored to the specific form of cannabis being used in the moment. We also observed preliminary evidence for the predictive validity of THC consumption assessed using this approach in predicting acute negative cannabis-related consequences. Continued refinement of this approach may advance understanding of dose-response relations between cannabis use and harms in observational research.

Where There's Smoke: Estimating Access to Legal Cannabis in Massachusetts through Objective and Subjective Measures

Alexander M. Colby (Commonwealth of Massachusetts)
Graelyn Humiston (Commonwealth of Massachusetts)
Hailey Pensky (Commonwealth of Massachusetts)
Victoria Edwards (Commonwealth of Massachusetts)
Julie K. Johnson (Commonwealth of Massachusetts)

Aim: To examine geographic patterns of cannabis retailer density and subjective cannabis purchasing trends in Massachusetts. Background: Cannabis has been available to medical patients for nearly a decade, with the first medical-use dispensary (Registered Marijuana Dispensary (RMD); later Medical Marijuana Treatment Center (MTC) opening in June 2015, and adult-use dispensaries opening in November 2018. Understanding the distribution of these cannabis retailers is integral to understanding the 'saturation' of the cannabis market in Massachusetts. In the current study we estimate the density of dispensaries across Massachusetts and contextualize this data using the experience of residents through the International Cannabis Policy Study (ICPS). Methods Retail Density: We use the number of retailers per 100,000 population in each county to estimate their overall prevalence. Population estimates were derived from the 2023 American Community Survey released in March 2024. The number of RMD/MTC priority and General/Other priority retailers was derived from licensing data on the Massachusetts Cannabis Control Commission's Open Data Catalog. ICPS: We use data from the 2019-2023 waves of the International Cannabis Policy Study (ICPS) to investigate the subjective experience of Massachusetts residents (N = 11,635). We use the percent of cannabis products purchased legally to explore how reported purchasing trends have changed over time and how they differ across counties. The county of residence for respondents was derived from their self-reported city of residence in cases where an exact match was available from the U.S. Census Bureau's 2023 Population Estimates for Massachusetts Cities and Towns. An exact match was found for 82.94% of responses (9,650:11,635). Barnstable, Dukes, and Nantucket counties were collapsed with Bristol and Plymouth into one 'Southeast and Cape Counties' region, and Berkshire, Franklin, and Hampshire were collapsed with Hampden County into the 'Western Counties'; both cases were due to small sample sizes for 2023 (ns<10). Results Retail Density: Among all retailers, Berkshire (18.92), Hampshire (16), and Nantucket (13.85) had the highest prevalence per 100,000 population. Trends were different, however, when observing only retailers licensed under RMD/MTC priority, with Nantucket (6.92), Hampshire (6.77) and Dukes (4.80) having the highest prevalence of RMD/MTC priority retailers per 100,000 population. ICPS: The reported percentage of cannabis purchased from

legal sources by respondents increased from 60.78% of all purchases in 2019 (n = 612) to 84.15% in 2023 (n = 626). In the most recent 2023 sample, respondents from the Southeastern and Cape counties were the most likely to source from the legal market at 90.9% (n=110) in 2023, compared to Suffolk County respondents who sourced products from the legal market 78% of the time (n=64). Conclusions Access to cannabis in the Southeastern counties appears to have improved since this data was last calculated for RSMj 2022 (Colby et al., 2022), with the Southeastern and Cape counties having the highest percentage of legal purchases, and Dukes County having the third highest retail density. Future research should consider how more fine-grained analyses at the municipal or even census tract level can be leveraged for a more refined understanding of cannabis access in Massachusetts.

Cannabis Use & Driving Under the Influence Among Canadian Youth

Robert Colonna (Centre for Addiction & Mental Health)
Liliana Alvarez (Western University)
Michael Bauer (Western University)
Andrew Johnson (Western University)
Alexander Crizzle (University of Saskatchewan)
Isabelle Gelinas (McGill University)
Jeffrey Holmes (Western University)

Background Since the legalization of recreational cannabis in Canada, concerns have grown regarding cannabis use among youth and driving under the influence of cannabis (DUIC). Preventing youth from engaging in DUIC remains a top public health priority, as it increases the risk of collisions and has become more common than alcohol-impaired driving. Moreover, young novice drivers are at the highest risk for crashes, even when not impaired by alcohol or drugs, underscoring the importance of prevention. Understanding the factors that influence young drivers' involvement in DUIC is vital for developing effective prevention strategies. Objective This CIHR-funded study aimed to identify the prevalence of cannabis use, DUIC, and the individual and social determinants of DUIC among Canadian youth aged 14 to 24. Methods An anonymous online survey was conducted with a national sample of young Canadian drivers (N=2651; mean age 19.7 years; 52% female). Recruitment occurred between July 2023 and June 2024 through social media posts, paid advertisements, and targeted outreach at various colleges/universities. The survey assessed demographics, cannabis use, DUIC behaviours, riding experiences, knowledge and credibility of the law, personal attitudes, and social norms. Ordinal logistic regression was used to identify the determinants of future DUIC intention. Results Overall, 84.5% (2241) reported lifetime cannabis use, 79% (2094) had used it in the past year, and 33.5% (750) reported daily use. Nearly half of current users (53%; 1109 of 2094) indicated a history of DUIC, with 29.3% (615) doing so in the past 30 days. Additionally, 30.8% (818) expressed intent to engage in DUIC in the next year. Regression analyses

identified 13 determinants of DUIC intention, including past 12-month cannabis use, the number of days using cannabis in the past 30 days, past DUIC experiences, DUIC combined with alcohol, riding with an adult (over 25) who was DUIC, decisions regarding being a passenger with someone DUIC, perceptions of how many friends and peers engage in DUIC, beliefs about how many hours after cannabis use it is safe to drive, and personal beliefs that DUIC is acceptable, safe, not morally wrong, and/or not dangerous. Conclusions A significant number of young Canadians currently use cannabis and engage in DUIC. These findings provide critical insights into the individual and social determinants of DUIC, offering guidance for future interventions aimed at reducing DUIC and promoting safer cannabis use. Addressing these determinants through targeted, evidence-based strategies could play a pivotal role in lowering DUIC prevalence and fostering safer driving behaviours among Canadian youth.

At-Risk Cannabis Use Prevalence and Associations Among Elective Surgical Patients

Richard Davies (Michigan Medicine)
Xintong Ju (Michigan Medicine)
Estevan Pena (Michigan Medicine)
Jake Solka (Michigan Medicine)
Maureen A. Walton (Michigan Medicine)
Frederick Blow (Michigan Medicine)
Kelley Kidwell (Michigan Medicine)
Anne C. Fernandez (Michigan Medicine)

Purpose. Preoperative cannabis use is linked to pre- and post-surgical complications including higher pain and increased opioid use. Cannabis use disorder (CUD) is associated with a higher incidence of myocardial infarction and a modest increased risk of perioperative morbidity and mortality. Using screening data collected from an ongoing clinical trial, we examined cannabis use patterns across surgical services to assess prevalence and identify potential at-risk demographic groups. Methods. We analyzed preoperative screening data collected during recruitment between 2/20/2024-2/10/2025. Patients scheduled for elective non-cancer surgery within 7-9 weeks were identified using electronic health records (EHRs) and invited to complete an online screening survey assessing alcohol, cannabis, tobacco, illicit drug use, and perceived health. Alcohol use was assessed using the AUDIT-C, a validated 3-item screening tool that measures frequency and quantity of alcohol consumption over the past 2 months. Based on established criteria, scores were categorized as low-risk (0-4) or at-risk (5+). Cannabis and other substance use frequency over the past 12 months was categorized as "at-risk" (weekly or daily use) or "low-risk" (monthly or less). Based on substance use patterns, participants were classified into four mutually exclusive groups: no risk, cannabis risk only, cannabis + other substance (alcohol/drug) use risk, and non-cannabis substance use risk. Chi-squared tests and one-way ANOVA were used to compare demographic characteristics across these four

groups. Logistic regression was then used to identify factors independently associated with at-risk cannabis use. Results. Participants (N=2,688) were categorized into four groups: No Risk (72.4%, n=1,945), Cannabis Risk Only (9.5%, n=255), Cannabis + Other Substance Use Risk (5.5%, n=147), and Non-Cannabis Substance Risk Only (12.7%, n=341). Participants in the at-risk cannabis use groups were significantly younger (44.1-43.2 years) than Non-Cannabis Substance use Risk and No Risk groups (51.4-52.8, p <.001). Non-cisgender participants were overrepresented in at-risk cannabis use groups (21.6% Cannabis Risk Only, 12.2% Cannabis + Other Substance) versus overall (7.9%, p<.001). Multivariable logistic regression confirmed younger age (OR=0.97 per year, 95% CI: 0.96-0.97), male sex (OR=1.34, 95% CI: 1.05-1.70), non-cisgender identity (AOR=1.94, 95% CI: 1.37-2.72), and worse perceived health scores (OR=1.45, 95% CI: 1.29-1.62) were independently associated with at-risk cannabis use. Conclusion. At-risk cannabis use was reported in 15% of preoperative patients, underscoring the need for comprehensive preoperative screening. The findings indicate that at-risk cannabis use is more likely among younger, male, and non-cisgender individuals, as well as those with worse perceived health. Tailored screening approaches that consider both general and population-specific risk factors may help identify patients who would benefit from targeted interventions to prevent surgical complications.

The effects of Cannabis on Cognition and Subjective Experience in Older Adults

Patricia Di Ciano (Centre for Addiction and Mental Health)
Bernard Le Foll (Centre for Addiction and Mental Health)
Sampson Zhao (Centre for Addiction and Mental Health)
Patrick Byrne (Ministry of Transportation of Ontario)
Yoassry Elzohairy (Ministry of Transportation of Ontario)
Jeffrey Brubacher (University of British Columbia)
Michael McGrath (Ministry of Transportation of Ontario)
Bruna Brands (Health Canada)
Cheng Chen (Centre for Addiction and Mental Health)
Wei Wang (Centre for Addiction and Mental Health)
Pamela Kaduri (Centre for Addiction and Mental Health)
Christine Wickens (Centre for Addiction and Mental Health)
Tarek Rajji (Centre for Addiction and Mental Health)

Aims: The impact of cannabis on cognition is believed to be mediated by delta-9-tetrahydrocannabinol (THC). Adults over the age of 65 years are the fastest growing group of cannabis users, but there are few studies of the acute effects of cannabis in this population. Methods: The present observational study aimed to determine the effects of cannabis on tests of verbal learning and memory (verbal free recall), executive function and information processing (trail making test) and functional vision and visual attention (Useful Field of View

(UFOV)). Blood THC levels were also measured and correlated with cognitive measures. Results: Healthy participants aged 65-79 (31 in total; 21 male) were invited to smoke their own preferred legally purchased cannabis in the lab. Participants chose to smoke cannabis with an average THC content of 18.7%. Performance on the trail making test versions A and B were impaired 60 minutes after smoking cannabis, compared to the no cannabis condition. For the percent retained in the verbal free recall, the cannabis condition was significantly higher than the no cannabis condition, but this was apparent as a reversal in performance decrement that emerged over the day. Naturalistic doses of cannabis produced robust increases in ratings of drug experience. At 60 minutes, increased blood THC was associated with improved performance on a subtask of the UFOV, while at 210 minutes only the dose of cannabis used was related to performance on the UFOV. At 210 minutes, there was a positive correlation between potency of THC and slower performance on more complicated versions of the trail making test. Conclusions: These results suggest that older adults who use cannabis may experience slightly impaired cognition after using cannabis, and there is no definite relationship to dose, potency, and blood THC.

Changes in Cannabis Attitudes and Perceptions in the Five Years Following Recreational Legalization in Canada: Findings from an Observational Cohort Study of Community Adults

Amanda Doggett (McMaster University)
Kyla Belisario (McMaster University)
André J. McDonald (McMaster University)
Jane De Jesus (McMaster University)
Emily Vandehei (McMaster University)
Jessica Gillard (McMaster University)
Laura Lee (McMaster University)
James MacKillop (McMaster University)

Background: Social acceptability and perceived risks/benefits are key attitudinal factors that influence substance use, and a major concern about cannabis legalization is an increase in more favourable attitudes ultimately leading to greater cannabis misuse. This study investigated perceptions of cannabis acceptability and risks/benefits over the 5 years following legalization in Canada, the first G7 nation to have legalized cannabis nationally, in a longitudinal observational cohort of community adults. Methods: Participants (60 % female, median age = 29, 48% reporting cannabis use pre-legalization) were non-clinical adults from the general community who were assessed up to 11 times from September 2018 to October 2023 (mean waves = 9.9). Overall temporal attitudinal changes and whether changes were moderated by pre-legalization cannabis use status were examined. Results: Significant increases over time were present for social acceptability of any recreational cannabis use (OR [95% CI]: 1.06 [1.05, 1.07]) and trying cannabis (1.02 [1.01, 1.03]), while acceptability of medical cannabis use decreased (0.95 [0.94,

0.96]). Meanwhile, regular cannabis use was perceived as riskier (0.97 [0.96,0.98]) and addiction potential was perceived as greater (0.94 [0.93, 0.95]) over time. Health-related benefits of cannabis were significantly less likely to be endorsed over time, while there were significant increases in perceived risks, including exacerbating stress, anxiety, and depression; exacerbating existing medical conditions; and disrupting sleep. Moderator analyses found participants not using cannabis pre-legalization showed significantly steeper increases towards greater social acceptability of occasional and regular use, and less steep increases in endorsement of cannabis-related risks. Conclusions: Shifting social acceptability of cannabis post-legalization in Canada is paralleled by increases in perceived health-related risks and decreases in benefits. Continued surveillance of attitudinal changes following legalization in Canada is warranted to inform the impacts in the largest national legal cannabis jurisdiction as well as other jurisdictions considering regulatory reform.

Subjective Stress and Diurnal Salivary Cortisol in Adults with Frequent Cannabis Use

Julia Donner* (Oregon State University)
Megan Campbell (Oregon State University)
Jahnavi Nanwani (Oregon State University)
McKenzie Meyer (Oregon State University)
Anita Cservenka (Oregon State University)

**Student Award Honorable Mention*

Introduction: Several studies indicate that the hypothalamic-pituitary-adrenal (HPA) axis, the major neuroendocrine system that responds to stress, is dysregulated by substance use. However, little is known about diurnal HPA axis response in individuals who use cannabis frequently (CU). The rise of cortisol in the morning, known as the cortisol awakening response (CAR) is thought to be critical for mobilizing the body to meet the challenges of the day and is believed to be a reliable marker for individual differences in HPA axis activity. A recent study of young adults who used cannabis found a blunted CAR, suggesting that cannabis use may be associated with HPA axis dysregulation, which could contribute to continued substance use. The purpose of this study was to investigate differences in the CAR between adult CU and healthy controls (HC) and determine whether cannabis use status moderates the relationship between subjective stress and cortisol levels. Methods: 39 CU (3 days of cannabis use/week in the past year; cannabis use in the past month) and 43 HC (1/month cannabis use in the past year; no past month cannabis use; 50 lifetime cannabis use occasions) collected daily saliva samples at awakening, 30 minutes post awakening and in the evening on two consecutive weekdays and provided subjective stress at each collection time on a scale of 0 (no stress) to 10 (high stress). Cortisol immunoassays quantified salivary cortisol levels, which were averaged for morning, 30 min post awakening, and

evening across the two days. Independent samples t-tests examined group differences in the CAR (mean 30 min post awakening - mean awakening cortisol). Multiple linear regressions were conducted to determine the association between average subjective stress and average cortisol levels at each collection time with group status entered as a moderator in the analyses. Results: There were no significant differences in the CAR between CU and HC (p=0.23). The model examining the main effect of subjective stress at awakening, group, and their interaction in relation to awakening cortisol levels was significant (R2=0.14, p=0.007). There was a main effect of subjective stress being positively related to cortisol levels (p=0.001), a main effect of group (p=0.047), such that CU had higher cortisol at awakening than HC, and a trend-level interaction (p=0.093), illustrating a stronger relationship between subjective and physiological levels of stress in HC relative to CU. For the second model (R2=0.12, p=0.016), there was a main effect of subjective stress 30 min post awakening being positively related to cortisol levels (p=0.003), no main effect of group (p=0.193), and a trend-level interaction (p=0.072) similar to that noted above. The third model examining the effects of subjective evening stress, group, and their interaction in relation to evening cortisol levels was not significant. Conclusions: These findings suggest that subjective stress during the morning was significantly related to salivary cortisol, with CU having greater awakening cortisol levels relative to HC. Trend interactions indicating a dissociation between subjective and physiological stress in CU may suggest a dysregulation of their HPA axis functioning and warrants further research.

Detecting Cannabis Use Reduction Through Biochemical Verification of Urinary Cannabinoids: An Exploratory, Aggregated Analysis Characterizing Cannabinoid Decay

Ashley N. Dowd (Medical University of South Carolina)
Nathanial L. Baker (Medical University of South Carolina)
Brian Neelon (Medical University of South Carolina)
Rachel L. Tomko (Medical University of South Carolina)
Kevin M. Gray (Medical University of South Carolina)
Aimee L. McRae-Clark (Medical University of South Carolina, Ralph H. Johnson VA Medical Center)
Erin A. McClure (Medical University of South Carolina)

Introduction: Cannabis use is prevalent and appears to be increasing in the United States (US) and globally. Concurrently, there is a decreased perception of harm associated with cannabis use and more interest in reduction as a treatment outcome, rather than abstinence. However, data-driven cannabis reduction metrics using objective urinary cannabinoids and/or self-report is lacking. This gap must be addressed to inform public health and clinical recommendations regarding cannabis harm reduction. Measurement of urinary cannabinoids, along with detailed and standardized self-reported cannabis use

quantification, is necessary to determine the amount of reduction that may be beneficial for an individual. Using aggregated data from cannabis use disorder (CUD) trials, the aims of this analysis were to; 1) determine if decreases in self-reported cannabis use (50% in frequency and/or 75% in amount; based on our prior work) correlate with a decrease in urinary cannabinoids, and 2) characterize the decay in urinary cannabinoids in participants who reduce cannabis use to determine an individual cut-off metric indicating significant reduction. Our hypotheses are that; 1) within-subject changes in weekly urinary cannabinoids versus baseline will be positively correlated with changes in self-reported cannabis use over the same period, and 2) the decay model in weekly urinary cannabinoids will differentiate those that reduced use versus not. Methods: This exploratory aggregated analysis of seven CUD treatment trials include individual studies conducted within US academic medical centers and community substance use treatment settings and led by the investigative team at the Medical University of South Carolina. Participants with weekly self-reported cannabis use and urinary cannabinoid measurements through week 6 were included (n=471 of 920 total) and were classified as; 1) significantly reducing cannabis use (50% in frequency and/or 75% in amount; n=220) or, 2) no self-reported reduction (n=251). Linear mixed effects regression models were used to evaluate correlations in self-reported reduction and corresponding urinary cannabinoids. Random coefficient models with linear and quadratic polynomial time terms were utilized to estimate the slope of change in cannabinoids. Results: Participants self-reporting significant cannabis use reduction had significantly lower urinary cannabinoids relative to those who did not reduce ($p<.001$). Among participants who reduced their cannabis use significantly (50% reduction in use days and 75% reduction in amount), average urinary cannabinoids decreased by up to 50% from baseline levels. The overall model and parameter estimates for urinary cannabinoid decay during treatment were statistically non-significant (p's>.3). Decay in urinary cannabinoids was modified by baseline levels, such that participants with higher baseline cannabinoids showed a significant liner and quadratic change in urinary cannabinoids over time. Conclusions: This analysis provides important information on the potential role of urinary cannabinoid measurement to detect cannabis use reductions. On average, urinary cannabinoids differed between those with and without self-reported, significant cannabis use reduction (50% average decrease). However, decay models did not yield a cut-off value that could be used for individuals to detect significant cannabis reduction. Urinary cannabinoids are a reliable measurement of cannabis exposure, though individual-based biochemical verification of reduction will require further work to establish.

Posttraumatic Stress Disorder and Alcohol and Cannabis Co-Use:

Characterizing the Relationship in a Sample of Treatment-Seeking Adults

Kyra N. Farrelly (York University, Centre for Addiction and Mental Health)
Anthony C. Ruocco (Centre for Addiction and Mental Health, University of Toronto)
Ahmed N. Hassan (Centre for Addiction and Mental Health, University of Toronto)
Daniel Felsky (Centre for Addiction and Mental Health, University of Toronto)
Shannon Lange (Centre for Addiction and Mental Health, University of Toronto)
Yuliya Nikolova (Centre for Addiction and Mental Health, University of Toronto)
Thomas Prevot (Centre for Addiction and Mental Health, University of Toronto)
Etienne Sibille (Centre for Addiction and Mental Health, University of Toronto)
Erica Vieira (Centre for Addiction and Mental Health, University of Toronto)
Daphne Voineskos (Centre for Addiction and Mental Health, University of Toronto)
Lena C. Quilty (Centre for Addiction and Mental Health, University of Toronto)
Jeffrey D. Wardell (York University, Centre for Addiction and Mental Health, University of Toronto)

Background: Posttraumatic Stress Disorder (PTSD) may be a risk factor for co-use of alcohol and cannabis, as the synergistic psychoactive effects of the two substances might provide greater relief from trauma-related distress compared to single substance use. However, no studies have examined PTSD as a predictor of co-use (above and beyond single substance use) in a clinical population. This study examined the associations between PTSD diagnostic status and alcohol-cannabis co-use behavior, as well as the co-occurrence of Alcohol Use Disorder (AUD) and Cannabis Use Disorder (CUD), in individuals seeking treatment for AUD and/or CUD. We also examined how primary substance use disorder (SUD) moderated these associations. Method: This study utilized baseline data from a larger study of adults seeking SUD treatment. The present study consisted of a subsample of 75 individuals (Mage = 38.24, 65% male) seeking treatment for their alcohol and/or cannabis use, who reported at least one cannabis-alcohol co-use day in the past two months and endorsed a lifetime Criterion A traumatic life event. Participants completed a clinical interview to assess past month PTSD diagnostic status, past year diagnostic status for AUD and CUD, and a timeline follow back interview assessing substance use over the past 60-days. Primary SUD was determined by the diagnosis with the greatest number of symptoms (i.e., AUD or CUD). Results: A series of regression analyses (controlling for sex and age) were run with PTSD diagnostic status (n=23 with PTSD) as the independent variable and primary SUD (n= 34 AUD, n= 41 CUD) as the moderator. PTSD was associated with consuming more standard drinks on co-use days, controlling for drinks consumed on alcohol-only days (B=10.24, p<.001),

and there was a significant interaction between PTSD and primary SUD (B=-10.26, p<.001). Further probing of the interaction revealed that PTSD was only associated with heavier drinking on co-use days for those whose primary SUD was AUD (B=10.25, p<.001). PTSD was also associated with using more cannabis flower on co-use days (B=0.89, p< .01), but this relationship was not moderated by primary SUD, and it was no longer significant when controlling for use on cannabis-only days (p=.45). Further, PTSD was not associated with frequency of co-use days (p=.27). Finally, results of a multinomial regression analysis found that PTSD was not associated with greater odds of having comorbid AUD/CUD (n=34), compared to AUD-only (n=21, OR=0.87, p=.83) or CUD-only (n=20, OR=1.18, p=.79). Conclusions: Individuals meeting criteria for PTSD whose most severe SUD was AUD engaged in heavier drinking on days that they also consumed cannabis than on alcohol-only days. Findings reveal a potential complementary effect of alcohol and cannabis use for individuals with PTSD and who have more symptoms of AUD than CUD. In contrast, heavier cannabis use on co-use days among people with PTSD was accounted for by heavier cannabis use on cannabis-only days, suggesting individuals with PTSD may engage in heavier cannabis use overall. Future studies should examine whether interventions targeting alcohol-cannabis co-use may be beneficial among individuals with PTSD who are seeking treatment for their alcohol use.

Poly-Cannabis and Poly-Tobacco Co-use: Associations with Rurality and Chronic Health Conditions

Bethany Shorey Fennell (University of Kentucky)
Cherell Cottrell-Daniels (Health Choice Network)

SIGNIFICANCE: Evidence suggests tobacco and cannabis couse (couse) is associated poorer health outcomes, yet little is known about how different types of couse (single use vs. poly use) may influence chronic health conditions. Further, rural populations have often been overlooked in investigations of co-use and should be included as evolving cannabis policy expands access in the U.S.
METHODS: We describe co-use and chronic health conditions among US adults who use tobacco recruited nationally online (n=4013). Of these, 2058 (51.3%) co-used cannabis in the last month. Associations of rurality are examined using the Index of Relative Rurality (IRR; 0=most urban, 1=most rural). RESULTS: On average, participants were 47.55 (SD=16.39) years old, cis-gender men (50.1%) or women (49.0%), were primarily non-Hispanic White (58.6%) or Black (22.0%), and, were from all 50 US states and DC and on average were urban area-dwelling (IRR=.22, range =.02-.67). Participants who co-used were slightly more urban than those who did not (.21 vs. .23, p<.001). Among adults who co-used, 22.1% used one tobacco and one cannabis product (single use co-use, SU), 10.8% (222) used multiple tobacco products and one cannabis product (tobacco poly use, TPU), 26.8% (551) used one

tobacco product and multiple cannabis products (cannabis poly use, CPU), and 40.3% (827) used multiple tobacco and cannabis products (dual poly use, DPU). DPU was overrepresented among urban participants (44.8%), SU was overrepresented (25.0%) and poly-cannabis use (CPU & DPU) was underrepresented among peri-urban participants, and CPU was overrepresented among rural participants (30.4%). DPU were more likely to report lifetime diagnoses of anxiety (54%, p<.001), cancer (6.4%, p=.02), depression (48%, p<.001), & PTSD (18%, p<.001). CPU reported more chronic pain (26%, p=.03), anxiety (53%, p<.001), depression (47%, p<.001), & PTSD (18%, p<.001). TPU reported more diabetes (17%, p=.03) and SU were less likely to report anxiety (39%, p<.001) and asthma than other groups (14%, p=.003). Overall, SU (27%) and TPU (26%) were more likely to report no chronic health conditions (vs. 19% CPU & 20% DPU, p=.006) CONCLUSION: This research suggests poly-cannabis and poly-tobacco use varies by rurality and that prevalence of chronic mental and physical conditions differs within these groups. Specifically, poly-cannabis use was common across all levels of rurality/urbanicity while poly-tobacco use was more common among urban and per-urban participants and single tobacco use was common among rural participants. Additionally, reporting any chronic health condition was more common among DPU and CPU, with approximately half reporting anxiety and depression as well as high levels of PTSD. Future work and tobacco reduction or cessation interventions should further explore how rurality and co-use product choice may impact health outcomes.

A Qualitative Examination of Motives, Expectancies, and Consequences for Cannabis Use Among Women with Posttraumatic Stress Disorder

Reagan E. Fitzke (University of Colorado Colorado Springs)
Brigitta M. Beck (University of Colorado Colorado Springs)
Colin T. Mahoney (University of Colorado Colorado Springs)

Numerous studies have explored substance use following traumatic experiences via the self-medication model, which posits that individuals use substances to cope with trauma-related psychosocial sequelae (e.g., posttraumatic stress disorder [PTSD], negative affect, depressive, or anxiety symptoms). Most research in support of this model has investigated motives for, and effects of, alcohol use; however, the literature is still limited regarding differential motives, expectancies, and effects of other substance classes in response to traumatic events, including cannabis use. The current study is a secondary analysis of qualitative data from women (N = 48) with interpersonal trauma histories (e.g., intimate partner violence, sexual assault) and PTSD symptoms to understand and elucidate motives, expectancies, and consequences of recreational cannabis use in relation to trauma-related psychopathology. Participants reported using cannabis to reduce anxiety symptoms, gain new

perspectives on traumatic experiences (i.e., trauma processing and assimilation), and as a harm reduction replacement or alternative for heavy alcohol use. As far as consequences of cannabis use to cope with psychological symptoms, women disclosed higher frequency and quantity of use, higher tolerance, and use of stronger routes of administration (e.g., engaging in use of concentrates instead of flower or edibles). These findings have an etiological impact for the use of cannabis among women trauma survivors within the context of the self-medication model, as well as clinical implications for measurement-based care of this population, and policy efforts on the prescribed use of cannabis for PTSD.

Preliminary Findings from a Pilot Mobile Health iIntervention for Emerging Adults with Cannabis Use

Autumn Rae Florimbio (University of Michigan)
Devin C. Tomlinson (University of Michigan)
Maureen A. Walton (University of Michigan)
Erin E. Bonar (University of Michigan)
Maya Campbell (University of Michigan)
Susobhan Ghosh (Harvard University)
Pei-Yao Hung (University of Michigan)
Lauren Zimmermann (University of Michigan)
Susan Murphy (Harvard University)
Mark W. Newman (University of Michigan)
Inbal Nahum-Shani (University of Michigan)
Lara N. Coughlin (University of Michigan)

Background: Cannabis use prevalence in the United States is highest among emerging adults (EAs; aged 18-25 years) compared to other age groups. Early interventions that are both innovative and accessible are needed, especially given increased cannabis potency and potential for experiencing consequences among EAs. Mobile health (mHealth) interventions, including just-in-time adaptive interventions (JITAIs), offer promising tools for reducing cannabis use and associated consequences among EAs by delivering real-time personalized support. To address this need, we developed an mHealth app aimed at reducing cannabis use among EAs. We describe the acceptability and feasibility findings of a pilot trial. We also present preliminary findings on changes in cannabis use. Methods: We used social media advertisements to recruit 122 EAs who reported regular cannabis use (3 or more times per week) and some motivation to change their use. Study assessments included a baseline survey, twice-daily in-app surveys, a post-intervention survey, and a 2-month follow-up. During the 30-day intervention period, EAs were randomized twice per day to receive an intervention message or not; intervention messages focused on future goal-oriented behavior, alternative substance-free activities, and affect regulation strategies. In-app features included a digital reward card that revealed a small incentive (ranging between $0.50-$3.00) for completing daily surveys and life

insights graphs that visually displayed participants' daily survey responses. Acceptability items (rated on a 1-10 scale) included helpfulness of the app, likelihood of recommending the app to others, and ratings of in-app features (reward cards, life insights graphs); we also asked about the amount of messages received. We used paired Wilcoxon tests to evaluate the effect of the app on cannabis use (i.e., number of days using cannabis in the past month) post-intervention and at the 2-month follow-up compared to baseline cannabis use. Results: Participants (N=122; 53.3% female sex; 73.5% White, 9.9% Black, 5.0% Asian, 10.7% Other) indicated they would recommend the app to others (M=7.1, SD=2.2). Participants found the app helpful overall (M=6.2, SD=2.3). The assessment of individual app components indicated high acceptability of the reward card incentives (M=8.1, SD=2.0) and lower acceptability of the life insights graphs (M=5.5, SD=2.6). Most participants reported they received the right amount of messages (62.5%), while 21.4% would have preferred more and 16.1% would have preferred fewer messages. The intervention was feasible as indicated by the twice-daily in-app survey completion rate of 76.9%. Importantly, there was a significant reduction in the number of past-month cannabis use days from baseline (M=24.8) to post-intervention (M=22.9; p=.002) and 2-month follow-up (M=21.7; p<.001). Conclusion: The mHealth intervention app was feasible for EAs to use, and EAs rated the app and its features positively overall. Preliminary results showed the number of past-month cannabis use days reduced over time, providing support for further testing of mHealth interventions in promoting behavior change in EAs.

