Meeting of the
HB 21-1317 Scientific Review Council

November 21, 2022

colorado school of public health

Cannabis Research & Policy Project

Opening Remarks, Introductions and Welcome, Updates on Conflict of Interest

Christopher E. Urbina, MD, MPH
Chair, HB 21-1317 Scientific Review Council

Jonathan M. Samet, MD, MS
Dean, Colorado School of Public Health

Scientific Review Council Members

Member	Role on Council	Affiliation(s)
Chris Urbina, MD, MPH (Chair)	Preventive medicine specialist (or preventive medicine public health professional)	Pueblo Department of Public Health and Environment; Former Director of CDPHE
Gregory Kinney, PhD, MPH	Epidemiologist	Colorado School of Public Health
David Brumbaugh, MD, MSc	Physician familiar with the administration of medical marijuana pursuant to current state laws with experience recommending medical marijuana to those aged zero to seventeen	Children's Hospital Colorado; University of Colorado School of Medicine
Kennon Heard, MD	Medical Toxicologist	University of Colorado School of Medicine
Archana Shrestha, MD	Neurologist	University of Colorado School of Medicine
Erica Wymore, MD, MPH	Pediatrician	University of Colorado, School of Medicine
Paula Riggs, MD	Psychiatrist	University of Colorado, School of Medicine
Susan Calcaterra, MD, MPH	Internal medicine physician (or other specialist in adult medicine)	University of Colorado School of Medicine
Joseph Schacht, PhD	Licensed Substance Abuse Disorder Specialist	University of Colorado School of Medicine
Kent Hutchison, PhD	Neuropsychopharmacologist	University of Colorado School of Medicine
Lesley Brooks, MD	Medical professional (or public health professional) who specializes in racial and health disparities and systemic inequalities in health care and medicine	North Colorado Health Alliance; SummitStone Health Partners

Cannabis Research & Policy Project Team Members

Member	Sub-Team
Lisa Bero, PhD	Systematic Review
Ashley Brooks-Russell, PhD, MPH	Subject Area Expertise
Meghan Buran, MPH	Administration
Neeloofar Soleimanpour, MPH	Administration
Rosa Lawrence, BA	Systematic Review
Louis Leslie, BA	Systematic Review
Tianjing Li, MD, PhD, MHS	Systematic Review
Christi Piper, MLIS	Systematic Review
Thanitsara Rittiphairoj, MD, MPH	Systematic Review
Tsz Wing Yim, MPH	Systematic Review
Jean-Pierre Oberste, BA	Systematic Review
Jonathan Samet, MD, MS	Administration
Greg Tung, PhD, MPH	Administration, Subject Area Expertise
Sam Wang, MD	Subject Area Expertise

Review of Agenda and Meeting Minutes

Christopher E. Urbina, MD, MPH
Chair, HB 21-1317 Scientific Review Council

Agenda

- Opening Remarks, Introductions and Welcome, Updates on Conflict of Interest (Jon Samet and Chris Urbina)
- Review of Agenda and Meeting Minutes (Chris Urbina)
- Progress Update on Scoping Review (Tianjing Li)
- PRISMA Diagram and Evidence Map Overview (Tianjing Li and Jon Samet)
- Educational Campaign (Jon Samet)
- Approaches for Moving from Evidence Map to Evidence Synthesis (Tianjing Li and Greg Tung)
    - Top-Down: Question-driven Approach
    - Bottom-Up Approach
- Next Steps (Jon Samet)
- SRC Discussion (Chris Urbina)

Cannabis Research & Policy Project

Our Team | Scientific Review Council | Resources | Events | Contact Us

Researching and educating on cannabis and health

The CRPP team studies cannabis and health, provides policy recommendations, and educates the public.

Who we are

The Cannabis Research & Policy Project team is a group of researchers from the Colorado School of Public Health and the University of Colorado Anschutz Medical Campus.

