

CANNABIS RESEARCH REPORT

2021-2023

University of Washington Addictions, Drug & Alcohol Institute



The Addictions, Drug & Alcohol Institute (ADAI), a multidisciplinary research center in the University of Washington's Department of Psychiatry and Behavioral Sciences, has been the recipient of the Washington State Dedicated Cannabis Fund for Research at the University of Washington (**Dedicated Cannabis Fund**) since July 2015.

These funds have had two important functions in promoting cannabis research and education at the University of Washington:

1. Supporting University of Washington researchers across multiple disciplines to conduct projects focused on the short and long-term effects of cannabis through the [ADAI Small Grants Program](#).
2. Acting as the financial backbone of ADAI's [Cannabis Education and Research Program \(CERP\)](#) operations (formerly the ADAI Cannabis Workgroup).

This report describes the projects funded by the Dedicated Cannabis Fund and other contracts in the 2021-23 biennium.



**CANNABIS EDUCATION
& RESEARCH PROGRAM**

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MESSAGE FROM THE DIRECTORS OF ADAI & CERP

Cannabis Research & Education as Legalization Hits the Ten-Year Mark

The people of Washington State decided to end cannabis prohibition in 2012, in hopes of correcting the wrongs brought on by policies that disproportionately imprisoned people of color and fueled stigmatization and discrimination against people who consume cannabis. Fast forward ten years, and the most visible testimony of cannabis legalization in Washington State is not racial equity or an end to stigma, but the flourishing of a robust cannabis industry. In fiscal year 2022, cannabis retailers sold nearly \$1.4 billion in cannabis products and just over half a billion dollars were generated in excise tax revenues, surpassing alcohol, and tobacco taxes in the state¹.



Susan Ferguson, PhD
Director, ADAI



Bia Carlini, PhD, MPH
Director, ADAI CERP

ADAI has been the recipient of about 0.07% of these annual tax revenues, directed to the University of Washington for research on the “*short and long-term effects of marijuana use and related consequences*” as framed by I-502 and [RCW 69.50.540](#). The work that we do at ADAI with this very modest amount has served four main purposes:

- **Conduct research that informs policies, practices, and regulations** that ensures that the spirit of cannabis legalization – equity, health and well-being – is honored and alive.
- **Disseminate research to Washington communities on cannabis health and social risks**, including cannabis use disorder, cannabis hyperemesis syndrome, and increased risk of developing psychosis.
- **Produce and disseminate research** that indicates these risks have increased since the industrial mass production of cannabis began in our state, making cannabis exponentially stronger, cheaper, heavily marketed, and widely available.
- **Fund pilot studies on cannabis research across multiple disciplines** including Neuroscience, Psychology, Sociology, Pharmacology, Radiology, and Social Work on the “*short and long-term effects of marijuana use*” at the University of Washington through a Request for Proposals (RFP).

While we are proud of our accomplishments, much more needs to be done in terms of science-based education and research to address the many challenges created by widespread cannabis use since legalization. It is tempting to downplay cannabis risks when there is so much enthusiasm around cannabis industry revenues, but we need to keep in mind that these revenues are only possible because of the increasing consumption of such products. Ongoing and increased funding for cannabis education and research to ensure the mitigation of the potential harms associated with a product that is not risk-free should be a priority.

This report presents an account of ADAI CERP’s work for the biennium 2021-23, with funds from cannabis excise taxes (Dedicated Cannabis Fund) and other state and federal sources. [Previous reports can be found here](#).



Susan Ferguson, PhD
Director, Addictions, Drug & Alcohol Institute



Beatriz Carlini, PhD, MPH
Director, ADAI Cannabis Education & Research Program

¹Ingraham, B., & Rashid, A. (2023). *A 10-Year Review of Non-Medical Cannabis Policy, Revenues, and Expenditures* (Document Number 23-06-3201). Olympia: Washington State Institute for Public Policy.

WHO WE ARE

The ADAI Cannabis Education & Research Program (CERP), formerly known as the ADAI Cannabis Workgroup, was created in 2015. CERP is comprised of investigators and program staff who have come together to collaborate on research and dissemination activities in response to emerging needs of the community in the context of legalized cannabis.