Applying Qualitative Results to Inform a Novel Cannabis Brief Intervention for Emerging Adults: A Case Report Study

Kathryn S. Gex (MUSC)
Shannon Phillips (MUSC)
Benjamin O. Ladd (Washington State University)
Christine M. Lee (University of Washington)
Kevin M. Gray (MUSC)
Rachel L. Tomko (MUSC)

Background: Frequent cannabis use and cannabis use disorder are increasingly prevalent among emerging adults (18-25). Brief interventions for preventing problematic use are critical, yet cannabis brief interventions demonstrate mixed efficacy in reducing use and problems due to use. Novel approaches are needed to improve efficacy. Approach: To inform development of novel intervention content and approaches, qualitative interviews were conducted with 12 emerging adults (50% cis-women, 33% cis-men, 17% non-binary) from the community. Emerging themes focused on motives for use as well as perceptions of problematic use and consequence severity. Although participants overwhelmingly indicated their primary reason for use was to relax/unwind to cope with everyday stress, other motives also were endorsed, indicating a variety of

unique reasons for use. While severity of personal consequences from cannabis use were perceived as relatively low, participants perceived high frequency use, dependence, and impairment in everyday life as indicators of problematic use. We integrated these themes with existing theory and research to develop a 2-session cannabis brief intervention that uses Motivational Interviewing and emphasizes personal values and goals while targeting motives for cannabis use. The goal of the brief intervention is to motivate behavior change, whether by facilitating taking steps in an already identified plan or recognizing that their use pattern is creating or could create problems. To reduce the impact of cannabis use on quality time spent in valued life areas, Session 1 provides feedback on motives for use and time spent in valued life areas to promote discussion of values and goals. Session 2 complements Session 1 by providing cognitive behavioral strategies tailored to the individual's reasons for using cannabis with the goal of improving context-based decision-making regarding cannabis use. Case Studies: Three emerging adults (2 cis-women, 1 cis-man) have received the novel brief intervention as part of a small open-label trial (target N=6) and completed follow-up out to 1-month. Each participant had slightly different presentations of cannabis use and motives. For example, Session 1 feedback for one participant primarily discussed use to help with sleep, whereas for another participant it primarily discussed use for enjoyment and out of boredom. Although Session 2 structure and approach was generally the same, the content in terms of cognitive and behavioral strategies differed for each individual. Although reporting overall low motivation to change, two of the three participants reported increases in "Taking Steps" towards change on the Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES). One reported little-to-no change in "Taking Steps" but reported increased "Recognition" of a potential problem with their use and decreased "Ambivalence" about their use at the post-session assessment. On an 11-point scale (0, not at all, to 10, very much), all participants rated the intervention highly overall (M=9.0), in its interestingness (M=8.0), personal relevance (M=8.7), usefulness (M=8.3), and effectiveness in changing how they use cannabis (M=7.7). These initial cases are encouraging and support continuation of the open-label trial which will be followed by a randomized pilot trial.

Characterization of the Salivary Metabolome From Cannabis and Tobacco Users: Biochemical Insights to Drug Dependence Risk

Claire Gillespie* (McMaster University)
Meera Shanmuganathan (McMaster University)
Philip Britz-McKibbin (McMaster University)
Iris Balodis (McMaster University)
**Student Award Honorable Mention*

Cannabis and nicotine are two of the most widely used drugs of abuse globally, posing significant harms from

smoke exposures, especially from co-use, including chronic disease burden and/or cognitive impairment. Current methods for the assessment of nicotine or cannabis dependence rely on standardized questionnaires, such as the Fagerstrom Test for Nicotine Dependence (FTND), and the Cannabis Use Disorder Identification Test (CUDIT), which are prone to bias and misreporting. There is a need for a more objective and non-invasive approach for the assessment of polysubstance use and drug dependence which can exacerbate mental health conditions particularly among high-risk patients. Herein, we introduce a comprehensive approach to characterize the salivary metabolome from a diverse group of participants recruited for a psychosocial stress study divided into cohorts of self-reported never smokers (n=16), cannabis only (n=29) and mixed cannabis and tobacco users (n=17). We verify tobacco smoking and cannabis use habits while assessing drug dependence risk when compared to self-reports, including the impact of substance co-use (30% reporting mixed use). Metabolomics is an emerging field in functional genomics which encompasses the analysis of low molecular weight metabolites in complex biological samples, including exogenous compounds from environmental exposures. Previous reports have proposed that the salivary metabolome may provide unique insights into behavioral responses to psychological stress using a convenient non-invasive biofluid. A targeted and nontargeted analysis of polar aqueous metabolites, including salivary nicotine, cotinine, and hydroxycotinine was performed using capillary electrophoresis-mass spectrometry (CE-MS) under positive and negative ionization modes with full-scan data acquisition. Salivary nicotine levels identified two participants with mis-reported tobacco use, which further correlated with self-reported nicotine dependence scores. Salivary phytocannabinoid content, including cannabidiol, 9-tetrahydrocannabinol, and their metabolites were further quantified using reversed-phase liquid chromatography-mass spectrometry (LC-MS), and compared to self-reported modes of consumption and cannabis use dependence scores. The differential impact of drug use patterns on salivary metabolome and lipid profiles will be explored to better understand the deleterious effects of mixed cannabis and tobacco use, which may also allow for more objective assessment of nicotine dependence and/or cannabis use disorder. This work will provide new biochemical insights into drug dependence and health risks relevant to vulnerable Canadian adults in an era of recreational cannabis legalization.

Monitoring Changes in the New Jersey Cigar Market Following Cannabis Legalization: Implications for Blunt Use

Allison M. Glasser (Rutgers Institute for Nicotine and Tobacco Studies)
Kevin R.J. Schroth (Rutgers Institute for Nicotine and Tobacco Studies)
Cristine D. Delnevo (Rutgers Institute for Nicotine and Tobacco Studies)
Andrea C. Villanti (Rutgers Institute for Nicotine and Tobacco Studies)

Cigars are used to create blunts, which are disproportionately used by people who experience health disparities. Preliminary studies report greater availability of blunt wraps and cigarillos co-marketed with cannabis in states with legalized cannabis, highlighting the growing potential harm of tobacco and cannabis co-use. This study assessed the relationship between the opening of adult-use cannabis retail outlets in New Jersey (NJ) and cigar sales by characteristics of products sold (flavor, package size, brand). Nielsen Convenience Store data on cigar sales in NJ were obtained for 12 quarters (01/02/2021 to 09/03/2023). Halfway through this period (04/21/2022), legal sales of cannabis began in the state. Joinpoint analyses determined inflection points in time when linear trends in the quarterly percent change (QPC) in sales shifted. Over the full period, 6.0% of tobacco sales (6.2% pre- vs. 5.8% post-retail period, $p<0.001$) were for cigar products. Beginning during the quarter when cannabis retail outlets opened, sale of alcohol-flavored cigars (19.1% of cigar market share) declined (QPC: -7.4%, 95% CI: -11.3, -5.0) compared to a pre-retail increase (QPC: 2.8%, 95% CI: 0.7, 5.8). Fruit-flavored cigar sales declined during the first year of cannabis sales by 5.0% (95% CI: -6.4, -3.2) but rebounded over the study's last two quarters (QPC: 3.9%, 95% CI: 1.0, 6.4). Other/concept-flavored (e.g., "green envy", "kush") cigars' proportion of the flavored cigar market share (3.7% to 6.7%, $p<0.001$) almost doubled from the pre- to post-retail period. Following initial sale of cannabis, sale of 2-3-pack cigars dropped by 3.0% (95% CI: -4.1, -1.6) until one year later, then rebounded by 2.6% (95% CI: 0.1, 4.6) over the last two quarters. Sales for 5-packs dropped by 6.5% (95% CI: -7.8, -5.0) from when cannabis sales began to one year later. While sale of packs with 20+ cigars were low (2.6% of cigar market share), sales gained a 24.8% increase in units sold (95% CI: 4.4, 49.3) one year after cannabis sales began compared to a prior decline. Backwoods (QPC: -11%, 95% CI: -12.0, -9.4) and White Owl brand cigar (QPC: -14.2%, 95% CI: -18.6, -8.9) sales declined during the year after sales began. Sale of Game cigars (8.5% of market share) increased by 6.1% (95% CI: 2.3, 8.1) starting one year after sales began. Black & Mild cigars gained 2.3% (95% CI: 1.1, 3.4) of the cigar market share after sales began through the end of the study period. Sale of some traditional cigar flavors (e.g., alcoholic drinks, fruit) and cigars in 2-3 and 5-packs declined after cannabis retail sales opened, while sale of concept-flavored cigars and larger packs increased. Sale of some cigarillo brands commonly used for blunts declined post-cannabis retail, while sale of Black & Mild, commonly used to smoke tobacco, increased. For cigars often used for blunts, there was some evidence of a rebound in sales one year after cannabis sales began as the number of retail outlets increased. Alternative cannabis products, including pre-rolled blunts, available in legal cannabis retail outlets, may be displacing the use of cigar products to roll blunts.

Evaluating Diverse Impacts of Recreational Cannabis Legalization in Michigan

Jason E. Goldstick (University of Michigan)
Philip Stallworth (University of Michigan)
Keara Sullivan (University of Michigan)
Maureen A. Walton (University of Michigan)
Kipling M. Bohnert (Michigan State University)
Emily Dove-Medows (University of Michigan)
Erin E. Bonar (University of Michigan)

Introduction: Michigan citizens voted in November 2018 to legalize recreational cannabis for cultivation, sale, and consumption for those ages 21 and older. Michigan became the 10th state and the first in the Midwest to enact such a measure and the retail market subsequently opened in December, 2019. To gain a broad sense of the potential impacts of recreational legalization in Michigan across health-related indicators, we evaluated data over time from a variety of sources (e.g., healthcare utilization, state-representative surveys, etc.). Methods: We gathered data from administrative and community partners (e.g., department of health/human services) and publicly available sources (e.g., National Survey on Drug Use and Health) to characterize the following pre- and post-recreational legalization: state cannabis use prevalence, cannabis-related toxicology in suicide and homicide deaths, cannabis-related emergency department utilization, and cannabis use among expectant and post-partum mothers. Findings are descriptive and represent time periods that vary; demographic trends within each data source will be reported. Results: In the most recent data (2021-2022), 18.5% of Michigan residents reported past-month cannabis use, an increase of over 150% from 7.2% since 2002-2003. The post-legalization rate remains greater than what is found in the Midwest and the nation. Among Michigan suicide decedents receiving cannabis toxicology testing, the proportion testing positive for cannabis was relatively stable from 2016 (21.0%) to 2018 (23.0%). This proportion increased annually, reaching a peak of 35.0% in 2021, prior to declining to 25.0% in 2022. Regarding Michigan homicide victims tested, the proportion testing positive for cannabis decreased prior to recreational legalization, but starting in 2018 has increased steadily to a peak of 64.0% in 2022. ED visits for cannabis poisoning climbed after recreational legalization to 7.3 per 100,000, though have leveled off across 2019-2021; youth <15 accounted for the largest increase (10.4% to 16.4% of visits). Most expectant mothers do not use cannabis in the months before, during, or after pregnancy. For 2021-2022, 74.4% of Michigan expectant mothers did not use cannabis before, during, or after pregnancy; this rate is lower than the 86.7% reported in 2016-2017. Conclusions: With the opening of a legal recreational market in Michigan several indicators of health and well-being are being monitored for change. Notably, the retail market opened just prior to the COVID-19 pandemic, which likely impacted

health and well-being indicators concurrent with the data examined. Key findings reflect increases in cannabis found in the toxicology testing of homicide and suicide decedents, with a more recent decline in positive cannabis toxicology in suicide decedents. Also, there has been an increase in cannabis use among pregnant and post-partum mothers. ED visits related to cannabis poisoning increased initially, but appear to have leveled off. There is a need, however, for continued evaluation of these indicators over time as numerous forces can impact outcomes (e.g., potency, price, outlet density). Current findings point to the possible benefit of public health efforts to mitigate cannabis use among potentially vulnerable populations, such as those experiencing mental health symptoms, those who are pregnant or planning to become pregnant, and youth.

The Role of Coping Flexibility in the Association Between Depression and Anxiety Symptoms and Risk of Problematic Cannabis Use Among Young Adults

Bella M. González-Ponce (University of Extremadura)
Alberto Parrado-González (University of Huelva)
José Carmona-Márquez (University of Huelva)
Adrian J. Bravo (William & Mary)
Fermín Fernández-Calderón (University of Huelva)

Background and aims: Depression and anxiety are well-documented risk factors for problematic substance use, including cannabis. According to the self-medication hypothesis, individuals experiencing distress may turn to cannabis use as a maladaptive coping strategy. However, coping flexibility, which refers to the ability to adjust coping strategies to situational demands, may help mitigate this risk. Research suggests that individuals with greater coping flexibility demonstrate better psychological adjustment and are less likely to use substances for emotional regulation. For instance, studies on alcohol consumption show that those with greater coping flexibility adopt more adaptive coping mechanisms, reducing their need for substance use as a means of emotional regulation. In this vein, the present study examined the moderating role of coping flexibility in the relationship between anxiety, depression, and cannabis use disorder symptoms among young adults in Spain. Methods: This study is part of the Psicocann Project, a longitudinal study that used targeted sampling to recruit a community sample of 612 young adults in Spain aged 18-25 who reported cannabis use in the past-month. Among the 612 participants, 505 (31.9% female, Mage = 21.25; SD = 2.17) completed follow-up measures three months later. At baseline, participants completed the Coping Flexibility Scale (CFS-8) and the Depression, Anxiety and Stress Scale-21 (DASS-21). At follow-up, cannabis use disorder symptoms were assessed using the Cannabis Use Disorder Identification Test (CUDIT). Two simple moderation models were conducted using the PROCESS Macro in SPSS 29.0. Sex, age, and university status were included as covariates.

Results: Findings showed that coping flexibility moderated the relationship between anxiety (interaction É¿ = Å|0.034, p = .004) and depressive symptoms (interaction É¿ = Å|0.021, p = .024) on cannabis use disorder symptoms. Specifically, the positive relationships between depression/anxiety symptoms on cannabis use disorder symptoms was weakest among individuals reporting higher coping flexibility. For example, within the depression model the relationship between depressive symptoms and cannabis use disorder was non-significant at higher levels of coping flexibility (É¿ = 0.14, p = .060). Conclusions: Our results suggest that coping flexibility serves as a protective factor, reducing the impact of anxiety and depression may have on problematic cannabis use among young adults who use cannabis. Individuals with high coping flexibility may be less likely to use cannabis as a coping mechanism, as they may engage in alternative strategies to manage distress. These findings highlight the potential for interventions incorporating coping flexibility training to help decrease problematic cannabis use in this population.

Cannabis Policy and Product Safety: Implications for Patients and Consumers in the U.S.

Symone Griffith (Arizona State University)
Kendra Conrow (Arizona State University)
Marisa Kreider (Stantec)
Maxwell Leung (Arizona State University)

While cannabis legalization continues to advance, considering the health and safety of patients requires urgent attention to contamination risks. In particular, the opportunistic infection risk and neurological side effects associated with fungal contaminants and pesticide residues in cannabis have raised safety concerns in recent years. While the public health regulation of cannabis is often compared to alcohol, alcohol production in the U.S. has robust quality and safety controls at the state and federal levels. These quality and safety controls were prompted by the history of severe health effects of moonshine consumption on consumers. Since cannabis is often marketed as a beneficial product for those with certain medical conditions, there is a need for closer regulation. Yet, while cannabis is regulated by many states, the regulations are inconsistent. No uniform safety regulation is applied for the patient populations in the U.S. In this presentation, we would like to address the question of how scientists, regulators, doctors, and other stakeholders can help improve the safety of cannabis for medical and recreational use, given the risks apparent in the current lack of federal involvement and research. First, a multi-stakeholder regulatory framework is needed under the leadership of the federal government and state agencies. Like many federal-state partnerships such as Medicaid, the federal government sets the 'floor' or the minimum requirements/baseline level for healthcare coverage, and the states can set the 'ceiling' or any additional coverages that they may

deem appropriate for their constituents. Similarly in the context of cannabis, federal involvement as well as multiple stakeholders is crucial to shape a comprehensive regulatory system. As the federal government has yet to change its stance on cannabis, state agencies should play a key role in developing contaminant action levels that are risk-based, clear, and transparent. Second, the contradictory nature of current cannabis state and federal policies needs to be addressed. A Schedule I drug is defined as having a high potential for abuse, no currently accepted medical use, and a lack of accepted safety for use under medical supervision. This, in contrast to states' medical qualifying conditions is confusing for consumers and physicians alike and can lead to higher rates of misuse, abuse, and lack of communication between patients and providers. Lastly, federal investment is needed in cannabis safety research. The U.S. federal agencies such as the NIH, FDA, EPA, and USDA are not funding cannabis safety research, partly due to the current federal stance on cannabis as a Schedule I substance. Current cannabis research primarily focuses on abstaining from use, its effect on adolescent development and addiction, and evaluating it as a drug of abuse. We recommend that the U.S. federal agencies allocate funding to study contaminants, develop sterilization technology, improve patient education, and incentivize solutions for safer cannabis production. These changes in the science and technology policy of cannabis will play a pivotal role in promoting cannabis safety.

The Effect of Number of Dispensaries on Cannabis Consumption Among High School Students in Colorado

Mohammad I. Habib (Colorado State University)
Cole Scott (Colorado State University)
Maggie Vanbuskirk (Colorado State University)
Bradley T. Conner (Colorado State University)

Background: Cannabis markets are growing and there are generally mixed findings on the effects of increased number of retail markets. Research does suggest that greater number of cannabis dispensaries are associated with increased consumption. However, it is still relatively unknown how the number of dispensaries affects high potency cannabis use and cannabis use among adolescents, and whether the type of dispensary (recreational or medical) has any effect. High potency cannabis use is of importance because it is commonly associated with increased risk of experiencing negative outcomes from cannabis use, such as cannabis use disorder. In this study, we aim to determine if cannabis use frequency and high potency cannabis use frequency differ by the number of dispensaries or by dispensary type. Method: Data in this study were obtained from the Healthy Kids Colorado Survey. High school aged youth (N = 10,379) completed a survey asking about their past 30-day frequency of cannabis use and frequency of high potency (i.e., "wax") use. Students were separated into regions based on county groupings. Data on the number and type of

dispensaries for each county and subsequently each region in Colorado were obtained from the publicly available licensed list of dispensaries on the Colorado government's website. Data were collected from students at randomly selected public high schools in the state of Colorado. To determine if total number of dispensaries influenced either cannabis use frequency, a multilevel logistic regression among all students was tested followed by a multilevel negative binomial regression among those who used cannabis. Similar models were conducted for wax use and for the number of recreational/medical dispensaries. Data were analyzed using R version 4.4.1. Results: The total number of dispensaries, recreational dispensaries, or medical dispensaries were not associated with an increase in the log-odds of reporting past 30-day cannabis use (B=0.08, 95%CI: -0.03,0.20; B=0.09, 95%CI: -0.02, 0.2; B=0.06, 95%CI: -0.05,0.19, for total, recreational, and medical respectively), nor was the total number of dispensaries associated with increased past 30-day frequency (B=0.004, 95%CI: -0.05,0.06; B=0.01, 95%CI: -0.04,0.06; B=-0.07, 95%CI:-0.06,0.05, for total, recreational and medical respectively). We observed the same pattern with the relation between the number of total, recreational, and medical dispensaries and log-odds of reporting any past 30-day wax use (B=0.07, 95%CI: -0.09,0.09; B=0.01, 95%CI: -0.08, 0.10; B=-0.01, 95%CI: -0.10,0.08, for total, recreational, and medical respectively) and with past 30-day wax frequency (B=-0.02, 95%CI: -0.11,0.07; B=-0.01, 95%CI: -0.10,0.08; B=-0.03, 95%CI:-0.12,0.06, for total, recreational and medical respectively). Conclusions: These data suggest that the number of dispensaries, either recreational or medical, have little to no effect on cannabis use frequency or high potency cannabis use among high school aged students in Colorado. More research is needed to determine if distance to the nearest dispensary or dispensary advertising practices have different effects on adolescent cannabis consumption, and future studies should account for pre-filled cannabis cartridges.

Measuring Cannabis Use and Cannabis Use Disorder Among People With HIV, by Age, Sex, Race and Ethnicity and Sexual or Gender Minority Status, Using Biomarker, Self-report and ICD Codes

Danielle F. Haley (Boston University School of Public Health)
Amy Justice (VA Connecticut Healthcare Systems, Yale University School of Medicine)
Ziming Xuan (Boston University School of Public Health)
Rachel Sayko Adams (Boston University School of Public Health)
Michael Silverberg (Kaiser Permanente Northern California)
Adam Trickey (Bristol Medical School, University of Bristol)
Derek Satre (University of California, San Francisco and Kaiser Permanente Northern California)
Kaku So-Armah (Boston University School of Medicine)
Suzanne Ingle (Bristol Medical School, University of Bristol)

Farah Kidwai-Khan (VA Connecticut Healthcare Systems and Yale University School of Medicine)
Matthew P. Fox (Boston University School of Public Health)
Aleksandra Wrona (VA Connecticut Healthcare Systems, Yale University School of Medicine)
Rob J Fredericksen (University of Washington School of Medicine)
Kathleen McGinnis (VA Connecticut Healthcare Systems, Yale University School of Medicine)

Introduction. Nationally-representative samples estimate cannabis use and cannabis use disorder (CUD) to be at least three times greater among people with HIV (PWH) vs. those without. PWH use cannabis for pain, stress reduction, and HIV-related symptoms, but may be at elevated risk for adverse cannabis-associated outcomes due to multimorbidity, physiologic frailty, and polypharmacy. While characterizing benefits and risks of cannabis use among PWH is critical, cannabis use is not routinely captured in healthcare systems and may be subject to bias. We compared cannabis use based on a biomarker, self-report, and cannabis use disorder diagnostic codes using a multi-cohort study of PWH, overall and by age, sex, race and ethnicity, and sexual or gender minority status (SGM). Methods. The Medications, Alcohol and Substance use in HIV Study is a cross-cohort study examining polypharmacy and substance use among PWH enrolled for a single visit between 2018-2022. Participants reported cannabis use on a confidential survey and provided nail clippings for immunoassay and mass spectrometry testing. Two of the three cohorts provided electronic health records (EHR), supporting investigation of CUD diagnosis using International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) codes (F12*, T40.711*). We examined: 1) Kappa statistics comparing the biomarker (gold standard) to self-reported monthly (or more) cannabis use (n=1,226) and 2) overlap between cannabis use (biomarker or self-report) and a CUD diagnosis within 2 years (n=705 participants with EHR). We did this overall and by age, sex, race and ethnicity, and SGM status. Results. Participants (n=1,226) were mostly male (85%), non-white (64%), and SGM (60%). Mean age was 57 years. Twenty three percent self-reported cannabis use and 20% had a positive biomarker. Self-reported and biomarker cannabis measures showed substantial agreement (Kappa = 0.67 overall; 0.60-0.72 by subgroups). Among participants with EHR, 32% self-reported cannabis use and/or had a positive biomarker; of those, 21% had a CUD diagnosis. White non-Hispanic participants were more likely to use cannabis than Black non-Hispanic or Hispanic participants (39% vs. 32% and 30%) but less likely to have diagnosed CUD (14% vs. 22% and 27%). Participants aged >60 were less likely to use cannabis than participants aged <60 (30% vs. 35%), but more likely to have a diagnosed CUD (23% vs. 19%). Women were less likely to use cannabis than men (23% vs. 33%) and to have a diagnosed CUD (11% vs. 21%). SGM were more likely to report cannabis use than non-SGM (34% vs. 29%) and to

have a diagnosed CUD (21% vs. 19%). Conclusion. Cannabis use and CUD is common among PWH, including those aged 60, and can be reliably captured by self-report. As has been previously demonstrated for alcohol use disorder, non-white adults may be over-screened and diagnosed for CUD relative to white adults. Unbiased methods for identifying cannabis use in EHR, such as patient queries and innovations involving natural language processing should be explored so that both positive and negative impacts of cannabis use on health, especially among older individuals in care, can be better understood.

Cannabis Use Disorder Diagnosis Among People With and Without HIV, by Sex and Race/Ethnicity, 2000-2022

Danielle F. Haley (Boston University School of Public Health)
Kaku So-Armah (Boston University School of Medicine)
Amy Justice (VA Connecticut Healthcare Systems, Yale University School of Medicine)
Derek Satre (University of California, San Francisco and Kaiser Permanente Northern California)
Farah Kidwai-Khan (VA Connecticut Healthcare Systems and Yale University School of Medicine)
Ziming Xuan (Boston University School of Public Health)
Rachel Sayko Adams (Boston University School of Public Health)
Michael Silverberg (Kaiser Permanente Northern California)
Matthew P. Fox (Boston University School of Public Health)
Adam Trickey (Bristol Medical School, University of Bristol)
Suzanne M. Ingle (Bristol Medical School, University of Bristol)
Aleksandra Wrona (VA Connecticut Healthcare Systems, Yale University School of Medicine)
Kathleen McGinnis (VA Connecticut Healthcare Systems, Yale University School of Medicine)

Introduction. Systematic reviews and meta-analyses estimate 20-30% of people using cannabis have a cannabis use disorder (CUD). However, data are lacking that characterize CUD over time and among groups historically underrepresented in cannabis research (e.g., women, racialized minorities, people with HIV). To evaluate CUD trends, we examined CUD diagnoses from 2000-2022, by HIV status, race/ethnicity, and sex, in a large, demographically-matched cohort of people with HIV (PWH) and without (PWoH). Methods. This analysis includes electronic health records from ~180,000 individuals in The Veterans Aging Cohort Study-HIV, a national US cohort of PWH matched 1:2 to PWoH using data from 2000-2022. Annual CUD diagnosis was determined by dividing the number with a CUD International Classification of Diseases-Clinical Modification (ICD) code each year by number with at least one outpatient ICD code in each year. We examined trends by sex, race/ethnicity, and HIV status graphically and with multivariable logistic regression models. Results. Demographic characteristics were comparable for PWH (n=58,959) vs. PWoH (n=126,413): 45% Black non-Hispanic; 35% White non-Hispanic; 7% Hispanic;

3% women. The mean age was 48 years. Twenty percent of PWH and 17% of PWoH had a CUD diagnosis from 2000-2002. The percent with diagnosed CUD was highest for Black non-Hispanic PWH, Black non-Hispanic PWoH, and Hispanic PWH over time. CUD diagnoses increased in all subgroups and were consistently higher among PWH than PWoH over time (Odds Ratio=1.14 [95% Confidence Interval [CI]=1.10-1.18]). CUD diagnoses increased from 2000 to 2022 for PWH and PWoH, respectively, from 4.6% to 6.8% (PWH) and 4.1% vs. 5.6% (PWoH) among Black non-Hispanic, from 2.4% to 4.4% (PWH) and 2.2% to 3.4% (PWoH) among White Non-Hispanic and from 3.3% to 5.4% (PWH) and 2.0% to 3.4% (PWoH) among Hispanic. In adjusted models, among both PWH and PWoH, individuals who identified as Black non-Hispanic were more likely to have a CUD diagnosis (PWH OR=1.72 95%, CI=1.62-1.83; PWoH OR=1.77, 95% CI=1.69-1.85) than individuals identifying as White non-Hispanic. Among PWH only, those identifying as Hispanic were more likely to have a CUD diagnosis than those who were White non-Hispanic PWH (OR=1.28, 95% CI=1.14-1.43). Among PWH and PWoH, CUD diagnoses increased from 2000 to 2002 from 3.6% to 4.9% (PWH) and 1.9% to 3.2% (PWoH) for females and 3.4% to 5.7% (PWH) and 3.0% to 4.5% (PWoH) for males. In adjusted models, for PWH there was no difference in the likelihood of having a CUD diagnosis by sex (OR=1.01, 95% CI=0.87-1.18). However, among PWoH, females were 50% less likely to have a CUD diagnosis than males (OR=0.50, 95% CI=0.43-0.57). Conclusion. CUD diagnoses increased dramatically among all subgroups over time and were higher among PWH. CUD diagnoses were more common among Black Non-Hispanic and Hispanic individuals; this warrants further exploration to determine whether there may be differences in screening by race/ethnicity. Universal screening and treatment advances are needed, as is research characterizing patterns and modalities of cannabis use, CUD, and potential harms and benefits of cannabis use.

Combined Marijuana and SSRI Use: Effects On Romantic Relationships

Sadie E. Harper (Division of Mathematics and Natural Sciences, Brescia University)
Jonathan E. Dudko (Division of Mathematics and Natural Sciences, Brescia University)

Abstract: Despite the increased prevalence of marijuana and SSRI use among college students, limited research has examined their combined impact on romantic relationships. In 2022, 40.9% of college students reported marijuana use, and psychiatric prescriptions among this demographic increased by 42% compared to 2015-2019. Given that college provides a formative environment for romantic relationships-evidenced by reports that up to 50% of Tinder users are of traditional college age-understanding how substance use affects relationship satisfaction is critical. We used the Couples Satisfaction Index (CSI-32), an accepted clinical tool, along with

supplemental questions for group sorting to identify potential relationship impacts correlated with combined use of marijuana and SSRI medications. We recruited both traditional and non-traditional college students from two universities in western Kentucky and southern Indiana to participate in an anonymous online survey. A Kruskal-Wallis Test was conducted using preliminary data to examine the differences in relationship satisfaction rates between four groups: Combined Use, Marijuana Only, SSRIs Only, and No Use. No significant differences were identified (É‘ = 2.47, p = 0.481, df = 3). Median CSI-32 scores appeared highest in the No Use (137.5; n = 16) and SSRI Only (132; n = 4) groups, with lower scores for Marijuana Only (119; n = 10) and Combined-Use (110.5; n = 4) groups. While no definitive conclusions can be drawn from this preliminary data, it is interesting to observe the apparently higher scores achieved by those in the No Use and SSRI Only categories. Notably, both groups of participants that reported marijuana use scored lower than the groups without marijuana use. Additionally, the median value for the Combined Use group approached the threshold for "notable relationship dissatisfaction" (CSI-32 scores falling below 104.5). While these findings remain inconclusive due to the limited sample size, they highlight the need for future research exploring the potential effects of SSRI and marijuana use on romantic relationships. Additional analyses considering frequency of use, relationship length, and mental health status may provide greater clarity on how these substances influence relationship satisfaction.