Charge to the Colorado School of Public Health

Tasks for the Colorado School of Public Health in HB 21-1317

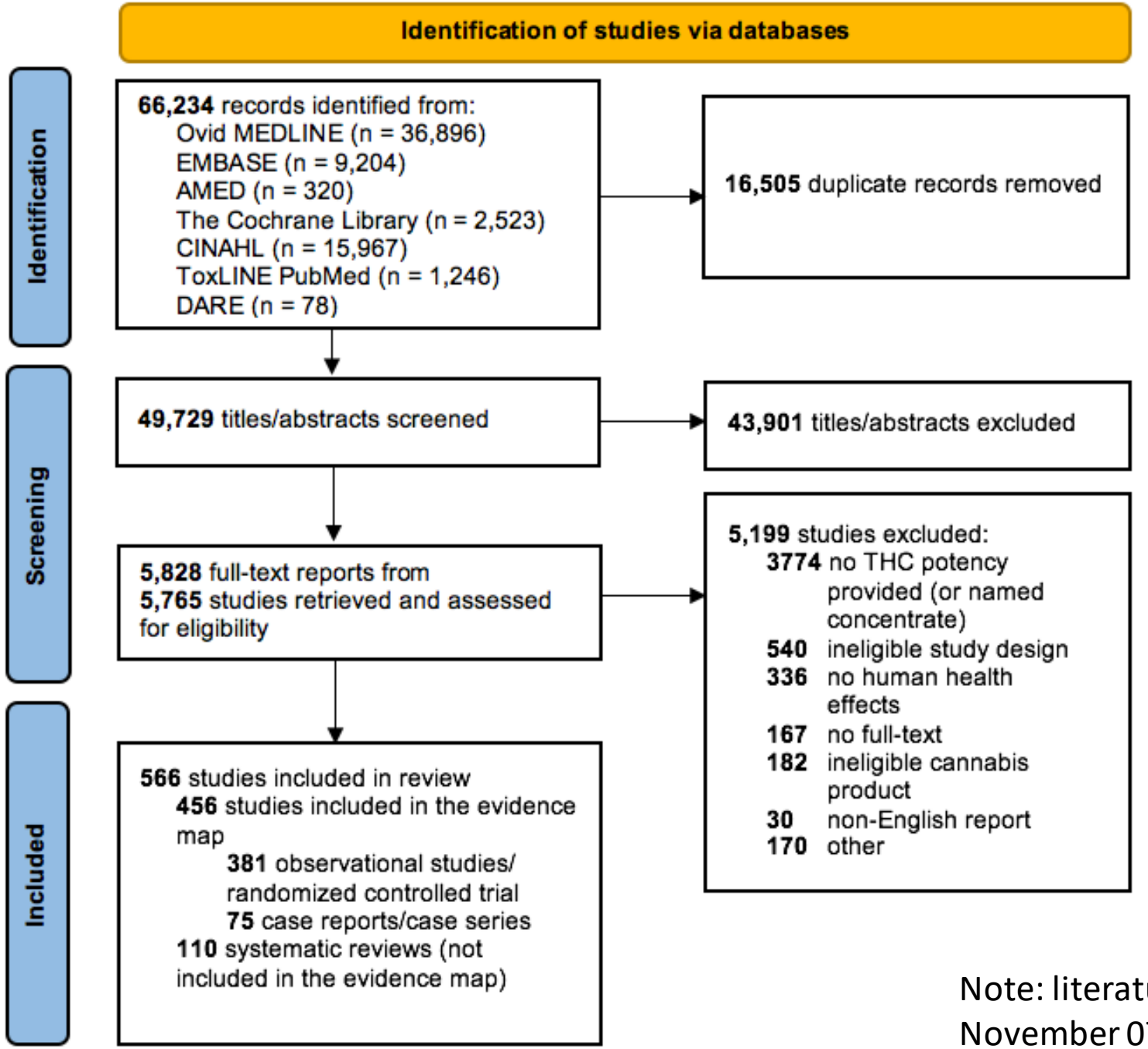
- Conduct a systematic review of high-potency THC marijuana
- Establish a Scientific Review Council
- Produce a public education campaign

High-Potency THC Marijuana and Marijuana Concentrate Research

- Conduct a systematic review of high-potency THC marijuana:
  - Systematically curate and synthesize the evidence regarding possible physical and mental health effects
  - Identify needed research
    - Report on gaps identified by 1/31/2022 and what needed to address the gaps, including funding and timeline for new studies
- Provide initial report by 7/1/2022
- Potentially conduct additional research
- The research must be conducted independently without any predetermined outcomes or undue influence from any party

Progress Update on Scoping Review

Tianjing Li, MD, MHS, PhD
Associate Professor, School of Medicine, Colorado School of Public Health