CORE TEAM

[Beatriz Carlini, PhD, MPH](#), CERP Director,
Research Associate Professor, UW Psychiatry and Behavioral Sciences
[Sharon Garrett, MPH, MA](#), Research Scientist
[Lyndsey Kellum, MEd](#), Program Evaluator
[Lexi Nims, BA](#), Research Coordinator
[Meg Brunner, MLIS](#), ADAI Director of Information Services
[Erinn McGraw, BFA](#), Public Information Specialist

Partners at ADAI

[Jason Williams, PhD](#), Research Scientist,
Expert in data analysis

Affiliates

[Robin Harwick, PhD, MS](#), Research Scientist,
Expert in qualitative research
[Gillian Schauer, PhD, MPH](#), Research Scientist,
Expert in cannabis policies and regulations

SUPPORT

The Washington State Dedicated Cannabis Fund has been CERP's financial backbone since July 2015. In the 2021-23 biennium, CERP was able to secure additional funds to expand its work, including projects supported by state and county agencies and the WA Legislature.

WHAT WE DO

The Cannabis Education & Research Program

- **Partners with state and county agencies and the legislature** to conduct research projects that inform decision-making and priority-setting with the goal of advancing public health and safety in Washington State.
- **Develops educational and informational resources** to disseminate science-based information to community organizations, health and educational professionals, policymakers, and the community at large.
- **Fosters collaborative research opportunities** with researchers at the University of Washington, Washington State University, state agencies, and other groups.

CANNABIS RESEARCH

Projects Across UW

ADAI periodically releases Request for Proposals (RFP) to University of Washington scientists and funds cannabis research across multiple disciplines on the "short and long-term effects of marijuana use" per requirements of the Dedicated Cannabis Fund. Projects funded in the 2021-23 biennium include:

Method Validation of Cognitive Deficits Induced by Novel THC Self-Administration Paradigm

Paul Phillips, PhD and Stefan Sandberg, PhD, Department of Psychiatry and Behavioral Sciences

Deciphering THC Locomotor Impairment with Machine Learning Pose Estimation and a Supervised Classifier Algorithm

Nephi Stella, PhD, Department of Pharmacology

Developing and Testing a Novel Measure of Momentary Affect for Cannabis-Related Ecological Momentary Assessment Studies

Katherine Walukevich-Dienst, PhD and Christine Lee, PhD, Department of Psychiatry and Behavioral Sciences

[Read more about these UW projects here.](#)

ADAI CERP Projects

CERP produces new knowledge and insights that can support evidence-based policies and practices. Every biennium, CERP collaborates with or leads research projects that can inform priorities of Washington community-based agencies and policymakers.

The outcomes of these projects are disseminated through academic publications and by regular participation of ADAI scientists in state-based workgroups, presentations for state legislators and rule-makers, county and national agencies, and by developing educational materials posted on our dedicated websites (see section on *Science-Based Education & Dissemination*).

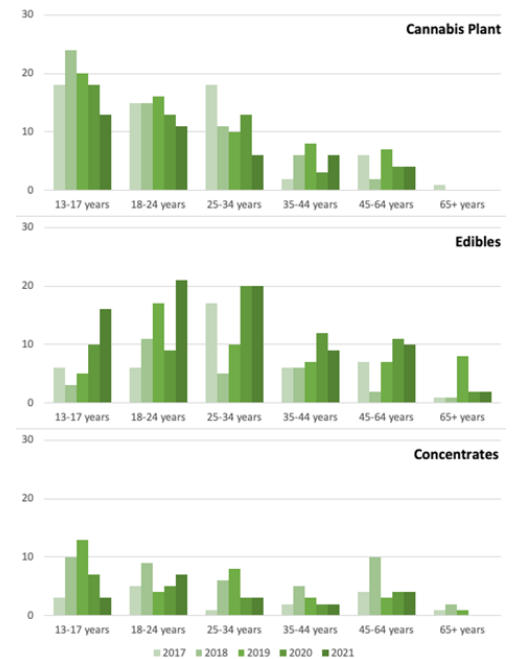
For the 2021-2023 biennium, the following projects have been concluded or are in development.