Associations Between the Retail Marijuana Environment and Youth Sources of Marijuana in 40 California Cities

Kirsten Helgeson (Pacific Institute for Research and Evaluation)
Mallie J. Paschall (Pacific Institute for Research and Evaluation)
Joel Grube (Pacific Institute for Research and Evaluation)

Objective: To investigate youth sources of marijuana and their associations with local marijuana retail environments in 40 California cities. Methods: Survey data were obtained from 1,082 15-to-20-year-olds in 40 California cities in 2023-2024. Survey questions asked participants who reported using cannabis in the past year to report their frequency of obtaining it from each of seven sources- (1) a retail cannabis store, (2) a home delivery service, (3) an unlicensed dealer, (4) someone they know who is 21 or older, (5) someone they know who is under 21, and from home either (6) with or (7) without their parents' permission-over that same 12-month period. A list of licensed cannabis retailers was obtained from the California Department of Cannabis Control, and a list of unlicensed dispensaries was compiled from systematic Internet searches. Counts of licensed delivery services available to each city were obtained from controlled Weedmaps searches. A series of multilevel logistic regression models were conducted with participants who reported past-year

marijuana use (n = 400). Participants' city of residence was treated as a random effect, and having acquired marijuana from each source (no, yes) were the dependent measures. City-level densities of licensed and unlicensed cannabis storefront retailers and numbers of licensed delivery services were used as predictors, along with city- and participant-level demographic characteristics. Results: The most commonly reported sources of marijuana were "from someone you know who is 21 or older" (65.3%) and "from someone you know who is under 21" (64.5%), followed by "from a dealer not at a cannabis store" (50.1%). The next most common responses were "from home without your parents' permission" (35.1%) and "at a retail cannabis store" (34.3%). The least commonly reported sources were "from home with your parents' permission" (23%) and "from a home delivery service" (19%). Licensed cannabis storefront density was positively associated with participants' obtaining marijuana from a home delivery service (OR = 1.19, p = 0.021) and a dealer (OR = 1.15, p = 0.035). No other local retail environment measures were significantly associated with youth cannabis sources in any of the models. City-level socioeconomic status was positively associated with respondents' obtaining cannabis from a retail store (OR = 1.71, p = 0.047), as were participants' age (OR = 1.38, p = 0.007) and being male at birth (OR = 2.38, p = 0.001). Participants' age was positively associated with obtaining marijuana from someone 21 or older (OR = 1.48, p < 0.001) and from home with their parents' permission (OR = 1.42, p = 0.011). Age was negatively associated with obtaining marijuana from someone under 21 (OR = 0.75, p = 0.014). None of the predictors were significantly associated with obtaining marijuana from home without the parents' permission. Conclusions: The findings of this study suggest that youth aged 15-to-20 primarily obtain cannabis through someone they know around their age and that a city's density of licensed cannabis retailers may be related to their obtaining cannabis through two other sources: from a home delivery service and from a dealer.

Body Dissatisfaction, Ruminative Thinking, and Cannabis Use and Consequences

Javeira Hernandez Puelma (William & Mary)
Hanna Pazo Vargas (William & Mary)
Katherine A. Berry (University of Wyoming)
Luke Herchenroeder (George Washington University)
Alison Looby (University of Wyoming)
Adrian J. Bravo (William & Mary)
Stimulant Norms and Prevalence 2 (SNAP2) Study Team (University of Wyoming)

Cannabis is the second most used substance among college students in the United States. National survey data suggests that 39.5% of college students used cannabis in the past year, and 26.1% used it in the past month. Cannabis use is a significant health concern among college students, as it is associated with a variety of psychological, academic/occupational,

and physical health consequences. Research indicates that body dissatisfaction may contribute to risky health behaviors, including cannabis use. The present study examined whether rumination facets (problem-focused thoughts, counterfactual thinking, repetitive thoughts, anticipatory thoughts) serve as potential mechanisms indirectly linking body dissatisfaction to cannabis use and related consequences in college students. Specifically, we tested whether higher body dissatisfaction relates to greater cannabis-related negative consequences via greater ruminative thinking and cannabis use quantity. College students (N=1,535; Mage=19.39; 71.9% female; 60.7% White) from six U.S. universities who endorsed past-month cannabis use completed measures of body dissatisfaction, rumination, and cannabis outcomes. Our estimated path model (i.e., body dissatisfaction --> rumination facets --> cannabis use quantity --> cannabis-related problems) showed one significant double-mediated association. Specifically, higher body dissatisfaction was positively associated with greater cannabis problems via greater endorsement of problem-focused thoughts and greater cannabis use quantity (indirect B =0.012; 99% CIs=0.005, 0.022). These findings suggest that individuals experiencing body dissatisfaction may ruminate more (particularly engaging in problem-focused thoughts), which in turn may lead to more cannabis use and, subsequently, more cannabis-related problems. Our findings align with prior research indicating that body dissatisfaction is a risk factor for cannabis use, and problem-focused thoughts may increase the risk of engaging in maladaptive coping strategies (particularly substance use). Overall, these results highlight the relevance of rumination and cannabis use as potential factors in linking body dissatisfaction to cannabis-related problems among college students. Intervention efforts targeting ruminative thinking, such as cognitive-behavioral strategies aimed at reducing problem-focused thoughts, may be advantageous in mitigating cannabis-related harms among students with high body dissatisfaction.

Medicinal Versus Recreational Cannabis Use Stigma: Examining Associations Between Indicators of Stigma, Use Behaviours, and Negative Outcomes

Ryan Hooshiar* (York University)
Annabelle Moore (York University)
Kyra N. Farrelly (York University)
Nicolle Fox (York University)
Matthew T. Keough (York University)
Jeffrey D. Wardell (York University, Centre for Addiction and Mental Health, and University of Toronto)
**Student Award Winner*

Background: Despite the increasing prevalence of cannabis use and more liberal cannabis policies, cannabis use remains stigmatized in some contexts. Perceived stigma surrounding cannabis use has been associated with negative outcomes such as decreased healthcare access. Past studies have focused on perceived stigma among people exclusively engaging in

medicinal cannabis use (MCU) or recreational cannabis use (RCU), despite a growing population engaging in both MCU and RCU, especially among young adults. The goal of this study was to examine whether young adults engaging in both MCU and RCU perceive different levels of disapproval for their MCU versus their RCU and whether they are more or less comfortable disclosing their MCU versus their RCU to others. The study also examined how both MCU and RCU stigma (operationalized as discomfort disclosing and perceived disapproval of cannabis use) relate to route of cannabis administration and cannabis problem severity. Method: Data came from a pilot ecological momentary assessment (EMA) study of young adults (ages 18-34) who reported engaging in both MCU and RCU (N= 43; 74% female). The current analyses focused on measures administered in the online baseline survey preceding the EMA, including items assessing participants' discomfort disclosing and perceived disapproval of their MCU and RCU for various referent groups (e.g., family, friends, etc). For the analyses, discomfort and disapproval items (rated on 5-point scales) were averaged across all referent groups for both MCU and RCU. Additionally, participants completed measures of cannabis use behaviours, including primary route of administration (dichotomized as smoking vs non-smoking), and cannabis problem severity. Results: A dependent samples t-test indicated no significant within-person difference in discomfort disclosing MCU (M=2.75, SD=0.85) versus RCU (M=2.79, SD=0.92), t(42)=-0.56, p=.58. However, a separate dependent samples t-test indicated participants perceived greater disapproval of their RCU (M=3.00, SD=0.61) than their MCU (M=2.79, SD=0.56), t(42)=-3.29, p=.002. Mixed ANCOVAs indicated no significant interaction between reason for use (MCU vs. RCU) and primary route of administration (smoking vs. non-smoking) on discomfort disclosing, F(1, 41)=0.01, p=.93, np2<0.01, or perceived disapproval, F(1, 41)=0.41, p=.52, np2<0.01. However, there was a main effect of route of administration on discomfort, F(1, 41)=15.04, p<.001, np2=0.14, such that individuals who reported primarily using non-smoking routes of administration had greater discomfort disclosing cannabis use (collapsed across MCU and RCU). Multiple linear regressions showed that discomfort disclosing and perceived disapproval of MCU and RCU were not statistically significant predictors of cannabis problem severity indices (all p>.05). Conclusion: Results indicate that despite similar levels of comfort disclosing MCU and RCU, young adults perceived more disapproval from others for their RCU than their MCU. While route of administration did not moderate differences between MCU and RCU in stigma indicators, the fact that young adults primarily using non-smoking methods felt greater discomfort disclosing cannabis use overall justifies further investigation given that it contradicts smoking stigma literature. The nonsignificant associations between cannabis use stigma indicators and cannabis problem severity may have resulted from low

power due to small sample size, pointing to the need for larger samples in future research.

Outlook Of the Massachusetts Medical Cannabis Program Eight Years After Adult-Use Legalization and Implementation

Graelyn Humiston (Commonwealth of Massachusetts)
Alexander M. Colby (Commonwealth of Massachusetts)
Hailey Pensky (Commonwealth of Massachusetts)
Victoria Edwards Commonwealth of Massachusetts)
Kate Fiske (Commonwealth of Massachusetts)
Andrew Carter (Commonwealth of Massachusetts)
Julie K. Johnson (Commonwealth of Massachusetts)

Background As adult-use cannabis approval grows, states pass laws to enact and implement legalization measures. Cannabis markets change rapidly, and it remains an ongoing question how medical cannabis programs fare after adult-use cannabis is implemented. Regulatory agencies must proactively monitor many indicators for market health, which differ for adult-use and medical markets. Medical markets, by definition, exist to provide patients with a medicine; if these markets are not closely monitored, patients may lose access to that medicine. Methods We evaluated Massachusetts' Medical Use of Marijuana Program through five metrics: Total sales, units sold, registered patients, registered clinicians, and Medical Treatment Centers (MTCs). Registered patients, clinicians, and MTCs are reported in Cannabis Control Commission (CCC) monthly public meetings. Registered patients are reported as "total patients (active patients)." Medical and adult-use sales data are available on the CCC's Open Data Catalog. We calculated inflation using the U.S. Bureau of Labor Statistics CPI inflation calculator. We used R, Microsoft Excel, and Tableau for data cleaning and analysis. Results Registered patients rose from 64,351 (57,285) in January 2019 to a peak of 104,960 (99,108) in January 2022, then decreased 19.7% to 87,719 (82,820) in February 2025. This most recent total remains 22.8% (24.6%) higher than the 67,742 (62,459) reported in March 2020, before the adult-use market temporarily closed due to the COVID-19 pandemic. The number of medical providers peaked in February 2025, with 334 physicians (+21.3% since March 2020), 124 nurse practitioners (+39.5%), and 7 physicians' assistants (none in March 2020). There were 97 MTCs reported as operating in February 2025, a 10.3% decrease from the peak of 107 in 2024, but a 38.1% increase from 60 in March 2020. Medical market sales peaked at $269M in 2021 and fell to $162M in 2024. January 2025 saw $11.7M in sales ($9.5M in February 2020 dollars), a 27.7% decrease from the $12.2M transacted in February 2020. By contrast, the adult-use market grew from $55.4M in February 2020 to $132.9M in January 2025 ($108.2M in February 2020 dollars, a 48.8% increase). Units sold decreased from a peak of 6.3M in 2022 to 5.6M in 2024,

but remain above pre-pandemic levels, with 419K units sold in January 2025, a 45.3% increase from 288K in February 2020. Prices have decreased for all products in both medical and adult-use markets. Buds, for example, decreased from $11.22/gram in the medical market in February 2020 to $4.62/gram in January 2025 ($3.76/gram in February 2020 dollars, a 66.5% decrease). Discussion These metrics paint a complex picture of the state of Massachusetts' medical market, which has shrunk by some measures since its peak, but whose peak was partly fueled by a steep increase in registered patients during the adult-use market closure in March-May 2020. Sales in dollars and units sold diverge due to the decrease in product prices, which is an unsurprising trend with the increased number of MTCs and adult-use establishments. These metrics reveal that maintaining MTC financial sustainability and patient registrations amid competition from adult-use establishments are key concerns for regulators.

The Impact of Cannabis Retail Availability on Cannabis and Mental Health Outcomes Among Medicaid Recipients in WA State

Helen Ippolito (Washington State Institute for Public Policy)

This paper examines the impact of cannabis retail availability on cannabis and mental health-related outcomes including diagnoses, treatment, ED visits, hospitalizations, and psychotropic drug prescriptions. Using individual-level Medicaid claimant data on participants aged 12 to 64 from Washington State between 2013-2023, we take advantage of the staggered opening of retailers across the state in a difference-in-differences estimation framework-this allows us to estimate if, on average, healthcare outcomes change with proximate cannabis retail openings. Retail availability is primarily measured as an average drivetime of 20-minutes-results are qualitatively robust to alternative measures of access. Overall, among legal-aged adults, we find that residing in a locale with a nearby cannabis retailer leads to roughly a 2-7% increase in the prevalence of cannabis use disorder diagnoses (CUD), cannabis-related hospitalizations, ED visits, inpatient treatment, and outpatient treatment. In addition, we find that retail availability leads to an increase in the co-occurrence of CUD-or CUD-related hospitalization or treatment-and mental health diagnoses including depression and psychosis. Impacts are increasing with hospital access, and in the years following the advent of legalization. Evidence is mixed regarding the relationship between cannabis-related outcomes and the prevalence of select psychotropic drug prescriptions. The size of the impact of retail availability differs across race, with the largest impact, at over 10%, observed among Asian recipients, followed by Hispanic and Native American recipients. Subgroup analyses further reveal that relatively larger effects are observed among recipients with a diagnosed disability, and there is little variation in effects across sex. When examining outcomes

for youth and under-aged adults, evidence suggests co-occurring CUD and select mental health diagnoses increase with retail availability.

Fungal and Illicit Drug Contaminants in Black- and Gray-Market Cannabis in Arizona and California, 2023 - 2024

Maxwell Leung (Arizona State University)
Albert Rivera (Arizona State University)
Mike Grommes (Desert Tox, LLC)
Thomas Cahill (Arizona State University)

Cannabis has been legalized in 39 states and Washington, D.C. for medical or recreational use. Yet, the illicit market - including unlicensed production (i.e., black market cannabis) within a legalized state and products that failed compliance testing in the gray market - accounts for the majority of the U.S. cannabis market at 76 billion dollars as compared to the legal market at only 30 billion dollars in 2022. The contamination level of black- and gray-market cannabis is largely unknown. In this study, we surveyed the production environment and contaminant sources of illicit cannabis. Maricopa County Sheriff's Office (MCSO)'s High Intensity Drug Trafficking Areas Task Force conducted 37 seizures between 2023 and 2024. While 90% of seized cannabis in Arizona was estimated to come from California, a few grow operations were discovered locally in Arizona. Stressed cannabis plants were found in improperly managed grow operations with standing water and algal growth. Water damage and black mold were found on the ceiling, walls, and doors of the illicit sites. Additionally, illicit cannabis products were packaged in unkempt bench areas. Next, we examined 20 Aspergillus and Fusarium mycotoxins and 3 metabolites in black and grey market cannabis seized by law enforcement in Arizona and California. MCSO, together with U.S. Postal Inspection Services, seized a total of 118 black- and gray-market cannabis dried flower samples between 2023 and 2024. Using Sciex 5500 QTrap LC-MS-MS with a matrix-matched calibration of hemp flower, we detected mycotoxins and fungal metabolites in 1 in every 6 illicit cannabis flower samples (i.e., 16%), including fusarenon-X (10 samples; 500-1,700 ppb), diacetoxyscirpenol (one of the federally designated biological select agents and toxins; 3 samples; 276-297 ppb), and deepoxy-deoxynivalenol (a microbial metabolite of deoxynivalenol, also known as vomitoxin; 2 samples; 316-876 ppb). Only one sample contained one of the five mycotoxins (i.e., aflatoxin B1, B2, G1, and G2 and ochratoxin A) regulated in the legal market. Further analyses are underway to test for the presence of illicit drug contaminants - including cocaine, fentanyl, and psilocybin - in the black- and gray-market cannabis samples.

Cannabis Social Equity Initiatives Among US States with Legal Non-Medical Cannabis Retail: A Review and Recommendations

Cassidy R. LoParco (George Washington University)
Rishika Chakraborty (George Washington University)

Morgan Speer (George Washington University)
Y. Tony Yang (George Washington University)
Carla J. Berg (George Washington University)

Background: Cannabis legalization continues to expand in the US. Several states have enacted laws/policies to advance social equity (SE). We documented cannabis-related SE policies in the 24 states that have legal non-medical cannabis retail. Methods: State cannabis-related SE laws/policies (promotion in industry participation among disproportionately-impacted communities, community reinvestment, criminal justice reform) as of December, 2024 were independently identified using on LexisAcademic, Westlaw, HeinOnline, state-specific legislative websites, and other relevant documents by two coders who underwent an iterative content and thematic analysis. Results: SE programs related to cannabis licensure were present in 20/24 states (83%); of these, 60% reserved a number/percent of for SE applicants. Regarding SE licensure eligibility, most states (65%) required majority ownership in the business and had criteria that considered whether applicants and/or their family were ever arrested/convicted for cannabis-related offenses (80%), residence in disproportionately-impacted/disadvantaged areas (80%), and/or applicants' income/wealth (50%). Most states with SE programs provided SE applicants/licensees with technical assistance, training, and opportunities for reduced application and licensing fees (65%). All 24 states had cannabis taxes on retail sales, ranging from 5-20%; 8 states (33%) also had excise taxes. Most states (58%) distributed cannabis-related revenue to substance education/prevention/treatment (ranging from 5-72%); one-third (33%) distributed funds for equity-related purposes. Over half of states (63%) had cannabis-related expungements. Discussion: While cannabis-related SE initiatives were present (e.g., reserved licenses, training, allocation of tax revenue, expungements), several states could benefit from implementing or expanding these programs. Future research is needed to monitor and evaluate these SE programs.

Cannabis and Derived Cannabis Use, Motives, and Consequences Among US Young Adults: Findings from a Cross-Sectional Mediation Study

Cassidy R. LoParco (George Washington University)
Yuxian Cui (George Washington University)
Matthew E. Rossheim (University of North Texas Health Science Center)
Rishika Chakraborty (George Washington University, Washington)
Morgan Speer (George Washington University)
Julia Chen-Sankey (Rutgers University)
Patricia A. Cavazos-Rehg (Washington University)
Carla J. Berg (George Washington University)

Background: Since the 2018 Agricultural Improvement Act, derived intoxicating cannabis products (DICPs)

emerged as largely unregulated products; meanwhile, traditional cannabis use has increased. To inform effective prevention, research is needed to assess differences in motives for using cannabis only versus both cannabis and DICPs, as well as use-related consequences. Methods: We analyzed survey data (June-November 2023) from 4,031 US young adults ages 18-34 (average age=26.9; 63.9% White; 59.0% female; aiming for ~50% past-month cannabis use). The analytic sample included participants reporting past-month cannabis use (n=1,968). Two cross-sectional mediation models were conducted to examine: 1) cannabis use motives (social/cognitive enhancement and coping) in relation to use-related consequences (psychophysiological and sociobehavioral) via use category (cannabis-only vs. cannabis-DICP co-use) and 2) consequences in relation to use category via use motives. Results: Overall, 54.4% reported cannabis-only use and 45.6% reported cannabis-DICP co-use. Greater enhancement and coping motives were associated with cannabis-DICP co-use (vs. cannabis-only use). Regarding Model #1, lower cannabis coping motives and cannabis-DICP use (vs. cannabis-only use) were associated with greater psychophysiological and sociobehavioral consequences, and the associations between coping and enhancement motives and psychophysiological and sociobehavioral consequences were indirectly mediated via cannabis-DICP co-use. For Model #2, lower psychophysiological and greater sociobehavioral consequences were associated with greater coping and enhancement motives, greater sociobehavioral consequences was associated with higher odds of cannabis-DICP co-use (vs. cannabis-only use), and psychophysiological and sociobehavioral consequences were indirectly associated with cannabis-DICP co-use through enhancement and coping motives. Conclusions: Considering the risks associated with cannabis and DICP use, future intervention and prevention efforts should focus on the observed associations to reduce risk.

Snapchat AI as an Information Source on Delta-8 THC

Cassidy R. LoParco (George Washington University)
Kayla K. Tillett (University of North Texas Health Science Center)
Ayyüce Begüm Bektaş (Memorial Sloan Kettering Cancer Center)
Matthew E. Rossheim (University of North Texas Health Science Center)
Carla J. Berg (George Washington University)

Introduction: Snapchat is a prominent social media site among youth. In April 2023, Snapchat released an AI-powered chatbot that was automatically implemented on all accounts. Given the apparent ease in communicating with this feature, youth may use it as an information source. Methods: While Snapchat purports to block results for drug keywords, it is unclear the extent to which this type of content is blocked. In August 2024 - January 2025, we asked Snapchat AI questions related to delta-8 THC, a derived psychoactive

cannabis product that has been rapidly rising in popularity in the US and has limited regulations. Qualitative responses were independently coded into thematic categories. Results: The AI prompted individuals to ask follow-up questions, which largely drove the themes. Themes included general information (similarity to delta-9 THC but with a purported lower potency; relaxing/euphoric effects; legality), use motives (pain relief, anti-nausea, appetite stimulation, anxiety reduction), potential consequences (dry mouth, red eyes, increased heart rate, drowsiness, contaminated products, inaccurate labeling), retail availability, and product recommendations. Responses did not provide supporting citations. While the AI did not block results related to delta-8 THC, it did block results pertaining to 'weed' and 'THC'. Discussion: Snapchat AI is a plausible information source about delta-8 THC among youth. No citations were provided to support claims made by the AI, which portrayed delta-8 THC use favorably, as having benefits and low risks from use. Findings have policy implications, including restricting or regulating this type of content - particularly relating to claims without supporting scientific evidence.

Cannabis and Alcohol Use and Co-Use in Black Young Adults' Daily Life: Leveraging Personalized Geospatial Data

P. Priscilla Lui (University of Washington)
Zachery Z. Willett (University of Washington)
Nia Jones (University of Washington)
Devin E. Banks (Washington University in St. Louis)
LaTrice Montgomery (University of Cincinnati College of Medicine)
Kevin M. King (University of Washington)

BACKGROUND: One in four Black young adults uses cannabis monthly. In recent years, Black individuals have seen rising cannabis use and cannabis use disorder rates and continue to face disproportionately negative health and legal consequences. These concerns are particularly pronounced among individuals who concurrently use cannabis and alcohol. Cannabis and alcohol use are influenced by environmental factors including opportunities to use, the substances' availability, and social contexts. To examine these contextual influences, research integrating geospatial data has focused on aggregated, area-level and cross-sectional analyses, but these have not been well integrated into daily life studies. Linking ZIP-coded geospatial data with self-reported quantitative and qualitative data can deepen insight into personal and environmental contexts of cannabis and alcohol (co-)use in young people's daily life.

METHOD: Data were from 110 Black young adults (ages 18-30, M=22.9) in an ongoing study conducted in Seattle, Washington. Washington state legalized recreational cannabis use in 2012. Eligibility criteria included weekly cannabis and/or alcohol use, scoring below thresholds for hazardous use on select CUDIT-R or

AUDIT items, and not seeking treatment for cannabis/alcohol use disorder. Most participants identified as non-immigrant Black/African American (75.5%); 47.3% were cis-women, 12.7% non-binary, and 50.0% were full-time students.

Study procedures included an in-person visit to complete baseline surveys, two online daily diary survey assessments, and a virtual semi-structured interview. Participants reported the locations for each cannabis use or drinking occasion. Corresponding geospatial data were examined in the context of licensed cannabis and alcohol vendors to estimate ZIP-level availability of each substance. Geospatial data also were analyzed alongside participants' qualitative responses to contextualize when, where, and with whom they used these substances.

RESULTS & CONCLUSION: Across 2 weekend days, 76.0% of participants reported using cannabis and/or alcohol. Among the 24 individuals who used both substances, 45.8% engaged in simultaneous co-use. Participants who used cannabis reported intoxicated in 93.3% of use occasions (nj = 144), with a median duration of intoxication of 75 minutes (range=1-600). Participants reported drunk in 78.0% of drinking occasions (nj = 82), with a median duration of intoxication of 70 minutes (range=1-420).

We recorded 59 unique ZIP codes where participants used cannabis and/or drank. Per ZIP code, we found a median of one (range=0-8) licensed cannabis vendor, 39 establishments licensed to serve alcohol on-premise (range=0-217), and 23 (range=0-54) licensed to sell alcohol for off-premise consumption. Coupled with their qualitative interview data, we observed that participants tended to use cannabis alone and close to home (median distance=0.38 miles), with only 33.1% of occasions taking place in the company of others. By contrast, participants tended to drink while among others in 78.3% of the occasions. They tended to report drinking further from home (median distance=2.33 miles). We demonstrated the feasibility of a multi-modal data collection approach integrating geospatial information to examine participants' idiographic patterns and contexts of cannabis and alcohol use. Research implications were discussed for integrating personalized geotemporospatial data into daily life research in a population at risk for hazardous cannabis and alcohol (co-)use, and practical implications for just-in-time interventions.

Associations Between Mental Health Symptoms, Cannabis Use Problems, and Cannabis Use Motives in a Diverse Sample of Community Young Adults

Andrea M. Maxwell* (McMaster University)
Molly L. Garber (Peter Boris Centre for Addictions Research, McMaster University)
Laura Reid Marks (Center for Translational Behavioral Science, Florida State University)

Kyla Belisario (Peter Boris Centre for Addictions Research, McMaster University)
James G. Murphy (University of Memphis)
James MacKillop (Peter Boris Centre for Addictions Research, McMaster University)
**Student Award Winner*

OBJECTIVE: Cannabis use disorder occurs concurrently to heightened levels of other mental health symptoms, such as depression, anxiety, and posttraumatic stress symptoms. Existing research has primarily focused on coping motives (i.e., using cannabis to manage/relieve unpleasant emotional symptoms) to explain these relationships, but limited research has examined these pathways in young adult samples. Furthermore, studies exploring these relationships among racialized groups (i.e., non-White individuals) is scarce. This is especially important due to well-documented health disparities faced by racialized individuals. Thus, the primary aims of this study were to (1) explore and characterize relationships between cannabis use problems, motives, and mental health symptoms, (2) examine possible indirect effects of cannabis use motives on the relationship between cannabis use problems and mental health symptoms, and (3) examine possible differences in these relationships among racialized young adults. METHODS: This study utilized baseline data from a larger longitudinal study of young adults with high-risk substance use (N = 761; M age = 21.9; %F = 50.3; %White = 58.2) in Hamilton, Ontario, Canada and Memphis, Tennessee, USA. Participants completed assessments related to cannabis use problems, cannabis use motives, and symptoms of depression, anxiety, and posttraumatic stress. First, bivariate correlations and hierarchical linear regression were performed to investigate and characterize relationships between study variables. Then, indirect effect analyses were performed to elucidate the possible mechanistic influence of cannabis use motives. Finally, moderated indirect effect analyses were performed to examine the possible moderating role of racial identity (trichotomized as White, Non-Black People of Colour [NBPOC], and Black). RESULTS: Regression analyses revealed significant associations between cannabis use problems and coping (É¿ = 0.43, p <.001), enhancement (É¿ = 0.15, p<0.001), and expansion (É¿ = 0.10, p=0.014) motives. The overall indirect effect analyses revealed significant indirect effects via coping (unstandardized effects= 0.04-0.12) and expansion (unstandardized effects= 0.01-0.02) among all mental health measures. When racial identity was included as a moderator, the indirect effects through coping remained significant, but only for the White (unstandardized effects = 0.05-0.19) and NBPOC groups (unstandardized effects = 0.04-0.11). CONCLUSION: Overall, results generally support a negative reinforcement pathway to concurrent cannabis use problems and mental health symptoms, where these relationships are at least partially explained via coping motives. However,

results revealed surprising between-group differences among racialized individuals, highlighting the need for future research exploring the cannabis use motives and mental health outcomes specifically among individuals with diverse racial identities.

Smoke, Sip, Sleep, Repeat: Investigating Daily-Level Bidirectional Relationships Between Separate and Simultaneous Alcohol-Cannabis Use and Sleep

Annabelle Moore* (York University)
Sophie G. Coelho (York University)
Christian S. Hendershot (University of Southern California)
Jeffrey D. Wardell (York University, Centre for Addiction and Mental Health, University of Toronto)

**Student Award Honorable Mention*

Background: Sleep problems are common among young adults, and both alcohol and cannabis are known to impact sleep. Given the high prevalence of simultaneous alcohol-cannabis use in this population, there is a need to clarify the mixed findings in existing research regarding the combined effects of alcohol and cannabis use on sleep. While studies suggest that the effects of alcohol and cannabis on sleep may depend on the level of use and/or dependence, this has not been thoroughly explored in the context of simultaneous use. This study examined daily relationships between simultaneous use (versus cannabis-only, alcohol-only, and no use) and key sleep indices (i.e., subjective sleep quality, sleep duration, and bedtime), exploring the moderating role of substance use problem severity. Method: Young adults (N = 151; 64% female; Mage = 22.07) completed 21 consecutive daily morning surveys (89.12% compliance) in a smartphone app assessing prior-day alcohol use (number of drinks) and cannabis use (grams of cannabis flower, hits of concentrates, and servings of edibles and cannabis beverages), bedtime, wake time, and subjective sleep quality. Alcohol and cannabis problem severity were assessed at baseline using the Alcohol Use Disorders Identification Test (AUDIT; Saunders et al., 1993) and Cannabis Use Disorder Identification Test-Revised (CUDIT-R; Adamson et al., 2010), respectively. Results: Multilevel models (with days nested within participants) indicated that participants reported worse sleep quality and shorter sleep duration on alcohol-only use days relative to simultaneous use and no-use days (ps <.001.026). Participants reported similar subjective sleep quality and sleep durations on cannabis-only and simultaneous use days, but cannabis-only use days were associated with better sleep quality relative to no use (p <.001). The same pattern of differences between simultaneous and single-substance use days were observed even when controlling for quantities of alcohol and cannabis consumed. Further, alcohol problem severity moderated several associations. For example, controlling for quantities consumed, individuals with greater alcohol problem severity went to bed earlier (b = -0.63, SE = 0.17, p = <.001) on simultaneous use days relative to

alcohol-only days, whereas those with lower alcohol problem severity went to bed later on simultaneous use days compared to cannabis-only days (b = 0.50, SE = 0.13, p = <.001). Models examining reverse associations (i.e., impacts of sleep variables on next-day likelihood of simultaneous or single substance use) did not reveal any significant associations. Conclusion: Young adults' sleep appears to be more disrupted when they use alcohol on its own than when they use alcohol with cannabis. This effect is especially evident among those with greater alcohol problem severity, who experience more pronounced sleep disturbances associated with alcohol use. In contrast, those with lower alcohol problem severity tended to have later bedtimes on simultaneous use days compared to cannabis-only days. As contextual factors may also contribute to differences in sleep outcomes across simultaneous use and single substance use days, further research on the factors that explain these differences is warranted. Future studies should examine simultaneous use among people with sleep disorders to inform sleep interventions.