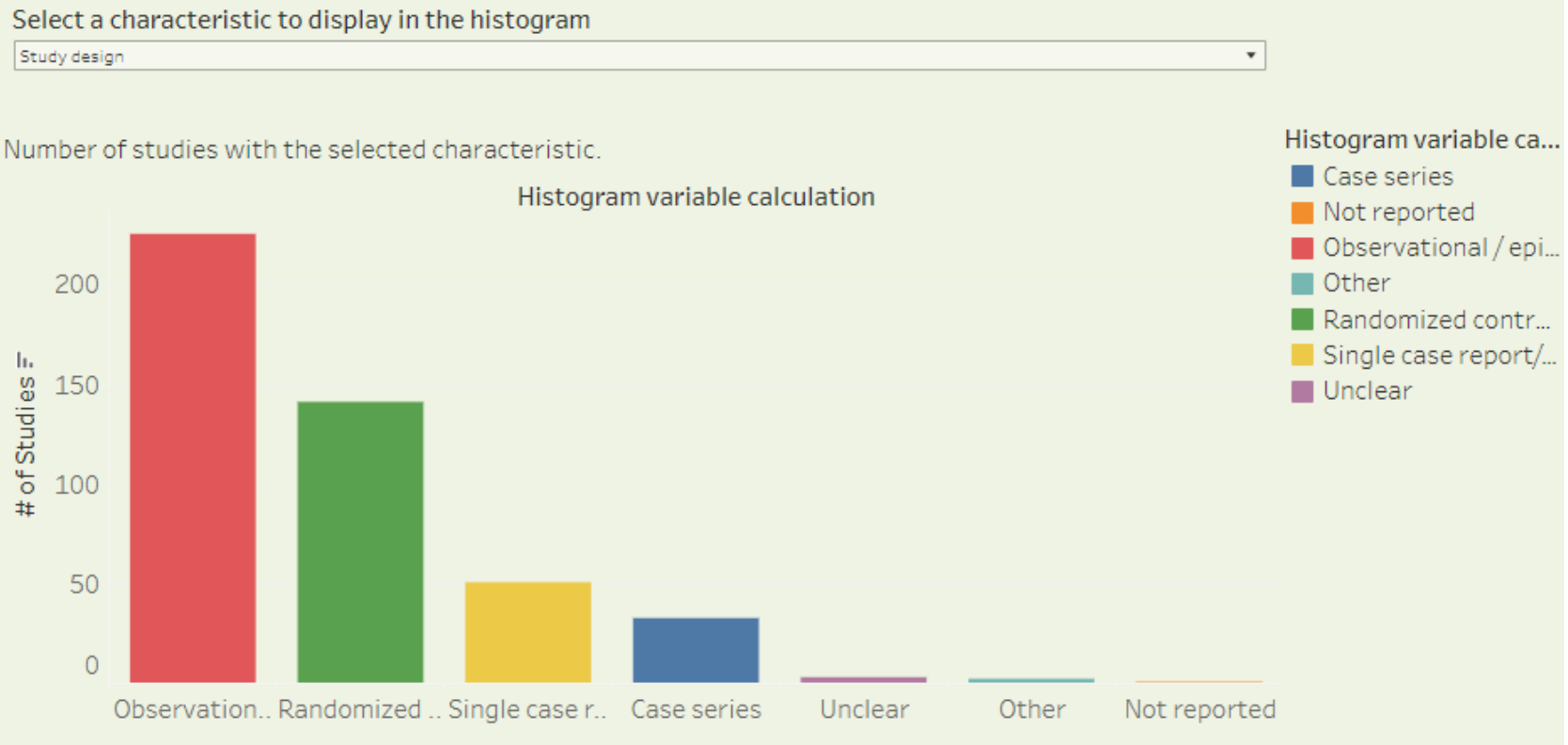
Note: literature search updated November 07, 2022

Study designs from the cannabis evidence map

Studies by characteristic

Studies of the health effects of high concentration cannabis were categorized by the study characteristics, study population, cannabis exposures included in the study and health outcomes. Select categories of interest in the drop down menu to the right to update the histogram.

Counts represent study characteristics and NOT study findings.



Please reach out to Rosa Lawrence (rosa.lawrence@cuanschutz.edu) if you have any questions.

Cannabis route of exposure by participant age group from cannabis evidence map

Studies by multiple characteristics

Studies of the health effects of high concentration cannabis were categorized by the study characteristics, study population, cannabis exposures included in the study and health outcomes. Look at the relationship between two categories by selecting the categories in below. The table to the right will be updated with the selected categories.

Counts represent study characteristics and NOT study findings.