Projects Led by CERP

It Was Only Cannabis! Washington Poison Center Adverse Effect Cases, 2017-21

Calls to poison centers can be an indicator of adverse effects incidence related to cannabis use. Reports on Washington Poison Center (WPC) calls typically include many types of cases: people who intentionally consumed cannabis and nothing else; people who consumed cannabis with other substances; and children who ingested cannabis products by accident. This study focused on the first group, since cases of only using cannabis can be a more accurate indicator of cannabis-related adverse effects, which represented 56% of cannabis-related calls to WPC from 2017-21.

- While still low, the number of WPC calls for drinks containing THC have doubled each year, with 21 calls in 2021.
- Moderate or major clinical adverse effects were nearly four times higher for those who used concentrates, and nearly twice as high for those who used edibles, compared to people who consumed cannabis plant or did not specify a cannabis product (results accounted for differences in age, gender, and year).
- Among cannabis products, edibles were the most common reason for calling WPC for all age groups in 2021. In prior years, plant consumption – not edibles – was the most common reason for calls under the age of 25.



[The full report on WPC calls is available here.](#)

High-THC Cannabis Products: What Do WA Stakeholders Want?

This study used Concept Mapping, a mixed methods approach that captures the collective thinking of a wide variety of stakeholders for guiding participatory and inclusive policymaking. In this project, concept mapping was used to explore policy options to address public health concerns with high-THC products and gauge stakeholders' views on their feasibility and impact, if adopted.

About 200 participants suggested 46 unique policy ideas. Most stakeholders (health care providers, researchers, government staff, people concerned with youth development, prevention agencies, and people with lived experience of harm from cannabis) expressed high concern with high-THC products and supported an array of evidence-based policy solutions, including increasing taxes on cannabis products with high THC levels, providing education about high-THC cannabis to the public and specifically to consumers, and restricting advertising. Stakeholders from the cannabis industry supported only educational measures. The results of this project are published in Appendix F of [this report on high-THC concentration cannabis policy](#).

High-THC Cannabis Policies and Regulations in the US

This project identified policies regarding high-THC cannabis products among US states with legalized cannabis markets as of August 2022. It was led by [Dr. Gillian Schauer](#), an ADAI Research Scientist and expert on the subject. The project examined policies related to THC caps, serving sizes, purchase limits, labeling requirements, advertising restrictions, tax approaches, health warning labels, age limits, and education efforts specific to high-THC products. The results of this project are published in Appendix B of [this report on high-THC concentration cannabis policy](#).

Collaborative Projects Led by External Research Groups

Reporting THC Content in Cannabis Products in Legal Markets: An International Multidisciplinary Delphi Consensus Study

The goal of this study is to find consensus among a multidisciplinary and international expert panel on how to report THC content for consumers (e.g., product labelling and packaging) across all cannabis products (e.g., medical/non-medical, administered via distinct modes) in legal markets, using a Delphi methodology. This project is led by [Valentina Lorenzetti, PhD](#).

Dr. Bia Carlini is a Steering Committee member for the study. Other members of the Steering Committee are Tom Freeman, PhD (Addiction and Mental Health Group, University of Bath, UK), Emeritus Wayne Hall, PhD (National Centre for Youth Substance Use Research at the University of Queensland, Australia) and David Hammond, PhD (School of Public Health Sciences at The University of Waterloo, Canada).

A Brief Behavioral Intervention for Co-Users of Marijuana and Tobacco Among Smokers Calling State Quitlines

This project proposed to develop an integrated treatment for co-users of cannabis and tobacco to be delivered via state-funded quitlines. CERP director, Dr. Bia Carlini, was co-investigator on [this research project funded by the National Institute of Health](#) (NIH) from 2020 to 2023 and led by Kelly Carpenter, PhD.