Characterizing the Cascade of Care for Cannabis Use Disorder in the U.S.: Treatment Gaps and Barriers to Care using the 2022-2023 National Survey on Drug Use and Health

Matthew G. Myers* (Michigan State University)
Kipling M. Bohnert (Michigan State University)
**Student Award Winner*

Research Question: Cascade of care frameworks describe patient utilization at various stages of care. In addiction medicine, they help identify discontinuities across the care continuum in the detection and treatment of substance use disorders. Such frameworks have illustrated gaps in care for those with alcohol and opioid use disorders; however, a cannabis use disorder (CUD) cascade of care model has not been examined. Here, we use nationally representative data to describe utilization of care among those with CUD. Secondarily, we explore perceived barriers of treatment. Method and Analysis: We aggregated 2022 and 2023 National Survey on Drug Use and Health data to identify a representative sample of US adults (unweighted n=91,528). The presence and severity (mild, moderate, severe) of past-year CUD was assessed using Diagnostic and Statistical Manual of Mental Disorders 5th edition criteria. Among those with CUD, we estimated conditional past-year prevalences of 1) healthcare utilization, 2) a drug use discussion with a healthcare provider among those who utilized healthcare, and 3) receipt of outpatient cannabis use treatment among those discussing their drug use with a provider. Among a subsample of those with untreated CUD (unweighted n=408), we examined prevalences of perceived barriers for treatment. All results are stratified by severity of CUD and are nationally representative of US adults. This work is deemed non-human subjects by the Michigan State University Institutional Review Board. Results: The weighted prevalence of CUD was 6.8% (95%CI:6.6, 7.1). Mild,

moderate, and severe CUD were present in 3.8% (95%CI:3.6, 4.0), 1.8% (95%CI:1.7, 1.9), and 1.2% (95%CI:1.1, 1.3) of U.S. adults, respectively. Healthcare utilization was common among those with mild (78.4%; 95%CI:76.1, 80.7), moderate (76.3%; 95%CI:73.7, 79), and severe CUD (79.5%; 95%CI:76.2, 82.8). Among those with past-year healthcare utilization, discussing drug use with a healthcare provider was common, and prevalences of such discussions did not differ between those with mild (75.2%; 95%CI:71.8, 78.5), moderate (76.4%; 95%CI:72.4, 80.3) or severe (76.7%; 95%CI:72.3, 81) CUD. The conditional prevalences of receiving outpatient treatment for cannabis use were rare among those with mild (1.7%; 95%CI:0.7, 2.8), moderate (4.8%; 95%CI:1.8, 7.9) or severe (11.3%; 95%CI:7.3, 15.3) CUD. Among those with untreated CUD, 73.5% (95%CI:63.6, 83.4) did not receive treatment because they thought they could handle the issue on their own. The majority of those with untreated CUD also reported not receiving treatment for the following reasons: it cost too much (57.9%; 95%CI:48.2, 67.6), they were not ready to start treatment (55.4%; 95%CI:45.7, 65.2), they didn't know where to get treatment (52.4%; 95%CI:44.6, 60.3), and they were not ready to stop use (51.5%; 95%CI:41.6, 61.4). Conclusion: Although adults with CUD commonly utilize health care and discuss their drug use with providers, very few ultimately receive treatment for CUD. It may be important to consider expanded screening and referral efforts for individuals in care settings that have the capacity to treat CUD. Additionally, healthcare systems may improve engagement in CUD treatment by addressing treatment barriers commonly perceived by patients.

Examining the Associations Between Cannabis Use and Indicators of Cognition in a Longitudinal Cohort Study of Emerging Adults

Peter Najdzionek (McMaster University)
Amanda Doggett (McMaster University)
Kyla Belisario (Peter Boris Centre for Addictions Research)
James Murphy (University of Memphis)
James MacKillop (McMaster University & Peter Boris Centre for Addictions Research)

Background: Frequent cannabis use is known to diminish cognitive functions such as attention, working memory, and inhibition. There's a current lack of research evaluating how cognition is affected by age-related reductions in cannabis use. Our study employed a longitudinal cohort model to assess cannabis use and cognition in an emerging adult sample. Methods: 691 young adults (mean age 21.4 years, 47.75% male) were assessed every 8 months across 3 timepoints. Participants reported their cannabis use frequency (via the Alcohol, Smoking, and Substance Involvement Screening Test), and engaged in the following cognitive-behavioral tasks: numeric digit span, go/no-go inhibition task, and a monetary delay discounting paradigm. Random intercept cross-

lagged panel models were used to determine the longitudinal relationship between cannabis use frequency and each of the cognitive measures. Results: While go/no-go and delay discounting revealed no cross-lagged effects with cannabis use, there was a negative relationship between forward digit span and cannabis frequency [b = -0.203, p = 0.035; b = -0.230, p = 0.043], such that decreases in cannabis use led to increased forward digit span capacity. Conclusions: Finding demonstrated that reductions in cannabis use frequency led to better performance on the forward digit span task 8 months later. As digit span forward is a proxy for attention, future research examining the relationship between cannabis & cognition should focus on attentional measures.

A Longitudinal Test of Health-related Psychological Theories in Explaining Avoidance of Driving Under Cannabis Influence

Alberto Parrado-González (University of Huelva)
Nehemías Romero-Pérez (University of Huelva)
Bella M. González-Ponce (University of Extremadura)
Adrian J. Bravo (William & Mary)
Fermín Fernández-Calderón (University of Huelva)

Background and aims: Driving under the influence of cannabis is a prevalent high-risk behavior. Identifying factors that predict the avoidance of this behavior can be approached through various psychosocial theories that have demonstrated their usefulness in explaining health behaviors, such as the Theory of Planned Behavior (TPB), the Protection Motivation Theory (PMT), and the Health Belief Model (HBM). This study aimed to longitudinally analyze the explanatory capacity of these models in avoiding driving under the influence of cannabis. Methods: Data were obtained from the Psicocann Project, a longitudinal study with an initial sample of 612 young people (aged 18-25) recruited from the community, all of whom reported cannabis use in the past month. 82.5% completed a three-month follow-up. For this analysis, participants who reported having driven a vehicle in the past 30 days at both baseline and follow-up assessments were included, resulting in a final sample of 167 young adults (female = 31.7%, Mage = 21.70, SD = 2.06). The baseline questionnaire assessed constructs (e.g., Attitudes, self-efficacy) of the three tested theories (i.e., TPB, PMT, and HBM). In both assessments, the frequency with which participants reported avoiding driving under the influence of cannabis in the past month was measured using an item from the Protective Behavioral Strategies for Marijuana Scale. Path analysis models were used to evaluate the explanatory power of the original models. Then, past behavior was included as a control variable to further establish the predictive ability of the models. All analyses controlled for sex and age. Results: All models showed adequate fit indices. The TPB and PMT explained a greater proportion of the variance in avoiding driving under the influence of cannabis (53.3% and 53.2%, respectively), while the HBM

explained 29.1%. When past behavior was included as a control variable, the explained variance increased for all models: 59.0% in TPB, 58.9% in PMT, and 54.3% in HBM. The results indicated that in both the TPB and PMT, intention was the only significant predictor of behavior. In TPB, a more favorable attitude toward protective behavior was associated with a greater intention to avoid driving under the influence of cannabis. In PMT, higher levels of self-efficacy, perceived vulnerability, and perceived efficacy were associated with a greater intention to avoid driving under the influence of cannabis. In HBM, a higher perception of vulnerability was directly associated with a greater frequency of behavior avoidance. Conclusions: Findings suggest that all three models are useful in explaining the avoidance of driving under the influence of cannabis, with TPB and PMT demonstrating greater explanatory power. These results could contribute to the design of more effective interventions aimed at reducing this risky behavior.

Demographic and Clinical Factors Associated with Recreational Cannabis Use in Female Psychiatric Outpatients with Suicidal Ideation and Healthy Controls

Anna Patterson (University of Illinois Chicago)
Anisha Nagpal (University of Illinois Chicago)
Ashley Ross (University of Illinois Chicago)
Jordan Barone (University of Illinois Chicago)
Hafsah Tauseef (University of Illinois Chicago)
Jaclyn Ross (University of Illinois Chicago)
Natania Crane (University of Illinois Chicago)
Tory Eisenlohr-Moul (University of Illinois Chicago)

Background: Given the widespread legalization of recreational cannabis across the United States, it is crucial to examine sociodemographic, affective, and behavioral factors associated with cannabis use to identify at-risk populations. Female individuals exhibit a faster transition from first use to problem use than their male counterparts1. Further, suicide is a leading cause of death in reproductive-aged female individuals, with rates in this group showing the steepest increases in recent years2,3. Considering these co-occurring trends, there exists an urgent public health need to identify characteristics of female recreational cannabis users with suicidality to inform prevention and intervention efforts. Methods: Demographic, clinical diagnostic, and daily psychiatric symptom and substance use data from baseline and washout phases across three randomized controlled trials were analyzed. Data was primarily collected after the legalization of recreational cannabis in Illinois. Female individuals were recruited for past-month suicidal ideation (SI) or as healthy controls with no history of SI. Results: Of 257 participants, 140 (54%) reported cannabis use. Participants with SI only and SI with a history of suicide attempt were more likely to use

cannabis than healthy controls (OR=5.23, p=0.005; OR=3.20, p<0.001, respectively). Sexual minority status also positively predicted cannabis use (OR=2.69, p=0.001). Cannabis use frequency did not differ significantly between the three groups (SI Only, SI with history of suicide attempt, and healthy controls). Cannabis use frequency was also higher in those of a sexual minority. Finally, cannabis use frequency does not appear to be associated with daily affect nor passive and active SI in our sample. Conclusion: In a sample of reproductive-aged female participants, those with past-month suicidal thoughts were more likely to use cannabis than controls, though cannabis use was not significantly associated with suicide attempt. Frequency of use did not differ between groups. Future work is needed to examine this relationship longitudinally within subject. Overall, our study serves to guide clinicians and researchers on the demographic and clinical correlates of cannabis use at a crucial time when recreational cannabis use, CUD, and suicide attempt rates are increasing in the female population.

College Marijuana Beliefs, Harm Reduction Strategies, and Marijuana Outcomes: A Cross-National Study

Hanna Pazo Vargas* (William & Mary)
Javiera Hernandez Puelma (William & Mary)
Adrian J. Bravo (William & Mary)
Cross-Cultural Addictions Study Team (William & Mary)
**Student Award Winner*

Within the college student alcohol literature, college alcohol beliefs (i.e., the belief that drinking alcohol is an important part of the college experience) has been shown to be a robust risk factor for excessive alcohol use and problems (Bravo et al., 2018). More recently, researchers have found that college marijuana beliefs (i.e., the belief that using marijuana is an important part of the college experience) is a unique robust predictor of marijuana-related outcomes (i.e., marijuana user status, frequency of use, marijuana-related consequences) among U.S. college students (Pearson et al., 2018). In exploring mechanisms, one prior study found that lower use of protective behavioral strategies (PBS) links greater college alcohol beliefs to problematic alcohol use (Bravo et al., 2017); however, limited research has examined whether marijuana PBS use links college marijuana beliefs to marijuana outcomes, particularly across diverse cultural contexts. The present study examined the associations between college marijuana beliefs, marijuana PBS use, and marijuana-related outcomes among college students from six different countries. Participants included 906 college students (64.8% female; mean age = 20.58) from six countries (i.e., USA, Argentina, Spain, South Africa, England, and Canada) who regularly consume marijuana within a typical week and completed measures of college marijuana beliefs, marijuana PBS, marijuana use quantity, and marijuana-related consequences. Within our estimated path model (i.e., college marijuana beliefs → marijuana

PBS → marijuana quantity → marijuana-related consequences), findings revealed that stronger endorsement of college marijuana beliefs was positively associated with lower use of marijuana PBS, which in turn was associated with greater marijuana quantity (indirect B = .11; 99% CI = 0.07, 0.16) and more marijuana-related consequences (indirect B = .08; 99% CI = 0.05, 0.12). Additionally, a significant double-mediation effect was found such that greater endorsement of college marijuana beliefs was associated with more marijuana-related consequences via lower use of PBS and greater marijuana quantity (indirect É¿ = .02; 99% CI = 0.01, 0.04). Importantly, this double-mediated effect was supported within a longitudinal model among a subsample of participants from our analytic sample (n = 251). Specifically, greater endorsement of college marijuana beliefs was associated with less PBS use 3 months later, which in turn was associated with greater cannabis quantity and negative marijuana-related consequences 3 months later (indirect É¿ = .04; 99% CI = 0.01, 0.11). These findings highlight the importance of addressing college marijuana beliefs and promoting marijuana PBS use to mitigate the impact of heavy marijuana use among college students, particularly in culturally diverse settings. Understanding these differences is essential for developing culturally tailored prevention strategies that promote healthier marijuana use habits and reduce marijuana-related harm among college students.

Acute Cannabis-Related Alterations in fMRI Global Brain Connectivity During Performance of a Simulated Driving Task

Godfrey D. Pearlson (Yale University/Institute of Living)
Shashwath A. Meda (Institute of Living)
Michael C. Stevens (Yale University/Institute of Living)

Introduction: Cannabis is associated with dose-related decrements in specific driving abilities. Global brain connectivity (GBC) mapping is an fMRI analysis method that usefully quantifies network integration between different brain regions by summing the strength of functional connectivity between every fMRI measurement in the brain and all other points.These high-definition GBC maps then can be directly compared in cannabis dose challenge studies to learn which brain regions might be relatively disconnected as a consequence of drug use and related to cannabis-impaired driving. Methods: In this placebo-controlled, double-blind, counterbalanced, randomized trial, N=33 regular cannabis-using adults aged 19-38 (27% female) underwent a placebo-controlled cannabis challenge. On separate days, participants received 0.5 gm of either cannabis (~12.5% THC flower) or placebo, via paced inhalation from a Volcano vaporizer. 45 minutes after acute dosing, participants' brain activity was assessed using fMRI while performing a 3-part, 30-minute simulated driving paradigm implemented on a Realtime Technologies, Inc. (Sim Vehicle LT

platform; this included lane-keeping, car following, and overtaking tasks. GBC was implemented on data collected during the entire 30 minutes of driving. Permutation Analysis of Linear Models (PALM) neuroimaging software implemented a paired t-test contrasting placebo versus active cannabis GBC maps, using 5000 permutations, threshold-free cluster enhancement (TFCE) and False Discovery Rate (FDR) control over whole-brain multiple comparisons. To identify links between brain connectivity and driving behavior, we used a multi-set canonical correlation analysis (mCCA) combined with joint independent component analysis (joint ICA) to fuse and decompose GBC maps and 19 driving behaviors derived from the driving scenarios. Paired t-tests assessed dose-related differences in the resulting joint components loading coefficients. Results: GBC after active cannabis was significantly reduced in many sub-cortical brain regions. Impaired network connectivity was particularly prominent in left hippocampus, bilateral cerebellum and bilateral thalamus, but extended to include lesser aspects of bilateral caudate, putamen, and brainstem. No drug effects on cortical GBC survived FDR corrections. However, diffusely widespread cortical disconnectivity was detected at less stringent, exploratory $p<.05$ uncorrected thresholds. Diminished cortical GBC deficits were most dense in visual cortex, motor and supplementary motor area (SMA), and right lateral prefrontal cortices. Data fusion analysis characterizing associations between GBC and driving behavior drug effects identified a 12-component solution as most optimal. Among these components, Component 8 demonstrated significant hypoactivity in SMA, frontal, and visual areas ($z = 2.12$; $p < 0.04$). This correlated with reduced lane-keeping steering reversal rate behavior ($z = 2.04$; $p < 0.05$) on the active dose. Additionally, Component 6 revealed increased standard deviation of lateral position (SDLP) at the active dose, associated with a regional network involved in attention, visual processing, and sensory integration. Conclusion: This study establishes the first links between impaired driving and drug effects on large-scale brain network function. We observed that acute cannabis use exerts strong effects on how strong and widespread sub-cortical regions co-engage with the rest of the brain, with less strong evidence for comparable cortical effects. Moreover, these neural changes were shown to be related to aspects of the participant's driving performance.

Exploring Daily Predictors and Harms of Cannabis and Alcohol Co-use Among Transgender and Gender Diverse Adults Who Drink

Stephanie M. Penta* (Toronto Metropolitan University)
Alexandra Uhrig (Toronto Metropolitan University)
Jeffrey D. Wardell (York University, University of Toronto, Centre for Addiction and Mental Health)
Sarah S. Dermody (Toronto Metropolitan University)
**Student Award Winner*

Background: Aside from combinations with tobacco, cannabis and alcohol are

the most commonly co-used substances in North America. Understanding cannabis and alcohol co-use is important because it is associated with experiencing more substance-related harms than single substance use. Emerging evidence suggests that transgender and gender diverse (TGD) adults experience a disproportionate impact from cannabis and alcohol use and co-use and corresponding harms compared to cisgender adults. This disparity is likely due to the everyday stressors that TGD people encounter due to their minoritized gender identities, termed gender minority stress (GMS). Very little research has examined the relationships between cannabis and alcohol co-use, substance-related harms, and GMS and resilience in TGD populations. The current study employed ecological momentary assessment (EMA) to explore daily associations between these variables among TGD adults. Method: This secondary analysis included 100 Canadian TGD adults (M = 27.88 years, SD = 7.64) who reported typically drinking alcohol at least once per week. Among the participants, 22% identified as transmasculine, 27% as transfeminine, and 49% as gender diverse (e.g., nonbinary, gender fluid). For 21 days, participants completed daily EMA surveys capturing their past-day substance use (i.e., alcohol and cannabis use frequency, number of standard drinks consumed, and types of cannabis consumed), substance-related harms (e.g., engaging in risky behaviors, interpersonal conflicts, and hangover symptoms), and GMS and resilience. To explore daily-level associations between these variables, we applied generalized linear mixed models (GLMM). Results: Across all participants, 330 alcohol-only days, 282 cannabis-only days, and 124 co-use days were reported. On alcohol use days, the mean number of standard drinks consumed was 3.16 (SD = 2.64). On cannabis use days, participants used cannabis flower, concentrates, edibles, beverages, and more than one form of cannabis on 53.98%, 23.51%, 1.49%, 1.49%, and 19.94% of days, respectively. GLMM results revealed that, on days when participants co-used, they experienced more substance-related harms than on alcohol-only days (IRR = 1.42, p = .008). Despite this, on days when participants co-used, they did not consume significantly more standard drinks (IRR = 1.06, p = .516) than on alcohol-only days. Participants also did not experience significantly more GMS or resilience on co-use days than on alcohol-only (GMS: OR = 0.89, p = .301; resilience: OR = 0.87, p = .327) or cannabis-only days (GMS: OR = 1.00, p = .976; resilience: OR = 0.91, p = .406). Conclusions: These findings raise additional concerns about the impacts of cannabis and alcohol co-use on the health and wellbeing of TGD adults. The results suggest that co-use is associated with experiencing more substance-related harms than alcohol-only use, which suggests that cannabis may worsen harms for TGD adults who drink. This is an important finding, given that participants endorsed high levels of cannabis use, including using more than one form of cannabis on one fifth of all cannabis use days. The results of this study may be used to inform tailored harm-reduction policy

and intervention efforts for TGD adults.

Methods for Exploring Cannabis Discussions on Reddit: Leveraging Machine Learning and Large Language Models

Chanda Phelan Kane (Brown University)
Xiangyu Tao (Rutgers University)
Jim Samuel (Rutgers University)
Kristina Jackson (Rutgers University)
Jane Metrik (Brown University)

Objective This project explores methods using machine learning and large language models (LLMs) for analyzing large-scale cannabis-related discussions on Reddit, with a focus on therapeutic topics such as sleep and pain. Method We collected posts and comments from 16 cannabis subreddits (e.g. /r/trees, /r/cannabis, /r/Petioles) and three health-related subreddits (r/Sleep, r/Anxiety, r/ChronicPain), comprising a corpus of over 60,000 posts and over 450,000 comments. For the cannabis-related subreddits, we used keyword filtering to select the subset of posts and comments likely to be about therapeutic effects of cannabis; for health-related subreddits, keyword filtering produced text likely to be about cannabis. We employed a multi-method natural language processing (NLP) approach to investigate thematic patterns and sentiment: word frequency analysis, topic modeling using Latent Dirichlet Allocation (LDA) and ChatGPT 4.o, and sentiment analysis using traditional machine learning libraries and ChatGPT 4.o. Results Initial word frequency analysis provided a high-level view of commonly used terms but lacked the granularity to capture health-related content. We then used LDA to identify latent thematic structures in the text. LDA helped highlight recurrent discussion areas, such as cannabis's perceived benefits for sleep, experiences with withdrawal-related insomnia, and the development of tolerance. To improve the interpretability of LDA results, we used ChatGPT 4.o to generate human-readable summaries of topics. While LDA was valuable for modeling large corpora and identifying patterns, interpretation remained subjective and sensitive to preprocessing decisions and model parameters Topic modeling by ChatGPT produced detailed, easily interpretable themes, but as interpretative tools LLMs can lack transparency and may introduce subjective biases. Finally, we conducted sentiment analysis to assess user perceptions of cannabis's effectiveness for sleep. Both traditional machine learning libraries and ChatGPT sentiment analyses revealed a spectrum of sentiment, highlighting both positive and negative experiences. Sentiment analyses are limited by the accuracy of their sentiment libraries when applied to cannabis-related text. Each method offered distinct strengths: word frequency analysis was fast and accessible; LDA revealed deeper topic structures; and GPT-assisted interpretation and sentiment analysis added context and nuance. However, challenges included the limitations of keyword filtering, the interpretability of unsupervised models like LDA, and the potential biases introduced by using LLMs for annotation and

interpretation. Conclusions This work is part of an ongoing exploration of the role of AI in cannabis research. We present this abstract to foster conversation about how NLP and LLMs can support, but also complicate, interpretation in substance use research. Open questions remain about best practices, limitations, and opportunities for responsible integration of these tools into substance use research contexts.

The SAFERR Just-in-Time Adaptive Intervention for Diverse Young Adults Who Co-Use Cannabis and Alcohol

Kristina T. Phillips (Kaiser Permanente Hawaii Center for Integrated Health Care Research; Kaiser Permanente Bernard J. Tyson School of Medicine)
Michael M. Phillips (University of Hawai'i at Manoa)
Mark A. Prince (University of Southern California)
Kara Tsuzaki (Kaiser Permanente Hawaii Center for Integrated Health Care Research)
Catherine Erickson (Kaiser Permanente Hawaii Center for Integrated Health Care Research)
Michael D. Stein (Boston University)

Introduction: Approximately one-fourth of young adults engage in simultaneous use of cannabis and alcohol (i.e., use of both substances with overlapping effects), leading to more negative consequences than use of either alone. To prevent substance use disorder (SUD), an intervention that targets harm reduction or protective behavioral strategies (PBS) may prove beneficial. Current PBS interventions are primarily designed for college students, with limited opportunities for community-recruited young adults. Just-in-time adaptive interventions (JITAIs) offer one mechanism for delivering PBS in a mobile and accessible format. The Smartphone App For Effectively Reducing Risk (SAFERR) is a new JITAI being tested in an ongoing clinical trial. The aim of the current presentation is to describe the SAFERR study design and explore feasibility and preliminary findings. Method: Young adults aged 18-30 who endorsed recent simultaneous use of cannabis and alcohol were recruited from a large integrated healthcare system and screened online. Eligible and interested participants completed informed consent and a virtual training session. Participants were randomly assigned to one of eight study conditions as part of a fractional factorial design. They completed a baseline assessment and five weeks of ecological momentary assessment (EMA). All participants completed an introduction module that included psychoeducation, personalized feedback, and goal-setting; those assigned to a JITAI intervention condition received intervention content for four weeks. Although the trial is ongoing, exploratory analyses focused on initial feasibility (response rate) and change in PBS use and cannabis and alcohol frequency over the follow-up period (one-week, one-month, and 3-month). Changes in past 30-day alcohol/cannabis use and PBS for alcohol/cannabis were examined using a series of linear mixed effects models. For count outcomes, quasi-Poisson

models were utilized. Results: Forty-three young adults have enrolled in the study. Participants reported a mean age of 24.95 (SD=2.94; range=20-30), were predominantly female (74%), and endorsed White (41.9%), Native Hawaiian or Pacific Islander (27.9), Asian (11.6%), Filipino (2.3%), Black (2.3%), or More than one race (14%). Of the 43 participants who enrolled, 29 have fully completed the protocol. Signal-contingent EMA response rate over the 5-week study period was 68%. From baseline to the 3-month follow-up across all participants, there was a significant increase in PBS for both alcohol and cannabis. The effect was small to medium sized for alcohol (beta=.24) and small for cannabis (beta=.17). Both past 30-day alcohol and cannabis use reduced. Days of alcohol use were not significantly different from the baseline to 3-mo follow-up (beta=-.16), but cannabis significantly changed (beta=-.14 cannabis). Conclusions: A preliminary examination of the SAFERR intervention suggests that the protocol is feasible and trending in the expected direction on outcomes, with increases in PBS use, and decreases in alcohol and cannabis use frequency. Additional participants will allow for a more nuanced examination of outcomes across the different study conditions.

Poly-substance use of Cannabis, Alcohol and Nicotine among Hawai'i Youth: Insights from the 2019, 2021, and 2023 Youth Risk Behavior Survey (YRBS)

Michael M. Phillips (University of Hawai'i at Mnoa)
Fran Woodworth (University of Hawai'i at Mnoa)
Mika D. Thompson (University of Hawai'i at Mnoa)
John R. Massey (University of Hawai'i at Mnoa)

Substance use among adolescents remains a significant public health concern, with cannabis, alcohol, and nicotine being the most commonly used substances. We utilized Hawaii YRBS 2019, 2021, 2023 data to assess the rates of cannabis, alcohol, and nicotine co- and poly-substance use among Hawai'i high school (HS) students, including sexual and gender minorities, race/ethnicity, rurality, mental health status, including depression and self-harm. The Youth Risk Behavior Survey (YRBS) provides critical data on the prevalence, patterns, and trends for substance use, informing prevention and intervention efforts. Cannabis use prevalence for Hawai'i HS students ranged from 17.2% for 2019, 12.0% for 2021, and 14.0% for 2023, and a combined 14.3% (95% CI: 13.3%, 15.4%) across all three data collection periods. A growing trend, females had a significantly higher co-use prevalence for cannabis-alcohol (8.9% to 6.4% for males) and cannabis-nicotine (10.8% to 8.2% for males). Of the 4 counties in Hawaii, all 3 counties having higher rurality (>94%) generally had statistically higher prevalence for cannabis, co-use, and poly-use of all three compared to Honolulu County (rurality, 63%). When examining race/ethnicity: Japanese, Filipino, and Other Asian HS students had statistically lower

prevalence for cannabis use, co-use and poly-use compared to White, Native Hawaiian and individuals with Other Race/Ethnicities. HS students who identify as transgender (21.9%, 95%CI: 15.6-29.8) had significantly higher prevalence of cannabis use compared to their cisgender peers (14.0%, 95%CI: 12.9-15.1) and a general trend of higher co- and poly-use, but not statistically different. When exploring the association between mental health, depression, and self-harm, there was a statistically significant trend across the board of higher prevalence for cannabis, co- and poly-substance use, with sometimes double and triple the rate. Demographic disparities emerged in the Hawaii data for cannabis use along with co- and poly-use, with differences in use patterns by sex, race/ethnicity, rurality of counties, gender identity, and with mental health, depression, and self-harm. Perceived harm associated with cannabis has decreased among youth, potentially contributing to continued use. Meanwhile, nicotine consumption has risen lately due to the popularity of e-cigarettes and vaping devices (19.3% compared to combustible usage at 3.8% for Hawaii HS students from 2019-2023). The YRBS data highlight that a substantial percentage of adolescents who use e-cigarettes also report concurrent use of cannabis, raising concerns about poly-substance use and long-term health effects. Additionally, others have found YRBS findings to suggest that youth engaging in substance use are more likely to participate in other risky behaviors, including unprotected sexual activity and impaired driving. The analysis underscores the importance of continued public health efforts, including education campaigns, stricter regulations, and prevention programs tailored to address evolving trends in youth substance use. The increasing prevalence of vaping and shifting attitudes toward cannabis necessitate adaptive strategies to mitigate risks and promote healthier behaviors among adolescents. By leveraging YRBS data, policymakers and educators can develop targeted interventions to reduce substance use and associated risks among young populations.

Trajectories of e-cigarette and cannabis co-use and dependence among multiethnic young adults

Pallav Pokhrel (University of Hawaii at Manoa)
Kristina T. Phillips (Kaiser Permanente)
Michael M. Phillips (University of Hawaii at Manoa)
Crissy T. Kawamoto (University of Hawaii at Manoa)
Thaddeus A. Herzog (University of Hawaii at Manoa)

Background: Little is known about e-cigarette and cannabis co-use patterns among young adults over time or how dependence evolves over time compared to exclusive use. This study sought to determine patterns of exclusive and co-use of cannabis and e-cigarettes over time in terms of latent classes, and to compare the trajectories of e-cigarette and cannabis dependence across the classes.

Methods: Multiethnic [~65% Asian American, Native Hawaiian or Pacific Islander (NHPI)] young adults from Hawaii were surveyed at six timepoints in six-month intervals between mid-2021 and mid-2024. The present analyses are based on a subsample (N=1305 at baseline; M age=25.0, SD=2.2; 57% women) who reported e-cigarette and/or cannabis use in the past 30 days at least once across the six survey timepoints. Co-use was defined as any use of cannabis and e-cigarette in the past 30 days. Repeated Measures LCA was conducted to examine the patterns of e-cigarette and cannabis use and co-use over the six time-points. Latent Growth Curve (LGC) modeling was used to examine the trajectories of e-cigarette and cannabis dependence within each class. Results: A model with the following 4 latent classes (entropy=.91) best fit the data: stable moderate cannabis-only (SMC) use (prevalence: 32%), stable high e-cigarette-only (SHE) use (16%), stable high co-use (SHCo; 14%), and stable low use of either (SLE) or both substances (38%). Older age was associated with higher likelihood of membership in the SMC class compared with the SLE class. Cigarette smoking at baseline was associated with higher likelihood of membership in each of the three other classes compared with membership in the SLE class. Relative to being White, being East Asian, Filipino, or NHPI reduced the likelihood of membership in the SMC class and increased the likelihood of membership in the SHE class compared to membership in SLE class. Similarly, relative to being White, being East Asian or Filipino reduced the likelihood of membership in the SHCo class, but no significant difference was found between White and NHPI for SHCo membership. On average, individuals in the SMC class showed a significant rate of increase in cannabis dependence initially (linear slope=.14, p=.009) that tended to level off later (quadratic slope=-.02, p=.03). Similarly, on average, individuals in the SHE class showed a steep initial rate of increase in e-cigarette dependence (linear slope=.32, p<.0001), which later tended to level off (quadratic slope=-.06, p=.001). Cannabis dependence showed no significant rate of change in the SHCo class; however, e-cigarette dependence showed a steep initial increase in the class (linear slope=.53, p<.0001) followed by slower or declining rate of change later (quadratic slope =-.07, p=.01). Conclusions: These data suggest that prolonged co-use of cannabis and e-cigarettes may increase e-cigarette dependence but not necessarily cannabis dependence. Future studies may need to examine the potential role of cannabis use in increasing nicotine dependence. In addition, some demographic groups such as Whites and NHPIs have increased risk for co-use of cannabis and e-cigarettes. Prevention interventions may benefit from targeting these vulnerable groups.