Heatmap variable 1: Study participant age/developmental stage*

Heatmap variable 2: Route of cannabis exposure*

	Variable 2							
Variable 1	Inhalation	Ingestion	Intravenous	Rectal	Sublingual	Topical	Other	Not reported
Birth to < 1 yea..	4	8			1	1	3	3
Child (1-8)	5	26		1	2	2	3	4
Adolescent (9-1..	34	35		1	5	4	4	13
Young adult (18..	167	91	11		17	14	10	41
Adult (25-64)	205	124	14	2	26	25	15	38
Older adult (65 ..	77	66	2	2	16	19	11	14
Preconception								1
Pregnancy (mot..	1				1			1
Postpartum bre..	1	1						
Postpartum ma..								1
Other	22	10	1	1	5	1	2	7
Not reported	19	10			2	3		7

Timeline of types of cannabis products studies from cannabis evidence map

Studies over time

Studies of the health effects of high concentration cannabis were categorized by the study characteristics, study population, cannabis exposures included in the study and health outcomes. Look at a category over time by selecting the category below. The timeline to the right will be updated with the selected categories.

Counts represent study characteristics and NOT study findings.

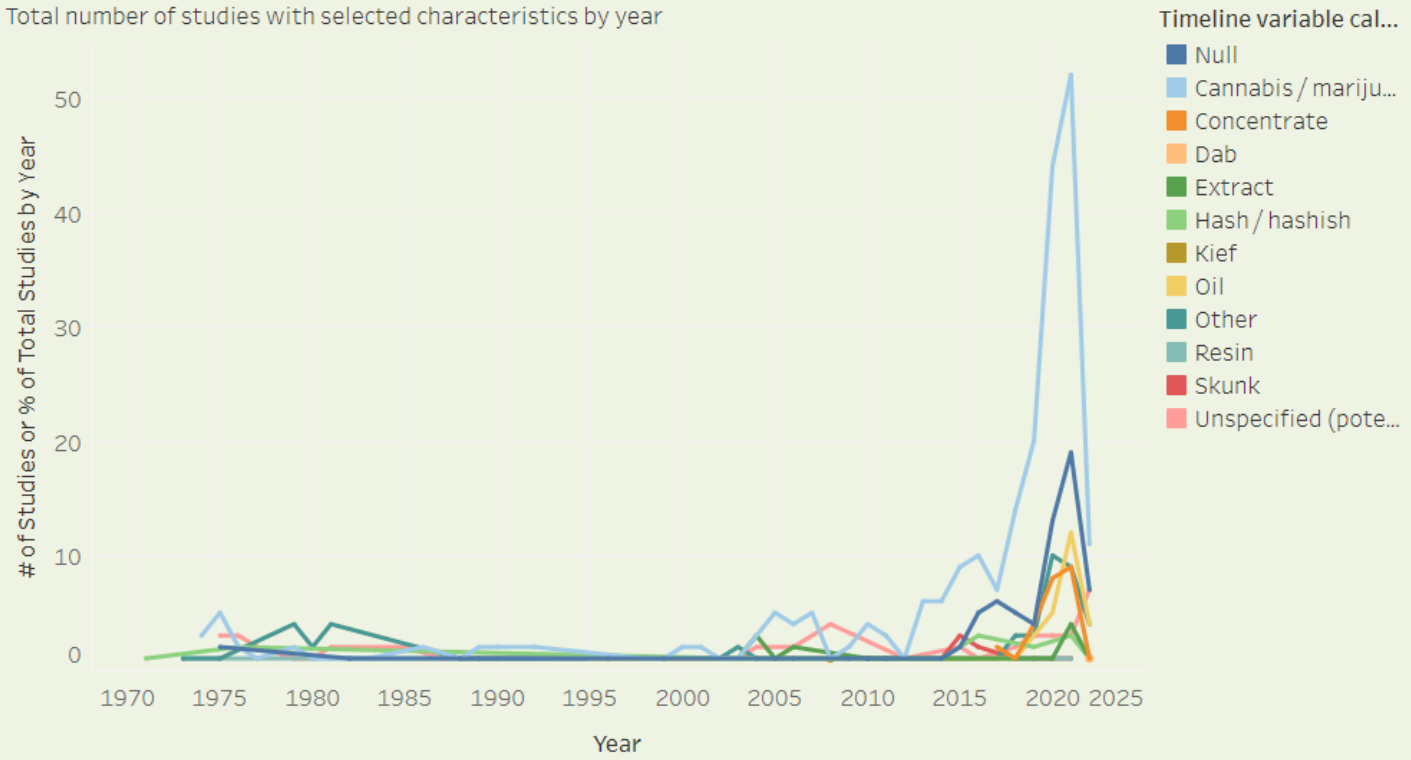
Timeline variable

Cannabis product studied*

Timeline display

(•) # of Studies by Year

( ) % of Total Studies by Year



Explore page of cannabis evidence map

DATA DASHBOARD

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Updated 10/28/2022 with all included studies (n = 456) - 381 Observational and RCT Studies, 75 Case Reports

Explore studies by selecting items from the tables below. Selections will refine the list of studies in the column to the right. Clicking on cells in the tables will refine all other tables on the page.