Using Narratives to Identify Stigma Phenotypes – A Socio-Ecological Approach

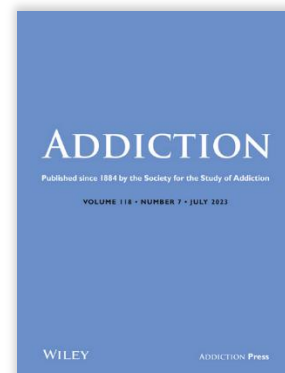
The long-term objective of this proposal is to derive insights concerning stigma in diverse settings (e.g., work, home, school), targeting diverse actors (persons involved in the stigma-related experience), and identify situations in which stigma reduction interventions are most needed. CERP director, Dr. Bia Carlini, is co-investigator on [this research project funded by the National Institutes of Health](#) from 2021 through 2023 and led by Annie Chen, PhD.

ADAI CERP Publications

The process of getting a publication released in peer-reviewed scientific journals may take an entire year or more. ADAI has traditionally shared their findings with the Washington community while papers are under submission to expedite the dissemination of work that can be used to support decision-making.

CERP publications in the 2021-23 biennium:

- Hall W, Leung J, Carlini BH. Do not let the ideal be the enemy of good enough regulation. *Addiction*. 2023 Jun;118(6):1009-1010. doi: 10.1111/add.16201. Epub 2023 Apr 23. PMID: 37088820. [View abstract](#).
- Hall W, Leung J, Carlini BH. How should policymakers regulate the tetrahydrocannabinol content of cannabis products in a legal market? *Addiction*. 2023 Jun;118(6):998-1003. doi: 10.1111/add.16135. Epub 2023 Feb 2. PMID: 36662648. [View abstract](#).
- Carlini BH, Garrett SB, Nims LN. The Kids Are Not All Right: E-Cigarettes, Cannabis Co-Use, and an Emerging Public Health Crisis--A Commentary on Roberts et al. (2022). *Journal of Studies on Alcohol and other Drugs*. 2022 Sep;83(5):771-772. doi: 10.15288/jsad.2022.83.771. PMID: 36136449. [View abstract](#).



- Carlini BH, Schauer GL. Cannabis-only use in the USA: prevalence, demographics, use patterns, and health indicators. *Journal of Cannabis Research* 2022 Jul 22;4(1):39. doi: 10.1186/s42238-022-00143-y. PMID: 35864553; PMCID: PMC9306107. [View abstract](#).
- Carlini BH, Garrett S, Firth C, Pinsky I. Cannabis Industry Marketing Violations in Washington State, 2014-2019. *Journal of Studies on Alcohol and other Drugs*. 2022 Jan;83(1):18-26. PMID: 35040756. [View abstract](#).
- Firth CL, Carlini B, Dilley J, Guttmanova K, Hajat A. Retail cannabis environment and adolescent use: The role of advertising and retailers near home and school. *Health Place*. 2022 May; 75:102795. doi: 10.1016/j.healthplace.2022.102795. Epub 2022 Mar 25. PMID: 35344691; PMCID: PMC9189000. [View abstract](#).

Under review:

- Carlini BH, Garrett SB, Matos P, Nims LN & Kestens Y. The Washington State (USA) legislative saga to address public health concerns of high THC cannabis: a Concept Mapping study. *International Journal of Drug Policy* (under review).
- Harwick R, Carlini BH & Williams J. Food hardship as a strong predictor of tobacco and cannabis use among youth in WA State. *Children and Youth Services Review* (under review).
- Carlini BH, Harwick R & Williams J. Language matters: Cannabis and tobacco use among youth of diverse racial/ethnic backgrounds. *Journal of Immigrant and Minority Health* (under review).

HIGHLIGHT: POLICY RECOMMENDATIONS TO WA LEGISLATURE

In 2021, the Washington Legislature directed the Washington State Health Care Authority through [ESSB 5092 \(2021\)](#) to contract with ADAI to develop policy recommendations for our state to mitigate the detrimental health impacts of [high-potency cannabis](#) (products with a high concentration of THC).

[The final report to the legislature](#), published in December 2022, describes recommendations in three areas:

- **De-incentivize the use of high-THC products** by adults who choose to consume cannabis.
- **Prevent initiation** of high-THC products.
- **Empower the public and consumers** with information and education about high THC products.