Cannabis as an Economic Driver in Post-Legalization Economies: Lessons for Botswana from the U.S. and Canada

Question Jaden Ramontsho
(University of Michigan)

Cannabis legalization in the United States and Canada has demonstrated substantial economic benefits, including job creation, increased tax revenues, and industry expansion. This paper explores how Botswana could leverage similar opportunities by legalizing and regulating cannabis as part of its economic diversification efforts. Botswana's economy remains heavily reliant on diamond mining, but high youth unemployment and the need for agricultural innovation highlight the potential of cannabis as an alternative growth sector. By examining economic benefits, challenges related to social equity, and public health considerations in post-legalization economies, this study provides policy recommendations tailored to Botswana's unique socio-economic landscape. The economic potential of cannabis legalization is evident in North America, where the U.S. cannabis industry generated $13.6 billion in 2020, with projections exceeding $41 billion by 2025. Similarly, Canada's cannabis sector contributed $8.26 billion to the economy in 2020 and employed over 151,000 individuals. Legalization in Botswana could attract investment, create employment, and enhance agricultural productivity. However, for these benefits to be realized, it is crucial to establish effective regulatory structures that ensure fair access to economic opportunities, particularly for marginalized groups. Cannabis legalization has raised significant social equity concerns, as historically marginalized communities have faced disproportionate legal and economic barriers to participation in the industry. In the U.S., only 19% of cannabis businesses are owned by Black and minority entrepreneurs, and gender disparities persist, with women comprising 37% of the workforce. To address these issues, countries such as the U.S. and Canada have implemented social equity programs, such as the Cannabis Opportunity Reinvestment and Expungement (CORE) Act, which provides grants and training to underrepresented groups. Botswana could adopt similar policies to ensure that legalization benefits all segments of society, particularly women, youth, and LGBTQ+ entrepreneurs. Despite the economic opportunities, cannabis legalization poses public health challenges. Studies indicate increased cannabis use among youth in legalized states, although legalization has also reduced youth-related arrests and expulsions, benefiting marginalized students. Additionally, concerns about impaired driving and mental health risks require careful regulatory measures. Botswana must implement harm-reduction strategies, including public education campaigns, THC potency regulations, and mental health support services, to mitigate potential negative effects. For Botswana to successfully integrate cannabis into its economy, a well-structured policy framework must balance economic benefits with public health safeguards and social equity considerations. Key recommendations include implementing inclusive licensing

policies, creating targeted funding for marginalized entrepreneurs, developing responsible taxation structures, and investing in research to monitor legalization's long-term effects. By drawing lessons from the U.S. and Canada, Botswana can establish a sustainable cannabis industry that fosters economic growth while ensuring social justice and public health protection. This study underscores that cannabis legalization, if implemented thoughtfully, can serve as a catalyst for economic diversification and social equity in Botswana. However, success depends on proactive policymaking that incorporates international lessons while addressing local economic and social realities. Keywords: Cannabis legalization, economic development, comparative analysis, Botswana, job creation, regulatory framework, U.S., Canada

Are Blunt-specific Messages Effective? An Experimental Study among US Youth who Smoke or are Susceptible to Cigars

Leah M. Ranney, PhD, MA (University of North Carolina at Chapel Hill)
Rime, Jebai, PhD (Boston University)
Michael Jetsupphasuk, PhD (University of North Carolina at Chapel Hill)
Sarah D. Kowitt, PhD, MPH (University of North Carolina at Chapel Hill)
Kristen L. Jarman, MSPH(University of North Carolina at Chapel Hill)
Sonia A. Clark, MHA (University of North Carolina at Chapel Hill)
Adam O. Goldstein, MD, MPH (University of North Carolina at Chapel Hill)
James F. Thrasher, PhD, MA, MS (University of South Carolina)
Jennifer Cornacchione Ross, PhD (Boston University)

Background: The use of cigars for blunts (i.e., which are hollowed-out cigars filled with cannabis) is well documented. Various product features of cigars, such as flavors, low cost, accessibility, and perforated (easy to open) wrappers, make it easy for youth and young adults to create blunts. Blunts pose significant health risks because the combined use of tobacco and cannabis exacerbates health risks. Messaging intended to reduce cigar use among youth does not specifically address the risks of using cigars to smoke blunts. This study assessed the efficacy of a blunt-specific message compared to traditional tobacco and cigar messages.
Methods: Participants were a sample of 506 US youth (ages 15-20) recruited from April through June 2023 from Qualtrics. Eligible participants include those who reported past 30-day or ever use of little cigars or cigarillos (LCCs) or were classified as susceptible to using LCCs. We conducted a between-subjects experiment embedded into an online survey where participants were randomized to 1 of 3 messages presented in a white box with black text: 1) "Tobacco use causes oral, lip, and tongue cancer" (tobacco message); 2) "Cigar smoking can cause lung cancer and lung disease" (cigar message); or 3) "Blunts contain

nicotine and tobacco, even if you remove the tobacco filler" (blunts message). After the participants viewed the message, they reported perceived message effectiveness (PME) measured over three questions, "How much does this message: 1) make you worry about what smoking blunts will do to you?; 2) make you think smoking blunts is a bad idea?; and 3) discourage you from smoking blunts?", measured from 1, "Not at all", to 5 "A great deal". Secondary outcomes included thinking about risks using the same 5-point response scale; risk perceptions measured from 1, "No harm", to 4, "A lot of harm", self-reported learning measured from 1, "Not at all", to 7, "Very much"; and new knowledge measured "yes" or "no". We assessed differences in outcomes between conditions using linear or logistic regression models depending on whether the outcome was continuous or binary. Results: Most participants were men or boys (56.1%), White (59.3%), and heterosexual (67.8%). Past 30-day LCC use was 32%, ever LCC use was 20.6%, and 47.4% never used LCCs but were susceptible. Over half of the participants reported smoking part or all of a cigar with marijuana in it (51.9%). Participants were more likely to have learned new knowledge when they received the blunt message compared to the tobacco (OR: 3.09, 95% CI [1.88, 5.07]) or the cigar (OR: 1.93 [1.22, 3.03]) messages. Self-reported learning was also higher for the blunt message compared to the tobacco message (beta= 0.57, [0.13, 1.02]). No other differences in outcomes between conditions were statistically significant at the 0.05 level. Conclusions: Blunt-specific messaging can increase self-reported learning and knowledge about blunts containing nicotine and tobacco among youth who use cigars and cigars as blunts. Larger sample sizes and a range of messages are necessary to identify effective blunt messages that promote accurate risk perceptions for future research in this area.

The Problems Posed by the Lack of Racial Diversity in Cannabis Use Disorder Clinical Trials

Mallet R. Reid (Department of Family Medicine, Michigan State University)
Omayma Alsharaawy (Department of Family Medicine, Michigan State University)
Blake Reynolds (Department of Family Medicine, Michigan State University)
Jacqueline Cape (Department of Family Medicine, Michigan State University)
Zara Ahmed (Department of Family Medicine, Michigan State University)
Hashim Ali (Department of Family Medicine, Michigan State University)

Background: Approximately 6.8% of US adults experience cannabis use disorder (CUD) in their lifetime. Notably, the rates of CUD vary as follows: 3.0% among multiracial people, 2.3% among American Indian/Alaska Natives (AI/AN), 2.2% among Black people, 1.6% among Latines, 1.3% among White people, and 0.8% among Asians. Additionally, AI/AN, Black, and Latine people are more likely to experience moderate

and severe CUD compared to White people. Thus, several groups of people of color (POC) have a higher prevalence of CUD and endure more severe clinical presentation than White people. Importantly, people often seek therapy to address substance use disorders (SUD) like CUD. However, evidence indicates that SUD treatments are less effective for POC compared to White people. Therefore, POC must be well represented in CUD clinical trials to ensure research is generalizable and effective for all. Objective: To investigate the racial diversity of CUD behavioral health interventions. Methods: We systematically searched for interventions undertaken in the US without date restrictions. We searched PubMed and PsycINFO using key terms, following PRISMA guidelines. We uploaded 384 articles into Covidence, a systematic review data management software, and screened articles by title, abstract, and full text. We included studies of behavioral health interventions conducted in the US among adults (18 years) that only addressed CUD and were published in peer-reviewed journals. After screening, we included 12 studies in our review. Results: Since 1994, 1,933 adults have participated in behavioral intervention trials for CUD. Most participants were White (61.1%), followed by Black (11.1%), Latine (9.2%), multiracial/other (2.1%), and Asian (0.3%). Additionally, 71.1% were males. Four author groups failed to report the demographic characteristics of participants of color, yet they reported the demographic characteristics of White participants. Additionally, one group collapsed participants of color in their study as "minorities." Finally, our search suggests that 0 Indigenous adults have been included in CUD behavioral intervention trials. Conclusions: People of color are severely underincluded in CUD behavioral intervention trials despite having higher prevalence rates and more severe CUD than White people. This poses serious concerns for the generalizability and applicability of the findings for CUD research. It may mean that those who experience and suffer from CUD the most are least likely to have their needs met by research. Additionally, it impacts researchers' ability to conduct meta-analyses examining CUD treatment effectiveness by race. Further, approximately one-third of researchers reporting race/ethnicity fail to meet the National Institutes of Health and other organizations' basic guidelines regarding racial inclusion and reporting standards established since the mid-1990s. For instance, grouping all people of color as "minorities" or "other" belies researchers' ability to reach meaningful conclusions about the effects of interventions by race/ethnicity. Overall, the dominance of White men in CUD research is undeniable. It should serve as a call to action for researchers to consider equity as well as efficacy and effectiveness in their trials.

Exploring the Gateway Theory: Emotion Regulation, Cannabis Use, and Increased Risk of Alcohol and

Tobacco Initiation Following Trauma in Adolescence

Gillian Rossmann (Brown University, Rhode Island Hospital)
Shaquanna Brown (Brown University, The Miriam Hospital)
Nicole R. Nugent (Brown University, Rhode Island Hospital)
Leslie A. Brick (Brown University)

Substance use behaviors, such as cannabis, tobacco, and alcohol use, often emerge during adolescence, a critical period for cognitive and emotional development. The gateway theory suggests early cannabis use may increase the likelihood of later substance use. This theory emphasizes the importance of identifying psychological and behavioral factors that contribute to the initiation of substance use in adolescence. Emotion regulation difficulties and impairments in executive functioning are known to be heightened during this developmental stage and may play a role in shaping substance use outcomes. This study analyzes pre-existing data from a longitudinal study that investigated the development of PTSD in adolescents 13-18 years of age following admittance to the emergency department following a traumatic event. The data were collected over a nine-month period through self-report surveys and clinical diagnostic interviews. This secondary analysis examines the relationship between substance use and emotion regulation difficulties at baseline within the emergency department and at nine months (N =191). The Adolescent Alcohol and Drug Involvement Scale (AADIS) and the Difficulties in Emotion Regulation Scale (DERS) were used to assess substance use and emotion dysregulation. Substance use was categorized into those who never used and those who have used at least once in their lifetime, both baseline and month nine timepoints and analyses focused specifically on the highest endorsed substance (i.e., tobacco, alcohol, and cannabis). About thirteen percent (12.6) of youth reported lifetime tobacco use, 20.9% reported lifetime alcohol use, and 29.3% reported lifetime cannabis use at baseline, with an additional 4.2%, 7.3%, and 7.9% initiating tobacco, alcohol, and cannabis use at month nine, respectively. Both the DERS total score and subscores were analyzed with the substance use variables using logistic regression modeling. Initial findings indicated that lifetime cannabis use at baseline increased the odds of initiating tobacco ($p = 0.025$) or alcohol ($p = 0.048$) use during the nine months following hospital discharge. Greater difficulties in overall emotion regulation at baseline increased the odds of initiating cannabis use ($p = 0.012$) at 1.11. Further analysis with DERS subscores indicated that greater difficulties in goal directed behavior and impulsivity both increased odds of lifetime cannabis use ($p = 0.014$, $p = 0.007$ respectively). These findings suggest that youth who indicate higher levels of emotion regulation difficulties are more likely to report initiating cannabis use after a traumatic event. The predictive relationship between cannabis use and an increased odds of initiating alcohol

or tobacco use indicates that early cannabis use may increase susceptibility to other substances, consistent with the hypothesis of the gateway theory. Additionally, difficulties in goal directed behavior and impulsivity are significant predictors of cannabis use, suggesting that those with impaired executive functioning may be more likely to use substances. These findings emphasize the importance of considering both emotional and cognitive factors in substance use prevention, particularity during adolescence.

Using Large Language Models to Identify and Extract Medicinal Cannabis use Data from Electronic Medical Records in a US Academic Health System

Johannes Thrul (Johns Hopkins University)
Nic Dobbins (Johns Hopkins University)
Cerina Dubois (Johns Hopkins University) Clarissa Madar (Johns Hopkins University) Paul Nagy (Johns Hopkins University)
Mark Dredze (Johns Hopkins University)
Ryan Vandrey (Johns Hopkins University)

Background: Medicinal cannabis use is widespread, with over 5.5 million registered patients in state-regulated programs in the U.S. alone. Significant gaps remain regarding patient-level health outcomes associated with medicinal cannabis use, including challenges related to capturing detailed use patterns in national health surveys. Electronic medical records (EMRs) represent a potentially rich data source providing detailed clinical insights into medicinal cannabis use and associated health outcomes. However, medicinal cannabis use is inconsistently coded in EMRs. Clinical Natural Language Processing (NLP) approaches are uniquely suited to extract information from unstructured text and turn it into structured data. Hence, the objective of this study is to use NLP to extract cannabis-related information from free-text provider notes in EMRs in the Johns Hopkins Health System (JHHS). Methods: In partnership with the JHHS Data Trust, we extracted approximately 2.1 million clinical notes from over 800,000 patients. Initially, patients were selected based on frequently reported health conditions for medicinal cannabis (i.e., chronic pain, mood and anxiety disorders, autism, epilepsy) and records were identified by cannabis-related diagnostic keywords. Utilizing OpenAI's large language models (LLMs) hosted within a secure, HIPAA-compliant Azure environment, we developed and refined preprocessing routines and classification schemas through iterative examination and syntactic pattern analysis of clinical notes. Our LLM-output data schema systematically captures detailed information including cannabis use status (medicinal or recreational), registration in medical cannabis programs, cannabis use disorder diagnoses, and conditions such as cannabis hyperemesis syndrome. Additional granular data extracted will include subjective effects of

cannabis use, quantity, frequency, and route of administration, product type, cannabinoid chemotype, treatment indications, and reported health consequences. LLM-generated outputs were validated and refined using a specifically developed annotation tool and results were used to iteratively revise and improve the LLM-output data schema. Results: Our preliminary processing flagged approximately 1.5 million clinical notes with a high likelihood of documenting cannabis use. By the time of the conference, detailed structured outputs from these EMRs will have been processed through our refined LLM-based NLP approach, enabling granular analysis of cannabis use characteristics in our study population, including medicinal versus recreational use, frequency, product types, cannabinoid chemotypes, and routes of administration. This comprehensive dataset will provide robust insights into patterns of medicinal cannabis use, patient demographics, clinical contexts of use, and associated health outcomes. Conclusions: Integration of advanced NLP methods with EMRs significantly enhances our ability to capture and analyze detailed cannabis use information in clinical populations. Identification of medicinal cannabis use within EMRs supports robust longitudinal, case-control, and other observational studies, including comparison to matched non-cannabis using controls, which are essential for investigating the health effects of medicinal cannabis use. This study will provide a tool to evaluate the health impact of medicinal cannabis on a health systems scale, which can ultimately inform clinical decision-making and public health policy. The scalability of this approach is substantial through working with the Observational Health Data Sciences and Informatics (OHDSI) community, which will allow us to collaborate with over 300 data partners worldwide with over 950 million unique patients for future analyses.

Cannabis Safety Considerations and Informed Decision Making by Cancer Patients

Morgan Tisdall (Arizona State University)
Symone Griffith (Arizona State University)
Iris Balodis (McMaster University)
Deirdre Querney (City of Hamilton's Alcohol, Drug & Gambling Services)
Allison Rosenthal (Mayo Clinic)
Mahmoud Siyam (Hamilton Health Sciences)
Robert Kirchoff (Mayo Clinic)
Maxwell Leung (Arizona State University)

With the increased availability and social acceptance of cannabis, cancer patients are increasingly considering its use to alleviate cancer symptoms (i.e., cancer pain) as well as chemotherapy-related side effects. Although the perceived benefits of cannabis use in cancer populations are common, there is little discussion of cannabis safety issues specific to cancer patients in the peer-reviewed literature. To support informed symptom management with cannabis use in this patient population, we reviewed three primary types of health

risk: adverse effects and misuse, drug interactions, and product safety concerns. Cancer patients, due to compromised health, are particularly vulnerable to cardiovascular, respiratory, and psychiatric effects that could arise from short- or long-term cannabis use. Potential drug interactions with common chemotherapeutic medications may result in adverse drug events and poor health outcomes. Additionally, the inconsistent quality and labeling of cannabis products pose an additional risk due to contaminants like fungi and other microbial contaminants. Informed decision-making by cancer patients - including the "start low and go slow" dosing method to prevent supratherapeutic doses and proactive recognition of misuse patterns - and thorough communication with healthcare providers may reduce the risk of cannabis associated adverse effects. Encouraging safety-conscious behaviors, including scrutinizing product certifications and considering safer consumption methods, are also important safety recommendations. As legalization efforts for medicinal cannabis continue, the findings from this review provide the basis for cannabis safety education in cancer care, which in turn will reduce the health risk associated with cannabis use in cancer symptom management.

Cannabis use in Adults over 50: Patterns of use and Self-reported Side Effects

Kara Tsuzaki (Kaiser Permanente Hawaii Center for Integrated Health Care Research)
Kathryn L. Pedula (Hawaii Permanente Medical Group, Kaiser Permanente Hawaii)
Catherine Erickson (Kaiser Permanente Hawaii Center for Integrated Health Care Research)
Kristina T. Phillips (Kaiser Permanente Hawaii Center for Integrated Health Care Research, Kaiser Permanente Bernard J. Tyson School of Medicine)

Introduction: Cannabis use among adults aged 50 and older has increased despite this population's heightened vulnerability for health-related conditions and use of medications for chronic illnesses. As cannabis is legalized across the U.S., corresponding changes in societal perceptions surrounding cannabis use have contributed to this rising trend. There is a need to better understand older adults' patterns of cannabis use and unintended effects to decrease susceptibility for harm. The current study reports on cannabis-related side effects and explores the relationship between side effects, form of cannabis used, and symptoms of cannabis use disorder (CUD) among adults aged 50 and older who use THC-based cannabis products. Method: Participants were recruited using targeted email outreach to patients aged 50 and older. Patients reporting recent cannabis use within the past 30 days via an online screener were invited to complete a comprehensive online survey that included questions assessing demographics, cannabis use patterns (e.g., form, method of ingestion, quantity), cannabis-related side effects, and symptoms of CUD

using the Cannabis Use Disorders Identification Test-Revised (CUDIT-R). Results: Participants (N = 342) were 42.4% female, with an average age of 65.8 (SD = 8.7), and predominantly White (68.4%), Native Hawaiian or Pacific Islander (NHPI; 12.9%), or Asian (8.2%). Overall, 84.1% of participants reported at least one side effect out of 22 possible, with an average of 3.1 (SD = 2.3). The most commonly reported side effects included dry mouth (74.2%), dry eyes (37.1%), and forgetfulness (42.3%). Of note, many participants experienced psychological symptoms such as anxiety (26.6%) and paranoia (23.3%), and physical symptoms such as dizziness (28.1%) and unsteadiness (27.6%). Participants who endorsed smoking as their primary method of cannabis ingestion (n=192) were more likely to report having at least one side effect compared to those using other methods (p = .0004). Significantly greater numbers of participants who smoked reported experiencing dry mouth (p = .005), breathing problems (p = .004), feeling agitated/upset (p =.016), and feeling forgetful (p = .021). The distribution of CUDIT-R scores were examined in quartiles; as CUDIT-R scores increased, the number of side effects also increased in a dose-response manner (p=.002). Side effects did not differ with varying amounts of cannabis quantity. Multiple logistic and linear regression models tested the impact of demographics, cannabis frequency/patterns, other substance co-use, and CUDIT-R scores on any/number of endorsed side effects. Younger age (p = .0002) and greater CUDIT-R score (p < .0001) were associated with a greater number of side effects. Smoking cannabis (OR = 3.99, p < .0001) and greater CUDIT-R score (OR = 1.1, p = .05) were associated with at least one side effect. Conclusions: Our findings suggest that older adults who use cannabis are experiencing cannabis-related problems and side effects. More research is needed to better understand the impact of cannabis on older adult health. Because older adults are more susceptible to various health conditions and cognitive decline due to the natural aging process, it is imperative to develop targeted education and harm reduction approaches specific to this population.

Patient-physician Communication about Cannabis: An Initial Exploration of Reasons for Non-disclosure in Adults Over 50

Kara Tsuzaki (Kaiser Permanente Hawaii Center for Integrated Health Care Research)
Kathryn L. Pedula (Hawaii Permanente Medical Group, Kaiser Permanente Hawaii)
Catherine Erickson (Kaiser Permanente Hawaii Center for Integrated Health Care Research)
Kristina T. Phillips (Kaiser Permanente Hawaii Center for Integrated Health Care Research, Kaiser Permanente Bernard J. Tyson School of Medicine)

Introduction: The increasing prevalence of cannabis use in adults over 50 raises concerns about open patient-physician communication, particularly as this population ages

and experiences medical issues that could be impacted by cannabis use. This presentation aims to assess 1) patient disclosure of cannabis use to their physician, 2) reasons for not disclosing cannabis use, and 3) patient characteristics associated with non-disclosure. Methods: Patients over 50 were recruited from an integrated healthcare system in a medical cannabis state and screened online for past month cannabis use. Eligible participants were invited to complete a comprehensive online survey covering cannabis use (including frequency, methods of ingestion, and problem cannabis use or CUDIT-R score), discussions with their physician about cannabis use, and-if they had not disclosed their use-reasons for non-disclosure. Two independent raters coded these open-ended responses, agreeing on discrepant codes. Results: Participants (N=367) were 43% female, with an average age of 65.9 (SD=8.6), and predominantly White (67.9%), Native Hawaiian or Pacific Islander (12.3%), or Asian (9.3%). Almost half of the sample (47%) was retired. Participants reported using a range of cannabis products; however, the majority (59.9%) reported primarily using THC-based flower, followed by edibles (16.7%). Most participants (56.7%) reported smoking as their primary method of ingestion, followed by oral consumption (22%). Participants used cannabis for a mean of 18.7 days (SD=11.5) in the past 30 days. Of the full sample, 333 participants (91%) reported having a regular physician; of those, 179 (53.8%) disclosed their cannabis use to their provider. Demographic variables were not associated with disclosure, but those who disclosed their use had a higher CUDIT-R score (M=8.3, SD=4.7) compared to those who did not (M=6.5, SD=4.2; p=.0007). Of the 154 participants who did not disclose their use, 54.6% either agreed or strongly agreed that their physician would judge them, 40.9% wondered if it would affect their medical treatment, and 34.6% were concerned that it might affect medications prescribed to them. Participants provided 88 additional open-ended reasons with 20 discrepant codes requiring consensus explaining why they had not disclosed their use. Five themes emerged: 1) Legality and fear of consequences (n=22), 2) Irrelevance or didn't feel it was necessary (n=31), 3) Never had an opportunity to discuss (n=21), 4) Privacy and reluctance for cannabis to be specified in their medical record (n=15), and 5) Other (n=26). Conclusion: Patient acknowledgement of cannabis use among this sample of older adults in a state without legal recreational cannabis highlights underlying reasons for non-disclosure that point to the need for improved patient-provider communication. Patients who endorsed greater cannabis problems were more likely to disclose their use, which may be associated with a need for more cannabis-related medical care. Overall, participants expressed some hesitancy to disclose and fear of judgement. Further research is needed to understand the nuances of patient-physician communication to promote open discussion.

Cannabinoid Neuroprocessing and Retina: Disruptions, Dysfunctions, and Impairment of ipRGC

Denise A. Valenti (IMMAD LLC)
Holly Kailher (IMMAD LLC)

Purpose: Cannabinoids and marijuana in particular have been identified as disrupting dopaminergic neuroprocessing. Among these are the retinal and visual pathways. The goal of this presentation is to relate the latest research and resulting hypothesis related to the marijuana induced disruptions of the retina and subsequent impairment of visual functions. The emphasis will be on those functions and visual responses that are essential to the task of driving. Methods: The data and information were derived from the laboratory and field work of Impairment Measurement Marijuana and Driving (IMMAD) through National Institute of Justice funded research; 15PNIJ-22-GG-04417-RESS and literature reviews undertaken to further validate research findings. The research was performed under an IRB approved protocol that allowed for opportunistic dosing of healthy volunteers under the age of forty. Opportunistic dosing is when a volunteer consumes their own legal adult use product. IMMAD's protocol had the volunteer come to the laboratory for consent process, drug screening, questionnaires and undosed research testing. Volunteers informed staff when and where they would be consuming their own legal adult use products and volunteers were then brought into the lab by shared ride. The only criteria for the products was it must be inhaled and no dabbing products. We measured retinal function using a virtual reality goggle system (for which IMMAD holds the marijuana utility patent) displaying seventeen small ten degree striped squares across the central forty degrees of visual field, one at a time and each eye separately. The stripes were of fixed temporal flip but variable contrast. The volunteer pressed a Bluetooth button each time they saw the stripes. Results: IMMAD laboratory identified disruptions and dysfunctions in retinal processing that correlates in location to the dopaminergic dependent intrinsically photosensitive retinal ganglion cells. Data are being further analyzed to determine how significant these disruptions and dysfunctions are in contributing to impairment to drive. Conclusions: Undertaking research on a drug that is Schedule I presents significant barriers. Further research is necessary with fully controlled dosing using precisely controlled cannabis and marijuana products. An example is the contribution nicotine makes to retinal neuroprocessing. This is a variable when inhaled blunts (tobacco wrapped marijuana) products are used. Better consistency and control is available if volunteers are provided with products.

Development of the Cannabis Use Questionnaire (CUQ): A Comprehensive Measure of Cannabis use Behavior

Ryan Vandrey (Johns Hopkins University)
Cerina Dubois (Johns Hopkins University)

Clarissa Madar (Johns Hopkins University) Johannes Thrul (Johns Hopkins University)
Justin Strickland (Johns Hopkins University)
Nicholas Schlienz (Roswell Park Comprehensive Cancer Center)
Alan Budney (Dartmouth College)
Heather Jackson (Realm of Caring)
Marcel Bonn-Miller (Charlotte's Web)

Background: The legalization of cannabis for therapeutic and non-therapeutic purposes has resulted in a substantial increase in the diversity of cannabis-based products available for retail sale. These products vary by intended route of administration, formulation, chemotype and dose. Laboratory research shows that these variables impact pharmacokinetics and pharmacodynamics. A consequence of the evolution of this industry is that there are no longer valid assessments of cannabis use behavior that capture the variety of marketed products. To meet this need, the Cannabis Use Questionnaire (CUQ) was developed as a comprehensive measure of cannabis use behavior. Methods: Cannabis product surveillance was conducted for online and retail marketplaces to establish product categories, which included differentiation by route of administration, formulation, and chemotype. A structure was developed to minimize participant burden using branching logic and the questionnaire programmed into both REDCap and Qualtrics platforms. Units of measure were determined for each product type based on intended route of administration and package content labeling to quantify consumption for each retail category. The survey was first deployed in an observational study and feedback obtained from participants using a variety of cannabis products for medicinal purposes. The measure was then refined and is currently undergoing test-retest validation with volunteers being administered the questionnaire across 2 time points, separated by 1 week. An algorithm is also being developed from controlled human laboratory data to quantify inhaled THC and CBD exposure based upon puff topography data. Results: Participants report which of 9 distinct product categories a given cannabis product they use falls: flower, e-liquid, concentrates, oils/tinctures, edibles, topicals, suppositories, pharmaceuticals, or they can specify another unlisted product type. Data on predominant chemical composition of the product (e.g., THC-dominant, CBD-dominant, balanced THC/CBD, or minor cannabinoid-dominant), as well as, for inhaled products, whether the product was smoked or vaporized is reported. The dose of THC, CBD, and/or the dominant minor cannabinoid is also reported. Analyses of test-retest results is pending completion of ongoing data collection and is expected well before the conference. Conclusions: The CUQ is the most comprehensive tool for quantitatively measuring cannabis use behavior and can be utilized in a broad array of research contexts. Branching logic is used to minimize the burden on the participant. The authors are willing to share the REDCap or Qualtrics program with

any researcher interested in using the measure. Widespread adoption of this tool will help integration and comparison of data from different sources.

Association between Plasma THC/CBD and Chronic Pain Outcomes: Early Results from a Prospective Cohort of Older Adults with Chronic Musculoskeletal Pain

Yan Wang (University of Florida)
Kimberly T. Sibille (University of Florida)
Zhigang Li (University of Florida)
Rene Przkora (University of Florida)
Siegfried O.F. Schmidt (University of Florida)
Margaret C. Lo (University of Florida)
Jost Klawitter (University of Colorado)
Robert L. Cook (University of Florida)

Background: Quantifying cannabis use via self-report is often challenging given the diversity of products (e.g., routes of administration, cannabinoids profile). Blood tests for cannabinoids and their metabolites provide an objective measure of cannabis use that can enhance research rigor. This study leverages plasma cannabinoids/metabolites test over time in a prospective cohort to examine the long-term effects of medical cannabis (MC) on older adults with chronic pain. Method: We analyzed data from 97 participants (mean age = 65 9.4, 66% female) as part of an ongoing prospective cohort that recruits and follows older adults (50 years or older) with chronic pain for one year, as some initiate MC (MC group) and others do not (control group) with a planned enrollment ratio at 3:1. Blood samples were collected at baseline, 3, 6, 9, and 12 months to test for 17 cannabinoids and cannabinoid metabolites. At each time point, self-reported chronic pain severity was assessed by the Brief Pain Inventory (BPI), and pain interference was measured by the 4-item PROMIS Pain Interference short form. Available data (collected so far as data collection is still ongoing) were analyzed to examine whether the presence of plasma THC/CBD and related metabolites is associated with lower chronic pain severity and interference at 3-, 6-, 9- and 12-month follow-ups. Results: Based on completed study visits, 35 out of 97 participants tested positive for plasma THC/CBD or related metabolites at 3 months, 22/72 tested positive at 6 months, 10/53 at 9 months, and 10/49 at 12 months (total n differed because not everyone finished all study visits yet). Those who initiated MC use had slightly higher baseline pain severity (5.83 3.22 vs. 5.38 3.76) and interference (63.8 7.3 vs. 61.6 7.2) than those who did not use MC. The presence of THC and its metabolites in plasma was associated with lower self-reported "worst pain", "least pain", and "average pain" scores at 3, 6, 9, and 12 months, and lower pain interference at 12 months (58.3 9.3 for THC positive group vs. 61.1 8.2 for THC negative group, $p < .01$). However, the presence of CBD and its metabolites in plasma was not associated with either lower pain severity or interference at all time points. In terms of reductions in pain severity and interference, the presence

of plasma THC/metabolites trended towards greater reduction in overall BPI average score (1.85 1.62 for THC positive group vs. 0.51 2.61 for THC negative group, p = .062) and reduction in pain interference score (9.63 9.60 vs. 0.87 7.54, p < .01) at 12-month follow-up. Conclusions: Although sample sizes are small and findings are preliminary, data suggest that consuming MC products containing THC reduce pain severity and interference among older adults, while CBD didn't show a direct benefit on these outcomes. More research leveraging blood test as an objective measure of cannabis use is needed to further investigate the differentiating effects of THC, CBD, and other cannabinoids on various health outcomes.