Study Characteristics

Study objectives*

Efficacy	24
Harm/safety	37

Study design

Case series	1
Observational / epidemiolo..	31
Randomized controlled trial	5
Single case report/study	
Other	
Unclear	
Not reported	

Author affiliations for any author by study*

Academic	30
Commercial/private	7
Government	10
NGO	2
Other	1
Not reported	1

Reported study funding

No	10
Yes	27

Study funding*

Cannabis industry	2
Government	14
NGO / non-profit	3
Other	7

Study Population

Study participant age/developmental stage*

Birth to < 1 years of a..	8
Child (1-8)	15
Adolescent (9-17)	37
Young adult (18-24)	194
Adult (25-64)	223
Older adult (65 and o..	83
Preconception	1
Pregnancy (mother's ..	1
Postpartum breastfe..	1
Postpartum maternal	1
Other	29
Not reported	19

Pregnancy - mother's stage*

First Trimester (0 to 1..	1
Second Trimester (14 t..	1
Third Trimester (27 to ..	1

Study participant sex*

Female	33
Male	32
Non-binary	
Transgender	
Other	3
Not reported	2

Study participant race*

American Indian or..	1
Asian	9

THC Exposure

Cannabis product studied*

Cannabis / marijuana ..	25
Concentrate	2
Dab	
Extract	1
Hash / hashish	4
Kief	
Oil	2
Resin	2
Skunk	2
Unspecified (potency ..	6
Other	1

Purpose of cannabis exposure*

Medicinal	13
Recreational	6
Unintentional	8
Other	5
Not reported	12

Route of cannabis exposure*

Ingestion	20
Inhalation	18
Intravenous	
Rectal	1
Sublingual	1
Topical	3
Other	3
Not reported	10

Health Outcome

Health outcome domain*

Cancer	2
Cardiometabolic	7
Gastrointestinal	10
Immunity	1
Injury and death	3
Mental health	15
Neurological	13
Ocular	2
Pain	4
Pre-, peri-, and neona..	1
Psychosocial	7
Respiratory	8
Sexual health and rep..	2
Sleep	7
Substance use /subst..	8

Direct association between cannabis concentrate and health outcomes*^

No	29
Unclear	1
Yes	10

Direct association between reported THC concentration and health outcomes*^

No	25
Unclear	1
Yes	13

Studies in Selected Categories

Number of Studies in Selected Categories: **37**

Download tables

To reset filters - **click 'Revert'** in the banner at the top of the page to reset all filters or refresh the browser.

Click on a URL in the table below to link to the article. **Mouse over circles** to view abstracts and additional information.

Studies in selected categories

Title	Author	Year	URL
A laten..	Mackie,..	2021	https:..
A pros..	Chang, ..	1981	http:/..
Acute c..	Noble, ..	2019	https:..
Acute e..	Mokrys..	2020	https:..
Adoles..	Audrain..	2018	https:..
Amelio..	Ekert, H..	1979	https:..
Are ad..	Mokrys..	2016	https:..
Cannab..	Andrew..	2015	https:..
Cannab..	Fanelli, ..	2017	https:..
Cannab..	Vo, K. T...	2018	https:..
Cannab..	Kaczor, ..	2021	https:..
Cannab..	Gabrhel..	2021	https:..
Cannab..	Madero..	2020	https:..
Compo..	Suraev, ..	2018	https:..
Cross-s..	van der ..	2014	https:..
Differe..	Foster, ..	2021	https:..
Does h..	Swan, C..	2021	https:..
Driving..	Lemos, ..	2015	https:..