These recommendations developed by CERP were based on: 1) a study to identify perspectives of WA stakeholders; 2) an inventory of cannabis policies that have been considered or adopted in North America; and 3) research evidence on public policies designed to mitigate harms associated with non-medical use of high-THC cannabis products and other legally commercialized health-compromising products, such as tobacco, alcohol, and unhealthy foods (for a description, see *Projects Led by CERP* above).



SCIENCE-BASED EDUCATION & DISSEMINATION

New knowledge can only impact practice if it is disseminated widely and in a timely manner. In this section, we present the highlights of CERP research dissemination and education efforts. These efforts include a symposium, updates on our educational website Learn About Cannabis, and presentations to stakeholders at a state, county, and local level, national and international audiences, and scientific conferences.

ADAI Symposium on High-THC Cannabis



CERP hosted a day-long hybrid (in-person and virtual) symposium on September 16, 2022, which focused on the short and long-term risks of high-THC products, including conversations about policy-focused solutions and ways to increase awareness through education campaigns for providers, parents, and youth. The panel of speakers featured a range of international, national, and regional experts, as well as local policymakers.

More than 200 people attended either virtually or in-person. While the goal of this symposium was to educate Washingtonians on the challenges posed by high-THC products and possible solutions to address it, our collective knowledge reached far and wide to include registrants from five other countries and nine other US states.

[Full recordings and slides from the 2022 symposium are available here.](#)

ADAI Website: Learn About Cannabis

LearnAboutCannabisWA.org

Launched in 2012, the Learn About Cannabis website is supported by the Dedicated Cannabis Fund. This site is widely viewed as an authoritative source for information about cannabis, with more than 700 organizations in Washington and other states linking to it and close to 33,000 views between July 1, 2021 and June 30, 2023.

Just Released! New Content for Parents and Adults Who Care About Youth

These new webpages offer accessible, science-based information for adults who have youth in their lives. Featured topics include:

- [Cannabis Impacts Adolescents' Developing Brains](#)
- [21st Century Cannabis](#)
- [Cannabis Trends Among Youth](#)
- [Reducing Youth Cannabis Use](#)



Dissemination & Outreach

The following presentations were made to stakeholders at state, county, and local levels, national and international audiences, and at scientific conferences.

In Washington State

Washington State House Regulated Substances & Gaming Committee

- Invited Presenter: Dr. Bia Carlini. Proviso Update: Developing policy solutions in response to the public health challenges of high tetrahydrocannabinol potency cannabis. November 18, 2021.
- Invited presenter: Dr. Bia Carlini. Work Session: Update on Cannabinoid Product Regulation and Enforcement and Summary of Research on High-THC Concentration Cannabis. December 2, 2022.

Washington State Liquor and Cannabis Board

- Invited panelist: Dr. Bia Carlini. Deliberative Dialogue Session 5 Concerning Evaluation of THC Compounds: How might we determine and define what is and is not “impairing”? June 21, 2022.
- Invited presenter: Dr. Bia Carlini. Prevention and Public Health Roundtable. Cannabis Potency Research at the University of Washington. May 23, 2022.

Washington State Department of Health – Youth Marijuana Prevention and Education Program (YMPEP)

- Invited presenters: Dr. Bia Carlini and Sharon Garrett. Consumer assessment of receptivity to point-of-sale education and safe storage intervention. YMPEP Retail Workgroup. Sept. 1, 2021.

Support to Students and Schools

Occasionally, the CERP team offers support to students in Washington State from all levels of education. These are some of the occasions where CERP participated in educational events.

- Invited speakers: Sharon Garrett & Lexi Nims. Cannabis: What do we know? Cedar High School, Shelton, WA, Oct 18, 2021.
- Invited interviewees: Sharon Garrett & Lexi Nims. Interview for CSPAN Student Cam documentary about substance use in the US. Whitman Middle School class project. April 28, 2022.
- Invited Practicum Faculty Advisor (Dr. Bia Carlini) and Mentor (Sharon Garrett). Student: Juan Sorto Jr, Master of Public Health student at University of Washington School of Public Health. PHSKC Site Supervisor: Sarah Ross-Viles, MPH. Practicum Project presented at UW Practicum Symposium “PHSKC feasibility analysis of cannabis prevention programs delivered at point-of-sale to adults who consume cannabis and have children at home.” University of Washington, Spring 2022.