Early Insights from the Non-therapeutic Research on Cannabis Framework in Canada

Raymond Yang (Health Canada)
Sophie-Anne Lamour (Health Canada)
Yasmina Medjamia (Health Canada)
Joseph Antony (Health Canada)
Austin Mayers
Hanan Abramovici

Since December 2022, Canadian researchers wanting to conduct clinical research studies for non-therapeutic purposes with legally available cannabis products regulated under the Cannabis Act can apply for a cannabis research licence under the Non-Therapeutic Research on Cannabis (NTRC) framework. Health Canada implemented this risk-based framework to inform public health and public safety measures, facilitate public education, and inform and support policy decisions. The objective of this work is to examine the types of NTRC studies that have been submitted by cannabis research licence applicants between December 2022 and December 2024. Studies under the NTRC framework are classified into three risk categories: Category 1 (lower risk) for consumer preference studies; Category 2 (medium risk) for studies involving healthy participants where the mode of consumption and amount of cannabis consumed are similar to their usual consumption habits; and Category 3 (higher risk) for studies involving additional risk factors such as participants with comorbidities, higher-doses of cannabis, novel cannabinoids, or combining cannabis with other substances or health products. Application requirements vary based on the risk category: the higher the risk category, the more information required to be submitted to Health Canada for review. Applicants must submit two to three documents for scientific review depending on the risk category. For Category 2 and 3 studies, applicants are required to submit the cannabis research and evidence dossier (CRED), which documents safety evidence drawn from peer-reviewed literature, and the research protocol, which outlines the study objectives, methodology, participant eligibility, dosing, and safety measures. For Category 3 studies, they must also submit the informed consent form(s), which explains the risks of participating in a study to the participants. Additionally, the

cannabis used in the study is required to meet good production practices (GPP) as mandated by the Cannabis Act and its Regulations. From December 2022 to December 2024, Health Canada received a total of 126 applications, including 104 Category 1, 4 Category 2, and 18 Category 3. Research topics for Category 2 and 3 studies were diverse and included studies on smoking topography, cognitive function, impacts on driving, and the safety of high-potency THC products. The participants were healthy, with about two-thirds being occasional cannabis consumers, and the remaining third being regular cannabis consumers. Cannabis was administered through inhalation (vaping and smoking) in 13 studies, and orally in 9 studies. The cannabinoids under study included THC (6), CBD (3), and their combinations (13). Additionally, one study included THC, CBD, CBG, and CBN. All the Category 1 applications were from industry, whereas most applications (16) for Category 2 and 3 studies came from academic institutions. The NTRC framework opens a new and important path to conduct critically needed research to gather evidence on the effects and risks associated with the use of cannabis products by Canadians for non-therapeutic purposes. This evidence will help further our understanding of the public health and public safety impacts of cannabis legalization and regulation in Canada, help inform lower-risk use, enhance public education and awareness and help inform policy decisions.

SYMPOSIA

Symposium Title:
Assessing the Relative Reinforcing Value of Cannabis among Dispensary Patrons using Novel Behavioral Economic Tools

Chair: Elizabeth R. Aston (Brown University School of Public Health)
Discussant: James MacKillop (McMaster University)

Evolving cannabis legality has yielded significant increases in cannabis accessibility and purchase. This has resulted in availability of novel cannabis formulations likely accompanied by changes in normative perceptions of peer cannabis use. Behavioral economic approaches to the study of cannabis use integrate tools from economics and psychology to explain the degree to which one values cannabis relative to other reinforcers (i.e., cannabis demand). Measurement of demand for cannabis has been highly effective in the detection of excessive substance valuation, and indices of demand for cannabis are robust predictors of cannabis misuse, consequences, and cannabis use disorder. These presentations will examine cannabis demand among those who use cannabis using novel measures that have been developed in response to the changing landscape of cannabis availability, use, and purchase. The presenters will comment on public health implications of cannabis demand assessment and the importance of tailoring behavioral economic measures in the face of continuously developing policy. Dr. Conner will present data on product

purchasing and cannabis demand collected from cannabis dispensary patrons. Dr. Aston will present results from work validating a novel behavioral economic purchase task for high potency concentrates among those with experience using concentrates. Dr. Prince will present findings from work using a novel marijuana purchase task designed to assess normative perceptions of cannabis demand among recreational dispensary patrons. Dr. MacKillop will synthesize the results from these investigations by discussing the promise of adapting marijuana purchase tasks to evolve with the transforming cannabis environment in the context of fluctuating cannabis policy.

Talk 1:

Testing the Marijuana Purchase Task in the Real World: Assessing its Predictive Validity and Utility in Identifying Problematic Cannabis Use among Dispensary Patrons

Bradley T. Conner (Colorado State University)
Elizabeth R. Aston (Brown University School of Public Health)
Mark A. Prince (University of Southern California)

Background: A drug's relative reinforcing value is a powerful determinant of its misuse. Relative drug value (i.e., demand) can be measured via hypothetical measures known as behavioral economic purchase tasks, wherein respondents indicate how much drug they would purchase and consume across escalating prices. The current studies focused on the marijuana purchase task (MPT), developed to measure the reinforcing nature of cannabis. Little research to date has tested the external validity and utility of the MPT when administered outside of the lab. Method: The goal of this study was to determine whether the MPT, administered in a real-world setting by collecting data from participants recruited while standing in line in a legal recreational cannabis dispensary in Colorado, was predictive of cannabis use and symptoms of cannabis use disorder (CUD). Discriminate validity was tested via examining whether indices of cannabis demand predicted alcohol use. Data came from 140 individuals (Age M = 30.6 SD = 11.5, women = 50.7%, self-reported race White = 91.9%, 16.4% Hispanic/ Latine) who reported recent cannabis use. Upon dispensary exit, participants provided information on demographics, cannabis use history, and cannabis products purchased that day, and completed self-report questionnaires including the MPT and the Self-Reported Symptoms of Cannabis Use Disorder questionnaire. Results: With respect to products purchased, 29.1% of the sample reported purchasing concentrated cannabis products (e.g., vape cartridge, wax, shatter), 18.6% reported purchasing edible products, and 67.1% reported purchasing flower products (product purchases were not mutually exclusive). Five indices of cannabis demand were obtained from the MPT: intensity - consumption at zero cost; Omax - maximum expenditure on cannabis; Pmax - price associated with Omax ; breakpoint - price suppressing consumption of cannabis to zero; and elasticity - the

rate of consumption decline with increasing cost. Pmax significantly positively and elasticity significantly negatively predicted number of days in the past 30 that participants reported using cannabis ($p < 0.05$ & 0.001, respectively). Intensity significantly positively predicted estimated grams of cannabis used in a typical cannabis use week ($p < 0.001$). Omax and breakpoint significantly positively predicted CUD symptom count ($p < 0.001$ & 0.05, respectively). Cannabis demand indices were not significantly associated with past 30-day alcohol use. Conclusions: These findings indicate that the MPT administered in real-world settings has both predictive and discriminate validity and may be a good assessment tool to determine who is at most risk for developing CUD symptoms. Moreover, this is the first study to assess cannabis demand among those reporting recent dispensary purchases. Future research is needed to replicate these findings in other settings and among other samples, specifically those who endorse cannabis use but do not obtain cannabis from a dispensary (e.g., growers, those who purchase from unregulated sources). Importantly, findings from the present investigation indicate that the MPT may be a valuable tool to use in the field to aid in determining those at greatest risk for cannabis misuse and progression to CUD.

Talk 2:

Initial Validation of the High Potency Concentrate Purchase Task

Elizabeth R. Aston (Brown University School of Public Health)
Mark A. Prince (University of Southern California)
Bradley T. Conner (Colorado State University)

Background: Evolving cannabis legalization has dramatically altered the landscape of cannabis use in the United States. While flower remains the most commonly used formulation, those who use cannabis often experiment with and adopt use of other formulations, including high potency concentrated cannabis products which contain extremely high THC levels. The relative value (demand) one places on cannabis is a key indicator of risk for misuse and cannabis use disorder (CUD) escalation. Cannabis demand can be assessed via a marijuana purchase task (MPT), which reflects the interplay between cannabis price and its consumption. Traditional single-commodity MPTs were designed to assess demand for flower and thus do not permit assessment of demand for other formulations. This study assessed high potency concentrate demand using a novel high potency concentrate purchase task (HPCPT). Methods: Participants were recruited outside a retail cannabis dispensary in Colorado. Upon dispensary exit, participants provided demographic and cannabis use information, and completed the HPCPT, MPT, Marijuana Consequences Questionnaire, Positive Outcomes of Cannabis Use Scale, and Self-Reported Symptoms of Cannabis Use Disorder. Participants who endorsed concentrate experience (n = 93; 50% female, mean [sd] age = 36 [13], mean [sd] past-month cannabis use days = 28 [7]) were

included in analyses. Five demand indices were obtained from the HPCPT: intensity (consumption at zero cost), Omax (maximum expenditure), Pmax (price associated with Omax), and breakpoint (price suppressing demand to zero). Bivariate correlations were run between HPCPT and MPT demand indices to assess convergent validity. Subsequent correlations were run among concentrate demand indices and cannabis use outcomes. Divergent validity was examined by dividing the sample according to self-reported CUD symptoms and examining concentrate demand as a function of group. Results: For participants with complete HPCPT and MPT data, concentrate demand indices were significantly correlated with their flower demand index counterparts (rs = .313-.821, ps < .01). Omax (r = -.259, p = .012), Pmax (r = -.350, p < .001), and breakpoint (r = -.243, p = .019) were significantly related to marijuana use days. Intensity was significantly related to self-reported CUD symptoms (r = .217, p = .036) and positive cannabis-related consequences (r = .295, p = .004). No concentrate demand indices were associated with negative consequences. Participants with more CUD symptoms exhibited signicantly greater breakpoint (mean = 63.82, SEM = 6.25) and Pmax (mean = 38.55, SEM = 5.30) than participants with fewer self-reported CUD symptoms (mean = 41.79, SEM = 4.99, p < .001; mean = 28.60, SEM = 4.50, p = .031). Conclusions: These results provide initial support for convergent and divergent validity of the HPCPT, demonstrating its sensitivity to demand for concentrates as a function of increasing cost, and its ability to differentiate between those with varying degrees of self-reported CUD symptoms. Associations between concentrate demand and negative cannabis-related consequences were not observed, however, negative cannabis consequence measures were not developed to assess concentrate-specific consequences. Future work can further improve upon this promising measure by using qualitative methods to tailor task components to the nuances of cannabis concentrates.

Talk 3:

Normative Perceptions of Peer Cannabis Demand Characteristics

Mark A. Prince (University of Southern California)
Bradley T. Conner (Colorado State University)
Elizabeth R. Aston (Brown University School of Public Health)

Background: Marijuana purchase tasks (MPTs) are hypothetical measures that offer an efficient way to assess cannabis' relative reinforcing value (i.e., demand). Such tasks ask participants to report on the amount of cannabis they would purchase across a range of prices. Data from the MPT can be used to generate a set of demand indices including intensity (i.e., amount of cannabis one would consume if it were free), Omax (i.e., the maximum amount one is willing to pay for cannabis), Pmax (i.e., the price associated with Omax), breakpoint (i.e., price at which one is no longer willing to purchase cannabis), and elasticity (i.e., rate of decline in cannabis purchase with increasing

cost). Two open questions concern whether individuals assume that their peers' cannabis purchasing behavior is similar to their own, and whether one's own motivations for using cannabis are associated with their perceptions of other's cannabis demand. Methods: Participants were recruited while standing in line in a legal recreational cannabis dispensary in Colorado; those with valid cannabis demand data (n = 137) were included in analyses. This was the first study to adapt the MPT to ask participants: "How much marijuana do you think a typical user would purchase and use at different price levels?" In addition to this normative perception-based purchase task, participants were also asked to complete the MPT about their own purchasing behavior, as well as the Marijuana Motives Measure. We hypothesized that those with conformity motives would be more likely to believe others' cannabis purchasing behavior to be similar to their own. Results: With the exception of Omax, participants' own demand indices were nearly identical to demand indices generated from their perceptions of others' purchasing behavior. Participants perception of others' cannabis demand generated higher Omax values than their own Omax values (Omax-personal = 135.19, Omax-other = 178.11). Correlations between personal demand indices and perceptions of others' demand indices were large and statistically significant (Omax r = .776, Pmax r = .671, breakpoint r = .752, intensity r = .731, elasticity r = .899). In addition, social motives were associated with normative perceptions of Omax (r = .221), and conformity motives were associated with normative perceptions of all demand indices with the exception of elasticity (Omax r = .471, Pmax r = .360, breakpoint r = .228, intensity r = .200, elasticity r = -.049). Conclusions: Based on the focus theory of normative conduct, it is likely that participants' beliefs about others' purchasing behavior influenced their own purchasing behavior. The higher Omax generated from perceptions of other's purchasing behavior suggests that participants believe others would spend more on cannabis than they would themselves. Subsequent work should aim to collect a large normative sample of cannabis demand data to determine whether purchasing behavior normative beliefs are exaggerated in a similar way to normative perceptions about others' substance use behavior. If the same exaggerated normative beliefs exist, normative re-education interventions could be developed to correct misperceptions potentially leading to safer buying practices.

Symposium Title:
What are the implications of cannabis intentions? Exploring planned and unplanned use
Chair: Lindy K. Howe (Brown University)
Discussant: Rachel L. Gunn (Brown University)

Exceeding one's planned amount of substance use may be an indicator of impaired control, a key criterion in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) for substance use disorders. As such,

examining the relationship between planned and unplanned use and related outcomes is essential. Explored primarily in the context of alcohol thus far, there remains limited understanding of how planned versus unplanned use, and related constructs, operates with cannabis. This symposium will include four ecological momentary assessment (EMA) studies aimed at addressing this gap. Nicolle Fox (Clinical Psychology PhD Student, York University) will present findings on the longitudinal associations between measures of impaired control over cannabis and daily experiences of unplanned cannabis use and difficulty limiting cannabis use, highlighting how these predict cannabis use and negative consequences at the day level. Alexander Sokolovsky (Assistant Professor, Brown University) will present data on the predictors and consequences of forgoing planned cannabis use in a sample of individuals that use both alcohol and cannabis. Holly Boyle (Assistant Professor, Yale University) will present data from a daily survey study of young adults examining the relationship between day-level cannabis use intentions and willingness and use (i.e., hours high), subjective high, and related consequences. Lindy Howe (Postdoctoral Fellow, Brown University) will present findings of intentions in predicting perinatal cannabis use and describe preliminary data on motivations behind planned and unplanned use. This symposium deepens our understanding of how intentions shape cannabis use across a variety of populations and could potentially inform future interventions.

Talk 1:

Understanding Impaired Control over Cannabis in Daily Life: Unplanned Use versus Difficulty Limiting Use

Nicolle Fox (York University)
Christian S. Hendershot (University of Southern California)
Kyra N. Farrelly (York University)
Annabelle Moore (York University)
Jeffrey D. Wardell (York University; Institute for Mental Health Policy Research; University of Toronto)

Background: Impaired control (IC) over cannabis, a feature of cannabis use disorder involving failed attempts to limit use, is linked with heavier consumption and negative consequences. There is limited research on IC over cannabis, and no studies have examined whether elevated IC is associated with perceived difficulty limiting cannabis use in daily life or whether this proximally predicts greater use and consequences. Further, IC may be a risk factor for unplanned cannabis use (i.e., using without prior intention), which could partially explain the link between elevated IC and increased cannabis use and consequences. This study investigated whether unplanned cannabis use and perceived difficulty limiting cannabis assessed at the day level mediated associations between IC over cannabis and cannabis use and consequences over one year. Methods: Participants were 133 young adults (ages 19-24; 65% female) from a larger Ecological Momentary Assessment (EMA) study of alcohol

and cannabis co-use. Participants completed 21 days of EMA surveys in three bursts (i.e., baseline, 6-month, 12-month; n=2115 total observations). Prior to each burst, participants completed a measure assessing attempts to control cannabis during the past 6 months and perceived IC over cannabis (Taguba et al., 2022). Participants then completed daily morning surveys (89-92% compliance across bursts) assessing their intention to use cannabis that day along with their previous days' cannabis use (forms and grams of flower). Unplanned use was operationalized as using on days when no intention to use was indicated on the preceding morning survey (26% of use days). Items assessing difficulty limiting cannabis use the prior day (endorsed on 5% of use days), and acute negative cannabis consequences were also included. Results: A multilevel structural equation model with cannabis use days (level 1) nested within burst (level 2) nested within participants (level 3) revealed significant day-level relationships between difficulty limiting cannabis (but not unplanned cannabis use) and both increased cannabis use [95%CI: 0.041, 0.150] and greater acute negative consequences [95%CI: 0.198, 0.542]. At the burst level, within-person increases in attempts to control cannabis use over the past 6 months were associated with more unplanned cannabis use days during the ensuing EMA burst [95%CI: 0.018, 0.107], and within-person increases in perceived IC over cannabis predicted greater endorsement of difficulty limiting cannabis on subsequent daily surveys [95%CI: 0.032, 0.132]. Increases in perceived IC reported prior to a given EMA burst were indirectly linked to increased use and consequences during that burst, mediated by difficulty limiting use during the burst (95% CIs did not contain zero). Conclusion: Perceived IC over cannabis predicted greater use and consequences in the daily lives of young adults, mediated by greater endorsement of difficulty limiting cannabis on daily surveys. More attempts to control cannabis use were linked to more unplanned use, but unplanned use was not associated with heavier use and consequences at the daily level. Findings suggest that changes in IC over one year are linked to changes in daily cannabis use patterns and consequences, and point to strategies for improving control over cannabis use as a future research direction.

Talk 2:

Forgoing Planned Cannabis use: Daily Correlates and Alcohol use Outcomes of Cannabis Non-use when use was Planned in a Heavy Drinking Young Adult Sample

Alexander W. Sokolovsky (Brown University)
Lindy K. Howe (Brown University)
Rachel L. Gunn (Brown University)

Background: Intentions are a cross-cutting antecedent of behavior across theoretical models of health behavior, including models of substance use. While research has examined the links between planned cannabis use and cannabis-related outcomes at the person level in cross-sectional and

longitudinal observational or treatment outcome studies, research examining the daily correlates of cannabis use intentions remains limited. Early work has found that daily cannabis use intentions (i.e., planned cannabis use) are associated with spending a greater number of hours high, although not with increased negative consequences. Critically, with the increasing legalization of cannabis use, there has also been a widespread increase in the co-use of alcohol and cannabis. Research on such co-use has found that cannabis can act both as a substitute and as a complement to alcohol, with different findings observed for different research questions. In light of this complexity and as substance use intentions are often a prime target for intervention, especially in just-in-time-adaptive intervention (JITAI), understanding the impact of forgoing planned cannabis use and identifying predictors of such non-use is critical in determining whether cannabis use intentions could be targeted to indirectly reduce daily alcohol use and what mechanisms may facilitate such intervention. In this secondary analysis, we examine the antecedents and outcomes of forgoing planned cannabis use in a sample of young adults who drink heavily. Methods. Young adults (N=107; Mage=23.3; 55% female) completed a baseline survey and completed 28 days of ecological momentary assessment (EMA) comprising random, substance, and morning surveys. To examine antecedents of forgoing planned cannabis use, we fit generalized linear mixed models regressing forgoing (ref: enacting) planned cannabis use onto prior-day positive and negative alcohol and cannabis use consequences and morning alcohol and cannabis craving. To examine the outcomes of forgoing planned cannabis use, we fit linear mixed effects models regressing total number of drinks and positive and negative alcohol consequences onto forgoing (ref: enacting) planned cannabis use. All models covaried age, sex, and everyday discrimination experiences. Results. Participants indicated planned cannabis use on 1,458 days, of which they forwent use on 144 days (9.9%). None of the examined antecedents (prior day positive and negative alcohol and cannabis consequences, morning alcohol and cannabis craving) were significantly associated with forgoing (versus enacting) planned cannabis use that day. Forgoing planned cannabis use was associated with consuming significantly fewer total drinks (Est = -1.18, SE = 0.31, $p < .001$) on a given day but was not associated with fewer positive or negative alcohol consequences. Conclusion. Although this preliminary examination did not identify significant antecedents of forgoing planned cannabis use, we did observe a significant protective effect of forgoing planned cannabis use on daily alcohol consumption. Targeting planned cannabis use in JITAI could serve to indirectly reduce alcohol use outcomes among heavy-using young adults. Future research in this and other studies could examine daily social, contextual, and behavioral patterns that may better predict forgoing planned cannabis use and act

as mechanisms to reduce the enactment of daily cannabis use intentions.

Talk 3:

Daily Cannabis use Intentions and Willingness: Implications for use, Subjective High, and Related Outcomes

Holly K. Boyle PhD (Yale School of Medicine)
Oksana K. Ellison PhD (Yale School of Medicine)
Jennifer E. Merrill, PhD (Brown University)

Expanding legalization of recreational cannabis use in the US has been associated with increased prevalence of use and cannabis use disorder in young adults, but the decision-making process of engaging in cannabis use is understudied. The Prototype Willingness Model suggests that level of intentions (i.e., plans) and willingness (i.e., one's openness to engage in a behavior if an opportunity presents itself) are both important predictors of substance use behavior. We tested whether the level of intention (i.e., plans) for cannabis use predicted (a) number of hours high, (b) subjective high, (c) one's evaluation of that high, and (d) cannabis-related consequences at the day-level. On cannabis use days when young adults did not have clear plans to use cannabis, we also explored whether increased willingness predicted cannabis use behavior. Eighty-four young adults (ages 18-29) who reported simultaneous alcohol and cannabis use (59% female, 66% White) completed 30 days of daily surveys. Each day, participants reported whether they intended to use cannabis (0 strongly disagree - 4 strongly agree). If they did not have clear plans (i.e., did not respond strongly agree), they were asked to report their willingness to use cannabis (0 strongly disagree - 4 strongly agree). They also reported substance use, number of hours high, consequences (16 positive and 21 negative consequences), subjective level of high (0 not at all - 6 extremely), and evaluation of the high (i.e., how enjoyable/pleasant was that - 0 not at all - 6 extremely). Across 647 cannabis days, 14.5% were unplanned. Participants strongly agreed to having intentions to engage in cannabis use on 17.6% of days. The average level of intentions to engage in cannabis use was 2.08 (SD=1.29). On days young adults did not have clear plans to use cannabis, their average level of willingness to use cannabis was 2.41 (SD=1.19). Multilevel models controlling for sex, age, weekend vs. weekday, day in study (1-30), and alcohol use revealed increased number of hours high on days when participants had increased intentions to use cannabis (ERR=1.06, 95% [CI=1.01-1.11]). Days of increased intentions predicted increased subjective high (ERR=1.04, 95% [CI=1.02-1.08]), but not one's evaluation of that high. On days young adults did not have clear plans to use cannabis, increased willingness to use cannabis did not predict number of hours high, but did predict increased subjective high (ERR=1.03, 95% [CI=1.00-1.07]) and more positive evaluation of that high (ERR=1.05, 95% [CI=1.03-1.07]). Both intentions

and willingness were unrelated to positive and negative consequences. On the majority of cannabis use days, young adults reported some level of intentions and willingness to use cannabis. Level of intentions to use cannabis positively predicted number of hours high and subjective high suggesting increased intentions for cannabis use may be a risk factor for heavier use. Willingness to engage in cannabis use was related to increased high and evaluating the experience as more enjoyable/pleasant potentially reinforcing future use. Day-level intentions and willingness may be important intervention targets for reducing adverse cannabis use in young adults.

Talk 4:

Intentions to Use Cannabis During Pregnancy: Preliminary Ecological Momentary Assessment Data

Lindy K. Howe (Brown University)
Lauren Micalizzi (Brown University)
Rachel L. Gunn (Brown University)

Background. Perinatal cannabis use is a significant public health concern, as it is linked to adverse maternal and neonatal outcomes. Despite growing evidence of the risks associated with prenatal cannabis exposure, many individuals continue to use cannabis, often to manage symptoms such as nausea, anxiety, or pain. The Theory of Planned Behavior (TPB) suggests that behavioral intentions are reliable and critical predictors of substance use. While intentions and subsequent behavior (planned/unplanned use) have been widely studied in non-pregnant populations, research on its application to prenatal cannabis use is limited. The current project presents preliminary data from an ongoing pilot ecological momentary assessment (EMA) study on perinatal (i.e., pregnancy and postpartum) cannabis use to: a) assess the prevalence of planned vs. unplanned cannabis use in pregnancy and postpartum; b) evaluate the association between daily intentions and subsequent use, and how this may differ between pregnancy and postpartum; and c) explore motives associated with daily planned vs. unplanned cannabis use. Methods. Pregnant participants (N=20, Mage=30.15) reporting current cannabis use were recruited to complete two 14-day EMA bursts (one in pregnancy [N=20], one 6-weeks postpartum [N=15]) measuring daily cannabis use, motives, and intentions. Planned use days were defined as morning endorsement of plans to use cannabis that day and reporting of subsequent use, while unplanned use days are those in which no morning intentions were endorsed, but cannabis was later endorsed. Results. Planned use was prevalent in both pregnancy and postpartum (60.8% and 46.7%, respectively), followed by planned nonuse (21.2% and 37.6%), unplanned use (9.2% and 9.1%), and foregoing plans to use (8.8% and 6.7%). Generalized linear mixed models indicated that intentions to use cannabis were significantly associated with daily use (OR=5.78, $p<.001$). No main effect of perinatal phase (pregnancy vs. postpartum) on daily use was observed (OR=0.48, $p=0.10$), nor was there an interaction between perinatal phase

and intention on daily use (OR=1.23, p=0.75). In the full sample, there were 25 unplanned days and 350 planned use days. For both planned and unplanned use days, common reported motives were "to relax" (plan/unplan=64%), "to relieve pain" (unplan=41, plan=44%), and "to sleep better" (unplan=31, plan=32%). Some motives were more common on planned use days relative to unplanned use days, including "to increase appetite" (plan=30% vs unplan=4%) and "to feel less anxious'" (plan=36% vs. unplan=20%), while "to enjoy the effects" was more common on unplanned use days relative to planned use days (unplan=44% vs. plan=26%). Discussion. Results demonstrate preliminary applicability of the TPB to perinatal cannabis use. Similar to non-perinatal samples, intentions were found to be associated with use in both pregnancy and postpartum. The endorsement rates of cannabis motives on planned vs. unplanned days reveal that physical management needs (e.g., appetite, pain) were associated with planned rather than unplanned use, suggesting individuals may anticipate these motives. In contrast, relaxation and pain relief were commonly reported on both planned and unplanned days. Larger samples are needed to further explore these relationships.

Symposium Title:

Ensuring Cannabis Policies aren't Half Baked: Pairing Policy with Science.

Chair: Julie K. Johnson (Commonwealth of Massachusetts)

Discussant: Julie K. Johnson (Commonwealth of Massachusetts)

Cannabis is illegal at the federal level, hindering research, including medicinal research, and leaving state-enacted legalization and medical programs with many scientific unknowns. Regulators often write policy and patients consume cannabis in the absence of verified research and data. As emergencies like the recent cannabis testing inaccuracies show, these research gaps can contribute to major regulatory challenges and potential harm to consumers, patients, and industry workers. As the science on cannabis progresses, it becomes even more important that we understand how research informs policy, regulation, and implementation, ensuring policy evolves with the science. Regulatory and medicinal science are urgently needed to help guide adult-use and medical-use cannabis policy. However, research being conducted often does not reflect the most urgent regulatory science needs, and typically does not account for the nuance that exists in the cannabis policy landscape across the U.S. Combining regulatory knowledge and data with research expertise can fill gaps around best-practices for regulating an industry as safely and equitably as possible. This panel brings cannabis regulators and state and academic researchers together to discuss applied cannabis research at the intersection of changing cannabis policies, medical research, and sustaining cannabis programs. Each panelist brings specialized knowledge in an area of policy or

medicinal research in New York, Minnesota, Utah, and Massachusetts. The goal of this symposium is to (1) provide insight into regulatory science ("applied cannabis policy"); (2) provide examples of scientific findings from regulatory and research-based collaboration, and (2) discuss urgent research needs for evidence-based cannabis policy.

Talk 1:

Evaluation and Analysis of Patient & Practitioner Experiences in the NYS Medical Cannabis Program

Kaitlin Kosinski (New York State Office of Cannabis Management)
Alexandria Wilkins (New York State Office of Cannabis Management)
Nakesha Abel (New York State Office of Cannabis Management)

Cannabis regulators play a crucial role in shaping the cannabis industry by monitoring market trends and developing data-driven programs, policies, and rules that protect public health and safety. The introduction of adult-use markets in states that previously had medical-only programs has led to a significant decline in the number of medical cannabis patients nationwide. Regulators are uniquely positioned to analyze these trends and develop strategies to better support medical cannabis patients in an evolving landscape. In 2023, the New York State Office of Cannabis Management (OCM) administered a patient and practitioner experience survey to assess the state's Medical Cannabis Program. Certifying practitioners in the program (N=265) provided feedback on their experiences and clinical perceptions of medical cannabis effectiveness. Medical cannabis patients were surveyed in 2023 (n=10,781 respondents) and 2024 (n=5,456 respondents) sharing insights on product usage, costs, travel time to medical dispensaries, and reasons for leaving the medical program. The analysis identified key patterns based on patient age, household income, medical conditions, and veteran status. The surveys provided valuable data on the program's evolution as NY works to develop a robust equity driven adult-use cannabis market. The findings helped OCM establish priorities for expanding medical cannabis access and informed key recommendations for strengthening medical cannabis programs nationwide.