Outside Washington State

State Agencies and Universities in Other States

- Invited Participant: Dr. Bia Carlini. California Department of Public Health (CDPH) High-Potency THC Think Tank. The goals of the Think Tank were to provide scientific guidance and recommendations on the research, health effects, and social impacts of high-potency THC, and potential policy actions. The Think Tank was comprised of 10-20 scholars in varying fields of study. December 16, 2022.
- Invited Speaker: Dr. Bia Carlini. High-Potency Cannabis Health Risks: what we know and the experience of WA State. California DCC Public Health and Community Impact subcommittee. May 24th, 2023.

National and International

- Invited panel presenter: Dr. Bia Carlini. North America Quitline Consortium (NAQC) Webinar: Implications of Cannabis Legalization for Quitlines. March 2, 2022.
- CERP team hosted Ivana Obradovic, Deputy Director of the French Monitoring Centre for Drugs and Drug Addiction (OFDT) and Anne-France Taiclet, researcher in political science at University of Paris 1-Panthéon Sorbonne at the University of Washington. The goal of their visit was to learn about cannabis-related research in the State of Washington as part of their project "A Strategic Analysis of Regulatory Cannabis Policies (ASTRACAN). July 15th, 2022.

Presentations at Scientific Conferences

- Garrett, S., Carlini, B.H., Nims, L, & Wilhelm, L. Consumer Assessment of Receptivity to Point-of-Sale Education and Safe Storage Intervention. Panel presentation. [Society for Prevention Research \(SPR\) 30th Annual Meeting](#). Seattle, WA, June 1st, 2022.
- Carlini, BH, Garrett, S., Nims, L. Are parents who use cannabis receptive to safe storage interventions and point-of-sale education? Poster presentation. [6th Annual Research Society on Marijuana \(RSMJ\)](#) conference. Boston, MA, July 22-24, 2022.
- Carlini BH, Garrett S, Matos P, Nims L and Kestens Y. Oral presentation: The Washington State (USA) legislative saga to address public health concerns of high-THC cannabis: a concept mapping study. 2023 Conference of the International Society for the Study of Drug Policy. Leuven, Belgium, May 30, 2023.



CERP IN THE MEDIA

According to the [Muck Rack](#) database, CERP director Dr. Bia Carlini had 423 mentions in the media in the biennium 2021-23, most of which represent [syndication](#) (the process by which material from one site is published automatically to another site) of 36 original articles.

Highlighted below are a few of these original articles.



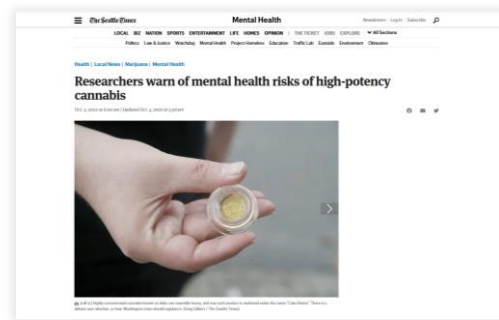
“While we should celebrate that, as a society, we moved away from the stigmatization of cannabis users, and wide exaggeration of the risks of using cannabis, we should be concerned about our current cultural moment, when cannabis has been portrayed as a harmless substance.” –Dr. Bia Carlini

HealthDay News, May 26, 2023



The New York Times

[Psychosis, Addiction, Chronic Vomiting: As Weed Becomes More Potent, Teens Are Getting Sick](#)



The Seattle Times

[Researchers Warn of Mental Health Risks of High Potency Cannabis](#) (supported by a [ST Editorial](#))



NBC News

[States that Legalized Marijuana Now Researching Mental Health Risks of High-Potency Cannabis](#)



The Times (UK)

[Potent Cannabis Strain 'Causing Psychosis Time Bomb' in US](#)



CANNABIS EDUCATION
& RESEARCH PROGRAM



UNIVERSITY of WASHINGTON

PSYCHIATRY & BEHAVIORAL SCIENCES
School of Medicine

This report was created August 2023 by ADAII CERP