Talk 2:

Benefits of Medical Cannabis in Patients with Autism Spectrum Disorder Registered to the Minnesota Medical Cannabis Program

Grace M. Christensen (Minnesota Department of Health Office of Medical Cannabis)
David Rak (Minnesota Department of Health Office of Medical Cannabis)
Emma Matthes (Minnesota Department of Health Office of Medical Cannabis)

The endocannabinoid system is hypothesized to play a role in behavioral functioning, leading to interest in cannabis as a therapeutic agent for patients with Autism Spectrum Disorder (ASD). However, there are few studies of cannabis and symptoms of ASD. This study aims to estimate symptom relief among

patients in the Minnesota Medical Cannabis Program qualified for ASD. ASD was introduced as a qualifying condition for the Minnesota Medical Cannabis Program in August 2018. A cohort was created from patients who enrolled in the Program between August 1st, 2018, and July 31st, 2023. Patient registry data was aggregated for the cohort, including medical cannabis product purchasing and patient self-evaluation (PSE) data. Patients are required to fill out a PSE prior to every medical cannabis purchase, which includes questions about eight standard symptoms and side effects. Improvements in anxiety, depression, and disturbed sleep were of greatest interest to the study given the relative prevalence of these symptoms in this patient group. We calculated proportions of patients who achieved 30% symptom relief within four months of starting the program, as well as those who were able to maintain 30% symptom relief for at least four months. We compared symptom relief and product purchasing trends between pediatric (< 18 years old) and adult (18+ years old) patients. 1,381 patients enrolled in the Minnesota Medical Cannabis Program for ASD and purchased medical cannabis during the study period. Medical cannabis product purchasing trends differed by age group. Pediatric patients primarily purchased enteral products with balanced or CBD-dominant cannabinoid profiles. In contrast, adult patients primarily purchased high THC cannabinoid products. Patient symptom relief changes were similar between age groups. Survey data included scores of eight different symptoms. Of those symptoms surveyed, anxiety was the most commonly reported symptom among patients with ASD. Overall, 88.4% (n = 1,219) of ASD patients reported moderate to severe anxiety scores before making their first medical cannabis purchase. Of those patients, 58.6% reported 30% improvement in their anxiety score within four months of starting the program. Overall, approximately 36.0% were able to both achieve 30% reduction and maintain it for at least four months. Depression and disturbed sleep scores were similarly improved, with 43.7% and 39.1% of patients, respectively, able to both achieve 30% score reduction and maintain it for at least four months. During the study period, 20% of patients reported experiencing side effects. Of those side effects, almost three quarters were reported to be mild. This is the first observational study of its kind to assess changes in symptoms in ASD patients enrolled in a state medical cannabis program. Medical cannabis may be beneficial for some ASD patients and appears to be generally well-tolerated. Further research must be conducted to better understand the effectiveness of cannabis to treat symptoms of ASD. Medical cannabis programs are a valuable data source to investigate these hypotheses and help set health care practitioners' expectations on what their ASD patients may experience in a real-world setting.

Talk 3:

A Literature Review of State Medical Cannabis Program Evaluations

Lirit Franks (University of Utah School of Medicine)
Gerald Cochran (University of Utah School of Medicine)
Carter Reeves (University of Utah School of Medicine)
Michael A. Incze (University of Utah School of Medicine)
Clinton J. Hardy (University of Utah School of Medicine)
Adam J. Gordon
A. Taylor Kelley

Background: The use of medical cannabis (MC) is increasing across the United States, with operational MC programs in 38 states and Washington D.C. Each state has varying program regulations and practices due to a lack of systematic guidance. Evaluations are useful to determine the safety and efficacy of state MC programs; however, not much is known about whether and how states evaluate their programs. Examining state MC program evaluations to date could inform state governments, MC program officials, and health providers about effective approaches and provide recommendations for future program evaluations. Summary: We conducted a narrative literature review of state MC program evaluations, including peer-reviewed manuscripts, reports produced by independent evaluators within state governments, and reports produced by third-party evaluators. After searching PubMed, APA PsychInfo, Medline, Embase, Scopus, Google Scholar, state MC program websites, and requesting unpublished or in-progress evaluations from national and international MC researchers, we narrowed our search to 304 abstracts initially screened. Seven evaluations met inclusion criteria. There were three overarching themes between the evaluations: 1) evaluation characteristics, including design and methodology of evaluations; 2) program experience, including perceptions of patients and healthcare providers; and 3) assessment of cannabis use, including patterns and frequency of use, self-reported efficacy for qualifying medical conditions, and investigation of risk factors applicable to MC use. We identified that goals and methods for conducting state MC evaluations differed greatly, but key factors were shared in evaluations with results that were more comprehensive and quantitatively rigorous. These include reliance on independent evaluators not associated with the state, a focus to measure specific stated goals, and inclusion of assessment of issues universal to MC use (including safety, misuse, and access). We also recommend that future evaluations utilize standardized and validated survey instruments, include comparison cohorts, and create a plan to minimize bias. Key Messages: A minority of states operating MC programs have conducted formal evaluations of their program and, within those, approaches differed greatly. However, common themes were also present, which can inform future efforts to conduct state evaluations. Evaluation through independent partners not associated with the state government may provide a preferential strategy to ensure meaningful results and valuable data.

Talk 4:

A Seven-Year Snapshot of the Adult-Use and Medical-Use Cannabis Industry in Massachusetts- What Can Revenue and Costs Tell Us About Overall Industry Health?

Julie K. Johnson (Commonwealth of Massachusetts)
Alexander M. Colby (Commonwealth of Massachusetts)
Hailey Pensky (Commonwealth of Massachusetts)
Victoria Edwards (Commonwealth of Massachusetts)
Graelyn Humiston (Commonwealth of Massachusetts)

Background: As of March 2025, 39 states have enacted medical cannabis laws and of these, 24 states have additionally enacted adult-use cannabis laws. Massachusetts enacted medical-use cannabis in 2012 and adult-use cannabis in 2016. Massachusetts law includes a robust research agenda pursuant to M. G. L. c. 94G, Åò 17 to understand different trends following cannabis legalization, includuding a market analysis of the legal marketplace. Methods: This surveillance study extracted state-collected cannabis industry data from November 2018, when adult-use retail was implemented, to April 30, 2024. This study assessed key indicators of industry health, including revenue, market share, and price (by weight and by unit, where applicable). Data cleaning was conducted in RStudio and Microsoft Excel, and descriptive statistics and data visualizations were computed using R, Microsoft Excel, and Tableau. Results: Adult-use market sales totaled $6.06B, including $524M in January-April 2024. Buds accounted for 42.2% of sales, followed by Vape cartridges (18.4%), Pre-rolls (15.0%), Infused edibles and beverages (14.7%), and Concentrates (7.6%). Year-over-year sales increased most from 2018 to 2019 (537%), and least from 2022-2023 (5%), with a slight uptick again from 2023-2024 (7%). The price per gram of adult-use cannabis, calculated as a monthly average, fell from $14.09 in November 2018 to $5.36 in April 2024. The price per ounce of adult-use cannabis similarly fell from $401.50 in 2018 to $153.73 in 2024, both reflecting 62% decreases. Medical market sales totaled $1.27B, including $66.6M in January-April 2024. Buds accounted for 45.6% of sales, followed by Infused edibles and beverages (15.3%), and Vape products (14.6%). Year-over-year sales increased from 2018-2021, then decreased for the first time from 2021-2022 (-13%), with the trajectory continuing to 2023-2024 (-16%, comparing January-April). Discussion: The adult-use and medical-use cannabis markets in Massachusetts followed similar trends from November 2018 to April 2024. Buds were the highest selling products across both markets, making up the largest share of both the adult-use (42%) and medical-use (46%) markets over the study. Trends were also similar between markets for the next largest products, with Vape cartridges making up 18% of adult-use sales and 15% of medical sales, and infused edibles making up 14% and 15% of adult-use and medical-use sales, respectively. Year-over-year changes in total sales show that the adult-use market continues to grow, although the pace of growth has declined, while the

medical-use market experienced peak sales in 2021 and has declined since. Some decreases are expected as the market saturates across the Commonwealth and as more East Coast states implement adult-use cannabis legalization and become operational. It is critical for regulators to monitor industry metrics and enact policies to balance market forces to ensure industry health, as market-based corrections may be necessary.

Symposium Title:
Beyond the High: Advancing the Science of Cannabis Impairment
Chairs: Jane Metrik (Brown University)
Nicholas J. Bush (Brown University)
Discussant: Jane Metrik (Brown University)

As cannabis use has become more prevalent, the ability to detect cannabis-induced impairment is increasingly critical for public health and safety. Controlled research provides clear evidence that É¢-tetrahydrocannabinol (THC) acutely impairs psychomotor functions, which are essential for driving performance, thereby increasing the risk of accidents and injuries. However, reliable objective methods for identifying impairment are lacking. Most prior research has focused on inhaled cannabis in relation to driving and psychomotor functioning, but products vary widely in cannabinoid formulation and composition. Understanding impairment from various cannabis formulations (e.g., edibles) and co-use patterns (e.g., with alcohol consumption) is essential for developing effective detection methods. This symposium introduces innovative methods and technologies for detecting cannabis psychomotor impairment. In a series of four talks, researchers will present findings based on objective behavioral assessments, including field sobriety tests, driving simulation, DRUID tablet-based testing, and mobile sensor technology measuring cannabis-induced changes in gait and balance. Studies range in laboratory and field-based methods, distinguish cannabis-induced effects from alcohol, and characterize acute impairment across different formulations, including flower and edibles, as well as key cannabinoids (THC and cannabidiol). The discussion will focus on how these technologically advanced methods can be used for real-time impairment detection, helping individuals make informed decisions to avoid high-risk behaviors such as impaired driving.

Talk 1:
Evaluating Detection Methods for Impairments from Oral Cannabis ("Edibles"), Alcohol, and Their Combination
Lakshmi Kumar (Johns Hopkins University School of Medicine)
C. Austin Zamarripa (Johns Hopkins University School of Medicine)
Spencer Lin (Johns Hopkins University School of Medicine)
McKenna Klausner (Johns Hopkins University School of Medicine)
Denis Antoine (Johns Hopkins University School of Medicine)

Thomas Marcotte (University of California San Diego, Center for Medicinal Cannabis Research)
Daniel Roche (University of Maryland School of Medicine)
Elise Weerts (Johns Hopkins University School of Medicine)
Ryan Vandrey (Johns Hopkins University School of Medicine)
Tory Spindle (Johns Hopkins University School of Medicine)

Introduction: Oral cannabis products (or "edibles") are increasingly popular and often co-used with alcohol, yet controlled research on their combined effects is limited. Though validated methods exist for detecting alcohol-induced impairment (i.e., breathalyzers and standardized field sobriety tests [SFSTs]), no analogous tests have been validated for cannabis. This human laboratory study characterized the acute impairing effects of cannabis edibles and alcohol (alone and combined) and evaluated impairment detection methods, including simulated driving performance, SFSTs, a novel behavioral task (the DRUID), and blood THC levels. Methods: Healthy adults (n=21) completed seven, Latin-square-ordered, double-blind, double-dummy sessions. In each session, participants ingested a brownie containing whole plant cannabis (18% THC concentration) for a 10 or 25mg total THC dose, or a placebo brownie (0mg THC) and, 45 mins later, drank an alcoholic (target breath alcohol concentration, BAC: 0.05%) or placebo (0.0% BAC) beverage. A positive control session with alcohol consumed to 0.08% BAC and placebo brownie consumed was also completed. Assessments, collected before and for 7.5 hrs after cannabis use, included subjective drug effects, simulated driving performance, SFSTs, the DRUID (tablet-based impairment test), and blood THC/metabolites pharmacokinetics. Driving performance was evaluated on several individual tasks and at a global composite impairment score by integrating individual outcomes (e.g., lane weaving, speed deviation). Results: Cannabis and alcohol alone produced dose-dependent increases in subjective impairment and global driving impairment, and alcohol (0.05% BAC) combined with 10mg or 25mg THC produced additive effects. 25mg THC + 0.05% BAC produced comparable driving impairment to alcohol alone at 0.08% BAC. At active doses, driving impairment peaked 3.5 hrs post-cannabis dosing (2.5 hrs post-alcohol) and subsided by 7.5 hrs. At 10mg THC alone and 0.05% BAC alone, participants' perceived impairment did not differ from placebo, but they displayed driving impairment. SFST impairment was consistently and strongly detected at 0.08% BAC alone. SFSTs also detected impairment at 25mg THC, 10mg THC + 0.05% BAC, and 25mg THC + 0.05% BAC, though to a lesser degree than at 0.08% BAC, but not in other conditions. DRUID scores distinguished placebo from active doses but showed no differences between active doses (e.g., similar scores at low and high cannabis doses). On average, THC concentrations increased dose-dependently; alcohol did not alter THC

or THC metabolite pharmacokinetics. Conclusions: Findings highlight the additive impairing effects of cannabis and alcohol on driving, even at BAC levels below the legal limit. Despite additive effects, blood THC levels were very low on average and did not differ between cannabis-only versus cannabis/alcohol conditions, suggesting blood THC is a poor proxy for impairment, unlike BACs. Notably, participants often underestimated their impairment, particularly at lower THC doses and 0.05% BAC. While SFSTs effectively detected impairment at 0.08% BAC, they were less sensitive to cannabis-alone and cannabis/alcohol conditions at 0.05% BAC. Additionally, although the DRUID differentiated active doses from placebo, it showed limited ability to distinguish between active doses. These findings emphasize the need for better impairment detection tools and further research to inform law enforcement strategies for identifying polysubstance-impaired individuals.

Talk 2:

Acute Cannabis Use and Motor Impairment: Effects on Postural Sway in Individuals with Frequent and Infrequent Use

Margy Y. Chen (Department of Psychology and Neuroscience, University of Colorado Boulder)
Angela D. Bryan (Department of Psychology and Neuroscience, University of Colorado Boulder)
Brian L. Tracy (Department of Health and Exercise Science, Colorado State University)
L. Cinnamon Bidwell (Department of Psychology and Neuroscience, University of Colorado Boulder; Institute of Cognitive Science, University of Colorado Boulder)

Cannabis use is becoming increasingly common, raising safety concerns related to its impact on motor coordination, balance, and driving performance. However, research on how acute cannabis use affects motor balance remains limited. This study examined impairment of standing postural stability in individuals who use cannabis flower infrequently (N = 129) and frequently (N = 194). Participants were randomly assigned to purchase and use a THC-dominant, THC+CBD, or CBD-dominant product from a partnered dispensary. Postural stability was assessed before and after ad libitum use under three conditions: eyes open (EO), eyes closed (EC), and eyes closed with head tilted back (ECHB). Postural fluctuations were measured using acceleration sensors on a hip-mounted smartphone. Greater fluctuations in acceleration indicated impaired balance. Postural stability was assessed before and immediately after use for infrequent cannabis flower users. Frequent cannabis flower users were assessed before, immediately, and 1 hour after use. Among infrequent flower users, EO, EC, and ECHB postural sway significantly increased after use ($p < .05$). The THC-dominant group showed greater EO sway than the CBD-dominant group acutely post-use ($t = 2.147$, $p = .034$). The THC-dominant group also showed significantly greater increase in EO sway acutely after use ($t = 2.1$, $p = .037$) while the THC+CBD ($t = 1.818$, $p = .070$) and

CBD-dominant group (t = .647, p = .519) did not. Among frequent users, EO sway showed a linear trend (p = .012) increasing after use while EC and ECHB sway followed a quadratic trend (p < .05), with initial impairment that improved from acute to 1-hour post-use. This trend was primarily driven by the THC-dominant group (t = 4.516, p < .001) and was not observed in the THC+CBD (t = .129, p = .897) or CBD-dominant (t = -.024, p = .981) groups. Additionally, a significant time by group interaction emerged (t = 3.70, p < .001) for EC sway. Simple effect tests indicated that the THC-dominant group had significantly greater EC sway than others acutely post-use (t = 3.965, p < .001) and 1-hour post-use (t = 2.324, p = .021), with no group differences in EC sway before use (ps > .230). Across infrequent and frequent users, results replicated prior findings that using THC-dominant products increases postural sway and impairs balance. Frequent users showed significantly higher EO postural sway than infrequent users (t = 3.073, p = .002) acutely post-use, though no differences emerged for EC or ECHB sway (ps > .367). This suggests frequent users may experience greater impairment in tasks requiring visual input but not in conditions with reduced sensory feedback. These findings demonstrate that acute cannabis use impairs balance, with THC-dominant products producing greatest impairment, while CBD appears to have no such effect. The observed differences between frequent and infrequent users highlight the need for individualized impairment assessments. Future research should refine cannabis impairment testing methods by focusing on medium difficulty postural control tasks (e.g., EC sway), which may offer a more sensitive and proprioception-focused measure of cannabis-induced motor impairment.

Talk 3:

Gait in the Wild: Smartphone-Based Detection of Recent Cannabis Use in Natural Environments

Nicholas J. Bush (Center for Alcohol and Addiction Studies, Brown University School of Public Health)
Ana Abrantes (Behavioral Medicine and Addictions Research, Butler Hospital, Providence RI; Alpert Medical School of Brown University)
Clifford Lindsay (University of Massachusetts Chan Medical School)
Jane Metrik (Center for Alcohol and Addiction Studies, Brown University School of Public Health, Providence VA Medical Center)

Background: Delta-9-tetrahydrocannabinol (THC) use has been associated with alterations in ambulatory and motor functions (i.e., gait), such as increased postural sway and disrupted balance. However, accessible, objective, and ecologically valid methods for assessing cannabis-induced gait alterations remain a critical gap. This is particularly concerning given the rising prevalence of cannabis use globally and the significant public safety implications, especially considering increasing rates of driving under the influence of cannabis. While our previous laboratory-based findings have

demonstrated an ability to classify cannabis intoxication using sensors in smartphone devices accurately, there is limited research examining THC-induced gait changes in naturalistic environments. Methods: This study investigated the feasibility of utilizing mobile sensor technology to classify cannabis intoxication during a prompted walking task. Ten individuals (Mage=33.5; 72.7% female) who reported regular cannabis use (at least five times weekly via vaporization or inhalation in the past month) participated in a 7-day ecological momentary assessment (EMA) protocol. Throughout this period, participants received prompts via their smartphones to complete brief surveys regarding their cannabis use. Immediately following each survey, participants were instructed to complete a 30-second walk at their natural pace with their smartphones in their pockets (nwalks=249). Data was collected at 100 Hz from the smartphone's accelerometer and gyroscope sensors. Walks were classified as intoxicated if they occurred within a one-hour window, plus the time spent inhaling cannabis. Gait features were extracted from the smoothed and filtered accelerometer (motion) and gyroscope (rotation) sensor data. A logistic regression model was used to classify walks with recent cannabis use (nwalks=116) and walks without recent cannabis use (nwalks=133). The model fit was assessed by comparing a null model (intercept only) to a full model with gait features. Results: The model demonstrated statistically significant discriminatory performance in classifying intoxicated versus non-intoxicated walks (ΔX^2=101.16, p<.001). The model achieved a Nagelkerke R2 of .45 and an overall classification accuracy of 75.1%. Further analysis revealed a sensitivity of .72, a specificity of .78, and a precision of .74. The area under the curve (AUC) model was .85, indicating good discriminatory ability. Standardized coefficient analysis revealed that recent cannabis use is associated with reduced predictability of vertical motion and increased asymmetry in overall movement. Conclusion: These findings provide preliminary evidence supporting the feasibility of utilizing mobile sensor-based gait analysis in naturalistic settings for the objective assessment of cannabis-related ambulatory impairment. The achieved classification accuracy, coupled with the high AUC, suggests that smartphone-derived gait features hold promise as indicators of THC intoxication. In addition, these results provide preliminary support that cannabis-induced gait changes may be characterized by less predictable and coordinated vertical gait patterns. This research has the potential to contribute to the development of accessible and ecologically valid tools for roadside impairment detection, consumer health monitoring, and clinical evaluations of cannabis-related motor deficits. Future considerations for machine learning models to utilize the model's identified features to build predictive models will be discussed.

Talk 4:

Naturalistic Observation of Cannabis and Alcohol-Related Gait Impairments: Evidence from Ambulatory Assessment In Young Adults

Rachel L. Gunn (Brown University)
Nicholas J. Bush (Brown University)
Nathan Didier (Brown University)
Jane Metrik (Brown University, Providence VA Medical Center)

With increasing national rates of cannabis use, behavioral impairments associated with heavy cannabis use are a significant public health concern (e.g., cannabis-impaired driving). Further, rates of simultaneous alcohol and cannabis use (i.e., so that the effects overlap) are also on the rise and laboratory work suggests additive impairment on cognitive and behavioral tasks when cannabis is used in combination with alcohol (relative to either substance alone). In line with these behavioral outcomes, cross-sectional and naturalistic studies have shown that simultaneous alcohol and cannabis use is associated with more substance-related consequences. Laboratory studies are necessarily limited in dose and form of cannabis administered, as well as amount of alcohol administered, relative to naturalistic patterns of use in young adults. The present study utilized a smartphone-based walking task to assess gait impairment in simultaneous, alcohol-only, and cannabis-only events in a 28-day observational ambulatory assessment study of young adults (N=115). Participants completed the walking task during a follow-up assessment administered 60 minutes after a user-initiated substance use report (alcohol and/or cannabis). The walking task instructed participants to walk in a straight line for 20 steps, and uses smartphone motion sensors (accelerometer and gyroscope at 100hz) to assess postural sway and gait features. Events were coded as alcohol (n=231), cannabis (n=297), or simultaneous use (n=155) based on self-report. Task data were preprocessed using rolling mean smoothing, outlier detection and butterworth bandpass filter. The magnitude of acceleration was calculated as the square root of the sums of squares. Time domain (e.g., skewness and autocorrelation), frequency domain (e.g., peak spectral energy) and behavioral (e.g., step cadence) features were calculated. Generalized linear mixed effects models were used to examine differences in gait features between event type (cannabis v. alcohol and cannabis v. simultaneous use), controlling for person-level (height, weight, sex) and time-varying (study day, subjective intoxication) covariates. Regarding mixed effects models on behavioral features, we found significant differences between cannabis and simultaneous events on two behavioral features: steps taken (Est=.95, p=.002) and cadence (Est=.04, p=.002), suggesting more steps and slower cadence in simultaneous use events relative to cannabis-only events. Regarding frequency domains, alcohol-only events were positively associated with greater spectral energy (Est=.85, p=.03) relative to cannabis-only events, suggesting greater motion

fluctuations. Regarding time domains, the standard deviation; (Est=.003, p=.01) and autocorrelation (Est=.01, p=.007) of the acceleration were positively associated with alcohol events relative to cannabis events, reflecting greater variability and predictability in the motion. Associations between subjective intoxication and all task outcomes were non-significant. Overall, results suggest that gait features captured via behavioral tasks in the field during substance use events can distinguish these events, and in particular that simultaneous use events reflect increased behavioral (i.e., step cadence) features of intoxication relative to cannabis-only events. Future work should incorporate these specific gait features into machine learning models to detect changes in gait associated with alcohol, cannabis and simultaneous use for mobile health interventions.

Symposium Title:
The Intersection of Neurodevelopmental Conditions and Cannabis Use
Chair: Lauren Micalizzi (Brown University)
Discussant: Alison Looby (University of Wyoming)

Growing evidence suggests that individuals with neurodevelopmental conditions-such as autism spectrum disorder (ASD) and attention-deficit/hyperactivity disorder (ADHD)-are at elevated risk for cannabis use and related harms. This symposium explores the complex interplay between neurodevelopmental traits and cannabis use across multiple levels of analysis. The first presentation examines cannabis expectancies among adolescents and young adults with ASD, revealing that those with cannabis experience-particularly for therapeutic purposes-report stronger positive and weaker negative expectancies than their non-using peers. The second presentation investigates ADHD symptom severity as a moderator of the link between frontostriatal connectivity and cannabis use patterns, identifying unique neurobiological vulnerabilities that may influence cannabis use trajectories. The third presentation explores cannabis-related consequences among college students with ADHD, showing that both diagnosed and undiagnosed students meeting the clinical threshold face heightened risks, reinforcing the importance of integrated screening and intervention. The fourth presentation highlights how impulsive tendencies and momentary ADHD symptom fluctuations predict unplanned cannabis use and increased consumption during treatment, emphasizing the value of addressing ADHD symptoms alongside cannabis-focused interventions. The discussant brings expertise in cannabis use predictors and consequences among those with neurodevelopmental disorders, and will integrate these findings, offering insights for future research and clinical applications.

Talk 1:
Marijuana Use and Expectancies among Adolescents and Young Adults with Autism Spectrum Disorder

Lauren Micalizzi (Brown University)
Becky Smith (Rutgers University)
Anthony Spirito (Brown University)
Stephen J. Sheinkopf (University of Missouri)
Kristina M. Jackson (Rutgers University)

Autism spectrum disorder (ASD) is a neurodevelopmental condition characterized by social communication challenges and repetitive behaviors. While preliminary research has demonstrated use of marijuana among individuals with ASD, including use for therapeutic reasons, little is known about marijuana expectancies — beliefs about the substance's positive and negative effects. These beliefs may influence patterns of use and associated outcomes, emphasizing the need for further investigation in youth with ASD.

N = 266 adolescents and young adults with ASD (M_{age} = 19.34 [minimum = 12, maximum = 24]; 47.9% female; 87.5% White; 12.9% Hispanic) self-reported their lifetime marijuana use, therapeutic use, and marijuana expectancies using the *Marijuana Effects Expectancies Questionnaire-Brief*. This measure yields a total expectancy score as well as subscale scores for positive expectancies (e.g., "Marijuana helps a person relax and feel less tense") and negative expectancies (e.g., "Marijuana generally has bad effects on a person"). Correlational analyses were conducted to explore associations between positive and negative expectancies, as well as between ever use of marijuana and expectancies. Six one-way ANOVAs were conducted to examine mean differences in overall, positive, and negative expectancies by: (a) lifetime cannabis use status; and (b) lifetime therapeutic use.

Approximately one-third of the sample (n = 84; 31.6%) reported lifetime marijuana use, and 12% reported therapeutic marijuana use. Positive and negative expectancies were significantly negatively associated (r = -.16, p = .02). Ever-use of marijuana was positively associated with positive expectancies (r = .41, p < .001) and negatively associated with negative expectancies (r = -.16, p = .01). Group comparisons revealed significant differences in expectancy patterns between those who reported lifetime use and those who did not. Specifically, participants with lifetime cannabis use endorsed significantly higher overall expectancies (F(1,264) = 15.13, p < .001), with a mean score of 3.81 compared to 3.52 among non-users. Positive expectancies were significantly higher among those who had used cannabis (M = 4.03) relative to those who had not (M = 3.20; F(1,264) = 54.37, p < .001). Moreover, individuals with lifetime cannabis use reported significantly lower negative expectancies (F(1,264) = 6.60, p = .01), with a mean of 3.58 compared to 3.85 among never users. There were no significant differences in positive, negative, or total expectancies across those who did versus did not endorse lifetime therapeutic use.

Overall, individuals with lifetime cannabis use reported greater overall and positive expectancies, as well as lower negative expectancies compared

to their non-using peers. These findings suggest that treatment and prevention programs might require distinct types of communication and content for young persons with ASD depending on both their lifetime marijuana use history.

Talk 2:

The Neurobehavioral Correlates of Adolescent Cannabis use and ADHD Symptoms

Sarah A. Thomas (Brown University)
Emily Olenik (E.P. Bradley Hospital)
Sarah K. Ryan (E.P. Bradley Hospital)
Meghan A. Gonsalves (Providence VA Medical Center)
Jodi Gilman (Mass General Hospital Center for Addiction Medicine)
Jane Metrik (Brown University)
Anthony Spirito PhD (Brown University)

Cannabis is frequently used by adolescents, with 26% of U.S. 12th graders reporting past-year cannabis use (CU). Although adolescents' reasons for using substances vary, one common motive is to cope with psychiatric symptoms, consistent with the self-medication hypothesis. Alternatively, certain psychiatric conditions characterized by increased reward sensitivity and impulsivity may predispose individuals to engage in activities like substance use. Attention Deficit Hyperactivity Disorder (ADHD) has been linked to adolescent CU, with some individuals believing that CU helps them concentrate. Neurobiologically, ADHD symptoms are attributed to dysfunctional frontostriatal circuitry. At the same time, regular adolescent CU may impact brain development in these circuits, increasing the risk of addiction. Therefore, understanding the biobehavioral relationship between adolescent CU and ADHD symptoms is crucial to support prevention and intervention efforts. We evaluated the connection between adolescent CU and ADHD symptoms using self-reports, interviews, and MRI in 75 adolescents aged 14-17 (mean age=15.55 [SD=1.13]; 59% female biological sex; 35% sexual or gender minority; 2.67% Asian, 9.33% biracial, 10.67% Black/African American, 6.67% Other, 69.33% White; 25.68% Hispanic), grouped by < five lifetime cannabis episodes ("control"; n=44) and >11 lifetime episodes ("cannabis teen"; n=31). Adolescents reported on lifetime and recent CU, reasons for CU; completed interviews characterizing past 90-day CU; and an MRI resting-state scan. Adolescents and their caregivers provided information on adolescent mental health, including DSM-oriented ADHD symptoms, from which age/sex-normed T-scores were derived (Achenbach Youth Self-Report and Child Behavior Checklist). The cannabis group included 14 adolescents who met or exceeded the ADHD clinical cut-off based on self-report or parent-report, whereas the control group had 5 adolescents exceeding clinical cut-off. Compared to controls, the cannabis group exhibited significantly greater ADHD symptoms via self-report ($t=-2.32$, $p=.024$), and parent-report ($t=-4.05$, $p<.001$). Adolescent-reported ADHD symptoms were significantly associated with daily hours high ($r=.35$, $p= 0.003$), with reasons for CU of "coping" ("To

forget your problems"; "Because you were depressed"; "To escape from your life"; r=.52, p<.001), and inversely with reasons for CU of "availability" ("It is readily available"; "You can get it for free"; "It is there"; r=-.38, p=.019). Parent-reported adolescent ADHD symptoms were marginally associated with a sleep motive (r=.28, p=.086). For a subset with high-quality neural data (n=39 controls; n=28 cannabis teens), the association between left caudate/right orbital frontal connectivity and CU sessions during the measurement period depended on the severity of adolescent-reported ADHD symptoms (b=0.01, p<.001), controlling for age and nicotine use: adolescents 1 SD below average ADHD symptom severity exhibited a negative association between brain connectivity and CU sessions (b=-0.09, p=.007), whereas adolescents 1 SD above average ADHD symptoms showed a positive association (b=0.06, p=.026). In conclusion, adolescents with CU have more ADHD symptom severity than control adolescents. The link between sessions of CU and frontostriatal circuitry depended on level of ADHD symptoms. More severe ADHD symptoms were associated with a coping motive. Understanding how adolescent CU relates to the severity of ADHD symptoms is essential for exploring the role of self-medication and determining effective symptom management strategies that minimize harm during brain development.

Talk 3:

Differences in Cannabis Outcomes among College Students with Varying ADHD Diagnostic Histories, Clinical Thresholds, and Symptom Presentations

Katherine A. Berry (University of Wyoming)
Allison K. Macht (Trinity College)
Laura J. Holt (Trinity College)
Alison Looby (University of Wyoming)

Attention-deficit/hyperactivity disorder (ADHD) is linked to increased cannabis use and related consequences among college students. However, most research has focused on students that have been formally diagnosed with ADHD by a mental health care provider, leaving an important gap in understanding whether similar cannabis-related risks exist among students who currently meet the diagnostic threshold for ADHD (i.e., five or more symptoms of inattentive and/or hyperactive/impulsive symptoms) but have never received a formal diagnosis. This study examined whether cannabis frequency, quantity, and consequences differed based on ADHD diagnostic history and diagnostic threshold. Additionally, among students currently meeting the diagnostic threshold for ADHD (regardless of prior diagnosis), we examined whether students with different ADHD symptom presentations differed in the aforementioned cannabis outcomes. College students (N=1500, Mage=19.36, 59.6% White non-Hispanic, 73.8% female) from six U.S. universities who reported past-month cannabis use completed an online

survey assessing ADHD symptoms, ADHD diagnosis history, and cannabis use frequency, quantity, and consequences. Participants were categorized into four groups: no prior diagnosis and not meeting the clinical threshold for ADHD (i.e., No diagnosis/No threshold; 64.2%), lifetime ADHD diagnosis but not currently meeting the clinical threshold (i.e., Diagnosis/No threshold; 8.4%), lifetime ADHD diagnosis and currently meeting the clinical threshold (i.e., Diagnosis/Threshold; 9.7%), and no prior ADHD diagnosis but currently meeting the clinical threshold (No diagnosis/Threshold; 17.7%). Three analysis of covariance (ANCOVA) models examined group differences in outcomes, controlling for biological sex. In the cannabis use models, students with Diagnosis/No threshold reported greater cannabis frequency and quantity than those with Diagnosis/Threshold and those with No diagnosis/No threshold. Additionally, students with No diagnosis/Threshold reported greater cannabis frequency and quantity than those with No diagnosis/No threshold. For cannabis consequences, students meeting the threshold for ADHD (with or without a diagnosis) reported greater cannabis-related consequences than those who did not meet the diagnostic threshold. Students with and without a diagnosis of ADHD but meeting the clinical threshold for ADHD did not significantly differ on cannabis consequences. Next, among students meeting the clinical threshold for ADHD (N=411), we examined differences by ADHD symptom presentation (inattentive: 47.9%, hyperactive-impulsive: 15.1%, combined: 37.0%). ANCOVAs demonstrated significant group differences in cannabis quantity, such that students with a combined ADHD presentation reported greater cannabis consumption than those with an inattentive presentation. No significant differences emerged when examining the cannabis frequency or consequences models. Overall, these findings highlight the need for more comprehensive mental health screening among college students who use cannabis and exhibit clinically significant ADHD symptoms, regardless of their formal diagnosis history or specific ADHD symptom profile. Given that students currently meeting the diagnostic threshold for ADHD reported greater cannabis-related consequences, but not greater use or frequency, relying solely on use metrics to assess perceived problematic cannabis use may be insufficient, as these students are more likely to experience adverse consequences from use in general. Intervention efforts could include early screening for both ADHD and cannabis use, as well as integrating ADHD symptom management with cannabis use interventions, particularly for students with a combined ADHD presentation.

Talk 4:

Trait vs. State ADHD Symptoms and Cannabis Use during Adolescent and Young Adult Cannabis Treatment

Jamie E. Parnes (Brown University & Bradley Hospital)

Robert Miranda Jr. (Brown University & Bradley Hospital)

Rationale: Adolescent and young adult (AYA) cannabis use is linked to several deleterious outcomes (e.g., dependence, lower achievement). Attention-deficit/hyperactivity disorder (ADHD), characterized by symptoms of inattention (ADHD-I) and hyperactivity (ADHD-H), confers risk for cannabis use and cannabis use disorder (CUD) and may influence responsiveness to cannabis treatment. Some research indicates that individuals with ADHD use cannabis to self-medicate their symptoms, while other studies suggest cannabis may exacerbate symptoms-especially among AYA. However, whether and how ADHD influences use during AYA cannabis treatment remains untested. We hypothesized that impulsive tendencies may promote unplanned cannabis use and greater quantities of cannabis consumption among AYA with ADHD. Methods: To this end, we tested how trait-level ADHD-I and ADHD-H symptoms captured via a gold-standard diagnostic interview and state-level momentary fluctuations in these tendencies (i.e., difficulty concentrating, hyperactivity, boredom) measured via ecological momentary assessment (EMA) relate to unplanned cannabis use, cannabis grams used, cannabis intoxication, and using more cannabis than planned. AYA (N = 65) participated in pharmacotherapy plus motivational enhancement and cognitive behavioral therapy intervention. At baseline, AYA received a formal ADHD assessment. During the intervention, AYA completed 42 days of EMA measuring affect and cannabis-related variables. We used multilevel modeling (MLM) to examine if ADHD-I and ADHD-H symptoms moderated the association between intentions to use cannabis (reported in the morning) and actual cannabis use (odds of use, grams used, intoxication level, using more than planned) later the same day. We also used MLM to examine if ADHD-I and ADHD-H symptoms moderated the association between momentary ADHD symptoms (person-centered) immediately prior to using and cannabis use. Results: ADHD-H moderated associations between intentions to use and cannabis grams, while ADHD-I and ADHD-H were unrelated to odds of cannabis use, intoxication level, and using more than planned. Planned use was related to greater grams consumed, but as ADHD-H symptoms increased, the difference in grams from planned versus unplanned use became negligible. Results from the momentary symptoms models found that ADHD-H symptoms were positively related to cannabis grams (IRR = 1.18) and moderated the association between hyperactivity symptoms and intoxication level. At low levels of momentary hyperactivity, relative to their own average, ADHD-H positively related to intoxication. Conversely, at high levels of hyperactivity, ADHD-H negatively related to intoxication; at mean levels of hyperactivity there was no association between ADHD-H and intoxication. Lastly, boredom was related to lower odds of using more than planned (aOR = .89).

Conclusions: Overall, results suggest that there are trait and state level associations between ADHD symptoms and cannabis use during AYA cannabis treatment. These findings suggest that AYA with ADHD may benefit from concurrent ADHD and cannabis treatment.

Symposium Title:

Understanding Budtender Practices, Customer Behaviors, and the Use of Artificial Intelligence in Mixed Methods Cannabis Research

Chair: Eric R. Pedersen (Keck School of Medicine, University of Southern California)
Discussant: Mark A. Prince (Keck School of Medicine, University of Southern California)

The rapid growth of the legal recreational cannabis market has made dispensaries an essential environment in which to conduct mixed methods research on customer purchasing and retail staff selling behavior. This symposium presents research examining how cannabis is sold, purchased, and understood within retail settings, with a focus on budtender influence (e.g., recommendations), promotion and use of high-potency THC products, and use of artificial intelligence (AI) to assist in generating codes and themes in qualitative research. Through interviews with 20 budtenders and 60 young adult cannabis users in The Cannabis Annex (The CANNEX) -a fully stocked mock dispensary- researchers examined how budtender recommendations shape consumer decision-making. The first talk explores budtenders' selling behavior, with a focus on how harm reduction strategies are discussed with customers. Findings highlight both the potential and limitations of such messaging in dispensaries. The second talk focuses on the sale and perception of high-potency THC products. Using mixed methods, researchers analyzed how budtenders sell these products and why customers purchase them, revealing key themes related to potency labeling, consumer trust, and sales tactics. The third talk describes the potential utility of AI in qualitative cannabis research. Using interview data obtained from budtenders and young adults, researchers compared human-coded thematic analysis with AI-assisted coding using a large language model. Findings suggest AI can enhance efficiency in processing large datasets, but human oversight is necessary to ensure conceptual validity. Together, these studies provide insights into cannabis retail dynamics, consumer decision-making, and the evolving role of AI in research.

Talk 1:

Budtender Harm Reduction in a Mock Dispensary Environment: Strengths and Future Considerations

Ireland M. Shute (Keck School of Medicine, University of Southern California)
Megan E. Brown (Keck School of Medicine, University of Southern California)
Bethany A. Gray (Colorado State University)
Angeles Sedano (Keck School of Medicine, University of Southern California)

Grace Earner (University of Southern California)
Isaac Bernstein (University of Southern California)
Olivia Newell (University of Southern California)
John R. Monterosso (University of Southern California)
Mark A. Prince (Keck School of Medicine, University of Southern California)
Eric R. Pedersen (Keck School of Medicine, University of Southern California)

As of 2024, there were approximately 15,000 dispensaries across the United States for medicinal and/or recreational cannabis. Recreational cannabis alone amassed 32 billion dollars in sales in 2024, indicating a demand for cannabis from regulated retail outlets. High frequency of use, however, is associated with adverse physical, mental, and interpersonal consequences. Harm reduction techniques, or protective behavioral strategies, are behaviors one can use before, after, or during cannabis use that may reduce an individual's experience of cannabis-related consequences. Although consumers often seek and receive advice from cannabis dispensary staff during visits to dispensaries, it is unclear whether staff present customers with harm reduction strategies in these retail cannabis environments. Twenty budtenders and 60 young adult cannabis users participated separately in semi-structured interviews in a mock dispensary environment to discuss their cannabis selling (budtenders) and purchasing (young adults) behaviors, which we examined with thematic analysis and survey data. Harm reduction strategies emerged as a post-hoc theme; thus, we sought to better understand how suggestions and recommendations from budtenders may be influential within the dispensary environment. In this mixed methods study, we investigated the harm reduction messages and strategies that retail dispensary staff (i.e., "budtenders") may present to customers during their interactions. As in prior literature, most young adults (72%) reported learning about products in dispensaries by asking budtenders about their personal recommendations and about individual product effects. Nearly half (48%) found budtender recommendations at least moderately important when deciding to buy a cannabis product. Given this potential influence of budtender suggestions and recommendations, we sought to examine the harm reduction strategies that budtenders may be discussing with customers in the context of these within-dispensary interactions. Harm reduction themes emerged among the budtenders relating to (a) sales methodology (e.g., product dissuasion, such as limiting purchasing high THC or concentrated products for nave users), (b) advice about use behavior (e.g., recovering from overconsumption or preparing for recovery), and (c) establishing budtender-customer relationships (e.g., acknowledging advice is anecdotal and limitations of expertise, such as encouraging consultation with medical professionals). Young adult interviews revealed themes related to avoiding

specific products (e.g., not purchasing vapes if concerned about using too often), limiting overconsumption (e.g., use of ratioed CBD products instead of products solely containing THC), and prioritizing purchases associated with positive use experiences (e.g., purchasing products they have used before and feel comfortable using). These results can help researchers and policymakers better understand harm reduction messaging within retail cannabis environments. Doing so can help address potential misinformation related to harm reduction and identify content areas that can be enhanced for the creation of future trainings and science-based educational materials to help consumers implement harm reduction strategies that will work best for them when choosing to use cannabis.

Talk 2:

A Mixed Methods Study Exploring Insights and Behaviors Related to the Sale of High Potency THC Products Among Customers and Budtenders

Megan E. Brown (Keck School of Medicine, University of Southern California)
Ireland M. Shute (Keck School of Medicine, University of Southern California)
Bethany A. Gray (Colorado State University)
Angeles Sedano (Keck School of Medicine, University of Southern California)
Grace Earner (University of Southern California)
Madison Moore (University of Southern California)
Seth Houghton (University of California, Santa Cruz)
John R. Monterosso (University of Southern California)
Mark A. Prince (Keck School of Medicine, University of Southern California)
Eric R. Pedersen (Keck School of Medicine, University of Southern California)

The legalization of cannabis for recreational sale and possession in the United States has raised concerns about products that contain elevated levels of THC (i.e., high-potency THC products). Frequent use of these products, especially among young adults, has been linked to negative outcomes such as increased risk for cannabis use disorder, early onset of psychosis, and adverse psychological effects like anxiety and paranoia. Additionally, these products are associated with acute cognitive impairment and an increased risk of tolerance and withdrawal. High-potency THC products are widely available in recreational cannabis dispensaries, with cannabis flower now averaging over 20% THC (compared to about 12% in 2012), and concentrated products, like oils and concentrates, reaching up to 99% THC. Additionally, reports of inflated THC levels suggest that cannabis companies list higher THC concentrations as a marketing strategy. Consumer demand for these products continues to rise, as past studies have found that many believe they offer a "better high," despite the associated risks. While existing literature has explored consumer preferences, no known studies have

examined how frontline cannabis dispensary staff (i.e., budtenders) sell high-potency THC products or provided detailed insights into consumer motivations for purchasing such products. The present mixed-methods study examined the general selling and purchasing behaviors of cannabis products in a mock dispensary. Twenty budtenders and 60 young adult cannabis users participated in separate semi-structured interviews that explored their insights and behaviors related to the sale and purchase of cannabis products. The interviews and surveys also included inquiries about the sale and purchase of high-potency THC products. During their interview, budtenders answered questions about how they would sell various types of cannabis products, which included three high-potency THC products (i.e., a cannabis flower product, a vape, and a concentrate). Young adults were interviewed after completing a simulated shopping experience where they were given a budget of $100 to purchase products in the mock dispensary. Interview and survey data related to high-potency THC products were selected for data analysis. Survey data revealed that 62% of young adult participants consider THC percentage important when making purchasing decisions, 41% buy high-potency THC products for their value, and 72% are at least somewhat confident in the accuracy of labeled THC concentrations. Thematic analysis of budtender interviews revealed key themes regarding their sales methods for high-potency THC products, their views on labeled THC percentages, and their insights into why customers buy these products. Similarly, thematic analysis of the young adult interviews highlighted key motivations driving consumer purchases of high-potency THC products, including the desire to get the maximum value for their purchase. The findings provide valuable information about the discussion surrounding high-potency THC products, both from budtenders' and consumers' perspectives, as well as how these products are marketed and sold in retail dispensaries. This study could help advise policymakers as they develop strategies to reduce the potential harm associated with high-potency THC products.

Talk 3:

Comparing AI-Assisted and Person-Coded Methods of Thematic Analyses: Understanding How Cannabis is Sold and Purchased in California Dispensaries

Bethany A. Gray (Colorado State University)
Megan E. Brown (Keck School of Medicine, University of Southern California)
Ireland M. Shute (Keck School of Medicine, University of Southern California)
Eric R. Pedersen (Keck School of Medicine, University of Southern California)
Mark A. Prince (Keck School of Medicine, University of Southern California)

Background: Marijuana purchase tasks (MPTs) are hypothetical measures that offer an efficient way to assess cannabis' relative reinforcing value (i.e., demand). Such tasks ask

participants to report on the amount of cannabis they would purchase across a range of prices. Data from the MPT can be used to generate a set of demand indices including intensity (i.e., amount of cannabis one would consume if it were free), Omax (i.e., the maximum amount one is willing to pay for cannabis), Pmax (i.e., the price associated with Omax), breakpoint (i.e., price at which one is no longer willing to purchase cannabis), and elasticity (i.e., rate of decline in cannabis purchase with increasing cost). Two open questions concern whether individuals assume that their peers' cannabis purchasing behavior is similar to their own, and whether one's own motivations for using cannabis are associated with their perceptions of other's cannabis demand. Methods: Participants were recruited while standing in line in a legal recreational cannabis dispensary in Colorado; those with valid cannabis demand data (n = 137) were included in analyses. This was the first study to adapt the MPT to ask participants: "How much marijuana do you think a typical user would purchase and use at different price levels?" In addition to this normative perception-based purchase task, participants were also asked to complete the MPT about their own purchasing behavior, as well as the Marijuana Motives Measure. We hypothesized that those with conformity motives would be more likely to believe others' cannabis purchasing behavior to be similar to their own. Results: With the exception of Omax, participants' own demand indices were nearly identical to demand indices generated from their perceptions of others' purchasing behavior. Participants' perception of others' cannabis demand generated higher Omax values than their own Omax values (Omax-personal = 135.19, Omax-other = 178.11). Correlations between personal demand indices and perceptions of others' demand indices were large and statistically significant (Omax r = .776, Pmax r = .671, breakpoint r = .752, intensity r = .731, elasticity r = .899). In addition, social motives were associated with normative perceptions of Omax (r = .221), and conformity motives were associated with normative perceptions of all demand indices with the exception of elasticity (Omax r = .471, Pmax r = .360, breakpoint r = .228, intensity r = .200, elasticity r = -.049). Conclusions: Based on the focus theory of normative conduct, it is likely that participants' beliefs about others' purchasing behavior influenced their own purchasing behavior. The higher Omax generated from perceptions of other's purchasing behavior suggests that participants believe others would spend more on cannabis than they would themselves. Subsequent work should aim to collect a large normative sample of cannabis demand data to determine whether purchasing behavior normative beliefs are exaggerated in a similar way to normative perceptions about others' substance use behavior. If the same exaggerated normative beliefs exist, normative re-education interventions could be developed to correct misperceptions potentially leading to safer buying practices.

Symposium Title:

Recipe Vs. Results: Comparing Cannabinoid Formulations in Legal-Market Cannabis Edibles Using an Integrative Within-Subjects and Double-Blind Approach to Measuring Dose-Response

Chair: Emma E. Smith (Colorado State University)
Discussant: N/A

Due to federal limitations on cannabis research, few studies have examined the relations between the pharmacokinetic and pharmacodynamic properties of cannabis edibles, limiting our understanding of cannabis dose-response and intoxication effects. Additionally, prior research often lacked true placebo conditions, reducing internal reliability and control. This series of studies addresses these limitations by integrating biological, subjective, and behavioral measures to examine how cannabinoid formulation influences intoxication experience, physiological effects, and cognitive function over time. All subjective and objective data were collected with pharmacokinetic markers across standard, fast-acting, and placebo edibles in a mobile laboratory setting using a randomized, placebo-controlled, counterbalanced, double-blind, crossover observational study design. This combination of internal and external validity was possible through partnering with a local vertically integrated cannabis business. Researchers observed participants (n = 20, within-subjects) before and for 5 hours after self-administering three distinct standardized cannabis edible formulations: (1) "regular" (10mg THC), (2) "fast-acting" (10mg THC), and (3) placebo (terpene only, 0mg THC). Study products were third-party tested by a state-regulated lab for consistency before distribution via a local dispensary. Study products produced by industry partners were tested by a 3rd party state-regulated lab for consistency in active compounds prior to participant distribution via local dispensary. During observation, participants completed data collection at thirteen time points that consisted of blood sample collection, self-report measures, and behavioral tasks. This symposium aims to take integrative approaches to characterizing the dose-response qualities of edible cannabis over time in terms of blood concentration, perceived intoxication, vital markers, and cognitive impairment.

Talk 1: Pharmacokinetic Differences between Fast-Acting, Standard, and Placebo Cannabis Edibles

Bradley T. Conner (Colorado State University)
Emma E. Smith (Colorado State University)
Samuel M. DiCecco (Colorado State University)
Kira L. Sturgess (Colorado State University)
Hollis C. Karoly (University of Colorado, Anschutz Medical Campus)
Gregory Dooley (Colorado State University)
Natalie Akagi (Colorado State University)
Charles Villanueva (Azuca, Inc.)

Michael Hennesy (Wana Brands, LLC.)

Introduction. Edibles have become the second-most used cannabis product in legal U.S. states, wherein 64% of cannabis consumers reported using edibles within the past year. Among expansions to the legal cannabis industry are the newly marketed "fast-acting" edible compounds, which may address many of the issues associated with edible use related to overdose and dose management. Conventional cannabis edibles typically contain extracted cannabinoids, primarily 9-tetrahydrocannabinol (THC). When ingested, THC is processed through the digestive system and undergoes first-pass metabolism in the intestine and liver prior to entering the systemic circulation. In this process, THC converts to 11-hydroxy-9-THC (THC-OH), which further oxidizes to 11-carboxy-9-THC (THC-COOH). This process results in low oral bioavailability, delayed onset of effects, and prolonged duration of action. Micro-encapsulation technology, such as in the formulation from Azuca, Inc. used in this study, involves enclosing small particles of active substances, such as THC, with a protective coating. This encapsulation process often involves materials like polysaccharides, proteins, or lipids. Micro-encapsulates can be engineered to protect active ingredients from enzymatic degradation in the gastrointestinal tract, enhance solubility, and regulate the release of these compounds, thereby improving absorption and increasing bioavailability upon consumption. This study aimed to systematically compare the pharmacokinetic properties of THC analytes in a standard, fast-acting, and placebo edible using a randomized, placebo-controlled, 3-way counterbalanced crossover observational study. The study hypothesized that fast-acting edibles would reach peak concentration significantly faster than standard and placebo edibles. Materials & Methods. Participants (n=20) completed a 3-arm within-subjects designed study to test hypotheses. The three arms were ingestion of a (1) fast-acting edible, (2) a standard edible, and (3) a THC terpene-derived placebo edible that was indistinguishable from the two THC-containing edibles. Blood plasma was analyzed for the presence of THC, THC-OH, and THC-COOH. The pharmacokinetic parameters tested were time to max concentration (Tmax), maximum concentration (Cmax), terminal half-life (t1/2), and area under the curve (AUC). As data were non-normally distributed and participants were not randomly selected, non-parametric Wilcoxon Signed Rank Tests were used to analyze the data. Alpha was set to 0.05 for all analyses. Results. Results supported study hypotheses in that Tmax for the fast-acting edible occurred, on average, 30 minutes earlier than the Tmax for the standard edible for THC, fast-acting compared to placebo ($Z=-3.1$, $p<.001$), fast-acting compared to standard ($Z=-3.5$, $p<.001$), and standard compared to placebo ($Z=-2.4$ $p<.001$), and for THC-OH, ($Z=-4.0$ $p<.001$), and standard compared to placebo ($Z=-4.0$ $p<.001$). There were no other significant differences between

the fast-acting and standard edibles; however, both significantly differed from the placebo across all pharmacokinetic parameters. Discussion. The results indicate that the micro-encapsulation technology used to create the fast-acting edible enabled analyte concentrations to peak significantly faster than the standard and placebo edibles. The delayed onset of intoxication associated with edible cannabis products may be a risk factor for overconsumption, as individuals may increase their dose while waiting to feel the effects; however, the fast-acting preparation may reduce this risk.

Talk 2:

Characterizing Differential Dose-Response Qualities of Varying Cannabinoid Formulations: A Synthesis of Intoxication Intensity, Experience Quality, and Biological Markers

Emma E. Smith (Colorado State University) Bradley T. Conner (Colorado State University)
Samuel M. DiCecco (Colorado State University)
Kira L. Sturgess (Colorado State University)
Gregory Dooley (Colorado State University)

Introduction. Among the most popular legal-market available cannabis product categories (i.e., flower, extract), cannabis edibles present the most significant challenges when it comes to dosing management (i.e., self-titration) and are linked to a higher incidence of adverse effects from unintentional overconsumption. Delayed onset of perceived intoxication with edible cannabis is a potential risk factor for overconsumption, as individuals may increase their dose before perceiving initial effects. Relatedly, high variability in the way that THC is prepared for ingestion (i.e., method of administration, formulation of cannabinoids) can impact the onset and intensity of intoxication, further complicating the individual's ability to anticipate ideal dosing. While biological markers (i.e., blood cannabinoid concentration) across time between fast-acting and standard edibles suggest a promising advance in addressing overconsumption issues, little is known about perceptual or experiential differences that may accompany these varying pharmacokinetic profiles. This study systematically compared dose-response characteristics of intoxication intensity and experience quality with pharmacokinetic markers across standard, fast-acting, and placebo edibles in a mobile laboratory setting using a randomized, placebo-controlled, counterbalanced, double-blind, crossover design. We hypothesized that fast-acting edibles would reach peak subjective intoxication significantly faster than the standard formulation and would descend from peak intoxication earlier as a result. Concurrently, we postulated that at peak blood concentrations, there will be no significant differences in overall subjective intoxication intensity or quality between the regular and fast-acting edibles. Methods. Participants (n=20) completed a 3-arm within-subjects designed study to test

hypotheses using (1) a fast-acting edible, (2) a standard edible, and (3) a THC terpene-derived placebo edible that was indistinguishable from THC-containing edibles. Participants provided blood samples and completed the Subjective High Assessment (SHAS) self-report measure before and at 12 time points after edible self-administration. We tested blood plasma for THC, THC-OH, and THC-COOH, and the pharmacokinetic parameter tested was time to max concentration (Tmax). We used Wilcoxon Signed Rank Tests to compare the differences in intoxication across time points, at Tmax, and between the highest peaks in quality and intoxication (Éø=.05). Results. Pairwise comparisons across identical time points showed no significant differences between intoxication intensity ratings for fast-acting and regular edibles; however, the fast-acting edibles showed significantly higher perceived intoxication quality at 30 minutes post-ingestion. When comparing intoxication intensity and quality at Tmax for both active THC edibles, the standard edible (Tmax=60min) had significantly higher intoxication intensity (Z=-2.45, p=.014) and intoxication quality (Z=-2.88, p=.004) than the fast-acting (Tmax=30min) edibles. No significant differences were found between active edibles in overall global intoxication intensity and quality when comparing totals over the 5-hour session. Discussion. These findings suggest a more intense perceived onset of effects in the standard edible during peak blood concentration, accompanied by greater reported intoxication quality, compared to the fast-acting edibles at their peak blood concentration. While fast-acting edibles did not necessarily create discomfort during peak intoxication, it appears that the cost associated with quicker perceived edible intoxication onset may be that the enhancing and ameliorative effects associated with intoxication are blunted compared to standard edibles.

Talk 3:

Differential Responses in Vital Markers to Regular vs. Fast-Acting Cannabis Edibles Formulations

Kira L. Sturgess (Colorado State University)
Samuel M. DiCecco (Colorado State University)
Emma E. Smith (Colorado State University)
Bradley T. Conner (Colorado State University)

Introduction: Current research on objective markers of intoxication (i.e., Blood Pressure, Heart Rate, Temperature) while under the influence of cannabis is minimal. Our study attempts to add to this body of work by examining changes in blood pressure, heart rate, and temperature throughout the administration, intoxication, and voiding processes associated with the consumption of a fast-acting cannabis edible, a standard cannabis edible, and a placebo edible. We hypothesized that blood pressure, heart rate, and temperature would significantly differ throughout the administration, intoxication, and voiding processes for the fast-acting and standard edibles compared to the

placebo edibles. Methods: 20 participants completed all three arms of the within-subjects design. Blood pressure, heart rate, and temperature were measured at each blood draw. We analyzed data using non-parametric Wilcoxon Signed Rank Tests and Friedman's Tests. Alpha was set to .05 for all analyses. Results. Post ingestion of the cannabis edible, we observed significant temperature changes compared to baseline. At maximal THC concentration, as detected in the blood analyses, the change in temperature for the standard edible was significantly higher than for the fast-acting edible. This trend is also present 15 ($Z = -2.33$, $p = .020$) and 30 minutes in ($Z = -2.16$, $p = .031$). This pattern reverses as participants voided the cannabinoids such that, at 120 minutes, the fast-acting edible was significantly lower than the standard edible ($Z = -2.24$, $p = .025$). Further, significant changes in blood pressure occur at 240 minutes post-ingestion. Essentially, changes in blood pressure over time post-ingestion for the standard edible ($Z = -2.88$, $p = .004$) and the fast-acting edible ($Z = -2.36$, $p = .019$) were significant compared to B, indicating similar vasodilatory effects in both standard and fast acting edibles. At 10 and 15 minutes, significant observed changes in heart rate occurred for both the standard edible condition ($Z = -2.66$, $p = .008$) and the fast-acting edible condition ($Z = -3.07$, $p = .002$). Most notably, the standard edible (60 minutes) and fast-acting (30 minutes) produce similar cardiovascular effects at peak concentration. The standard edible produced a noticeable jump in heart rate at 90 minutes compared to the baseline ($Z = -3.55$, $p = <.001$). Similarly, the fast-acting edible had the same effects at 60 minutes ($Z = -2.32$, $p = .021$). Discussion. The results indicate similar objective levels of intoxication across both regular and fast-acting edibles, with only slight differences in temperature across conditions. These findings suggest body temperature spikes faster for standard edibles and drops earlier than for fast-acting formulations. Fast-acting edibles are slower to impact body temperature at maximal concentration and on the descent, potentially due to differences in the digestive processing of fast versus regular-acting edibles. This information provides insight into the biological and pharmacological effects of cannabis, furthering our knowledge of physiological responses to cannabis edible products. To further understand the potential medicinal and therapeutic utility of cannabis, future research must continue to investigate the physiological effects of cannabis intoxication specific to legal-market available products.

Talk 4:

Cannabinoids and Cognitions: Behavioral Impacts of Acute Cannabis Edible Intoxication on Cognitive Performance Over Time Using an Impairment Detection App

Samuel M. DiCecco (Colorado State University)
Emma E. Smith (Colorado State University)
Kira L. Sturgess (Colorado State University)

Bradley T. Conner (Colorado State University)

Introduction. Acute cannabis consumption has previously been associated with impaired cognition in multiple domains, including confusion, concentration, and time dilation (i.e., inaccurately perceiving the passage of time). Less is known about the time course of these impairments, particularly across different cannabis product formulations. Methods: In our observational assessment of edible cannabis products, we measured behavioral and subjective reporting of impairment at multiple time points comparing the effects of a 10mg "standard" edible, a 10 mg "fast-acting" edible with Tmax at 30 minutes before the standard edible, and a placebo edible product. Impairment was measured behaviorally through the DRUID app and the Subjective High Assessment Scale for cognitive impairment. As data were nonnormally distributed, we did not randomly select participants and conducted non-parametric analyses. We used Wilcoxon Signed-Ranks tests to compare the differences in impairment across the same time points, Tmax time points, and between the highest peaks of each variable. Results: Overall, for the fast-acting edible compared to the standard edible, there were significant differences in DRUID behavioral impairment, where the fast-acting product was still higher in impairment later into the time course ($p < .05$). For self-reported impairment, the fast-acting product had a significantly lower reported distorted sense of time than the standard product at Tmax ($p < .05$). The fast-acting product was also associated with significantly lower difficulty concentrating closer to Tmax ($p < .01$), but greater difficulty concentrating near the end of the time course for the products ($p < .05$). When comparing the overall time course as compared to the placebo condition, DRUID behavioral impairment lasted longer for the fast-acting product ($p < .05$). However, self-reported impairment was shorter for the fast-acting product when considering self-reported clumsiness ($p < .05$), distorted sense of time ($p < .05$), and feelings of floating ($p < .05$). Discussion: Across all of the previously mentioned variables, there was no difference from the maximally reported effects in terms of magnitude, implying each product hits the maximum effect at some point during the time course, just at different times. From these results, for most effects it appears that self-reported impairment may be ending earlier for some cognitive effects in the fast-acting product but may actually be later when measuring impairment through behavioral means. This has potential implications for the risk of impairment when individuals no longer personally feel impaired, or issues with the method of behavioral measurement of impairment. Further investigation into different means of cannabis administration and the time course of various cognitive impairment, as well as differences between behaviorally measured and self-reported impairment is thus warranted.