Reach out to Rosa Lawrence if you have any questions. Rosa.Lawrence@cuanschutz.edu

Progress Update on Educational Campaign

Sheana Bull, PhD, MPH
Professor, Colorado School of Public Health

colorado school of public health

Cannabis Research & Policy Project

Educational Campaign

Jenn Leiferman, PhD

Professor, Chair (CBH Dept.), Director (RMPRC), Founder (PMHW)

Department of Community & Behavioral Health
Population Mental Health & Wellbeing Program
Rocky Mountain Prevention Research Center

Sheana Bull, PhD, MPH

Professor, Director (mHealth Impact Lab)

Center for Global Health
Department of Community & Behavioral Health
Health and Behavioral Sciences (CLAS)
mHealth Impact Lab

Charlene Barrientos-Ortiz

Senior Professional Research Assistant, Community Engagement Manager

Coming soon! Paige Buchanan-Hall,
Professional Research Assistant
Health Communication and Social Media

Educational Campaign Activities

- **Review of Reviews** to synthesize "Best practices" in Health Communication Campaigns
  - We have established eligibility criteria for the review
  - Identified 655 abstracts to review from an initial pool of >2000 articles
  - Completed abstracts screening and have 154 full-texts to review

- **Descriptive review** of the use of 21st Century media tools (e.g., social media, text messaging, web logs (BLOGS) for health communication
  - To date, we have identified 8374 articles to screen

Educational Campaign Activities

- **Community Engagement** to ensure awareness of the High-potency Marijuana research and education activities; help frame messages; help optimize message reach and impact
  - To date we have identified three community liaisons who will help us identify and invite members for two community advisory groups: a youth and an adult group
  - We have completed a scope of work for community liaisons and a budget for community engagement activities

Educational Campaign Activities

Activity	Timeline	Deliverable
Overview of systematic reviews	Complete By February 2023	Summary of evidence-based strategies that have been impactful in facilitation of healthy behavior or reduction of health risk behavior
Descriptive review of 21st Century communication strategies	Complete by February 2023	Summary of strategies that have been tried to improve reach and engagement of diverse audiences using social media and technology-based modalities
Convene community advisory groups	Initial meetings begin January 2023 and continue through May 2023	Summary of diverse perspectives on proposed health education message content; identification of potential vendors who could effectively craft and delivery health education messaging

Educational Campaign Activities

Activity	Timeline	Deliverable
Identify key message content for education campaigns on the impact of high-concentration marijuana consumption	Complete by April 2023	A list of critical message content to include in health education campaigns; potentially include 3-5 key messages
Identify priority audiences to receive campaign content	Complete by January 2023	Identify initial groups who are priority audiences to receive health education messaging
Identify vendors with potential to generate compelling health education content	Complete by May 2023	Identify 3-5 vendors who have potential to generate compelling health education content

Moving from Evidence Map to Evidence Synthesis

Gregory Tung, PhD, MPH
Associate Professor, Department of Health Systems, Management & Policy, Injury & Violence Prevention Center, Colorado School of Public Health

Tianjing Li, MD, MHS, PhD
Associate Professor, School of Medicine, Colorado School of Public Health

colorado school of public health

With the evidence map complete, what next?

- The evidence map is now complete, providing a comprehensive and searchable picture of the available evidence on THC and risks and benefits of cannabis products.
- We propose two approaches to utilizing the evidence map to identify next steps:
  - Top-down (question-driven): consider a priori questions and policy needs and determine if they can be answered.
  - Bottom-up (data-driven): utilize the evidence map to identify those clusters of studies that are sufficiently robust to address questions of interest

Top-down: Question-driven approach

- This approach begins with the development of questions that are then used to interrogate the evidence map

- These questions can be motivated for diverse reasons including interrogating the evidence map to determine subsequent systematic reviews, research recommendations, and policy recommendations

- We have developed three general policy-motivated questions

Policy-motivated question 1

Are adolescents and young adults especially susceptible to harmful physical or mental health outcomes of high concentration cannabis products?

- Policy implications: What policies or regulations, if any, should be put in place to protect adolescents and young adults from the harms of high concentration cannabis products?

Policy-motivated question 2

Are individuals with preexisting mental health conditions especially susceptible to harmful mental health outcomes of high concentration cannabis products?

- Policy implications: What policies or regulations, if any, should be put in place to protect those with preexisting mental health conditions from the harms of high concentration cannabis products?

Policy motivated question 3

Is there a concentration level or threshold at which high concentration products tend to produce more harmful physical or mental health outcomes?

- Policy implications: Should restrictions be placed on high concentration cannabis products and if so at what concentration level?

Question-driven approach process

Step 1

- Use the first of the paired questions to identify relevant studies from the evidence map
- Report a narrative description of the results and conclusions from those studies

Step 2

- To address the second of the paired questions we take the narrative description, identify core values, and identify potential trade-offs to determine a policy recommendation
  - Consultation with the SRC and other stakeholders

Policy-motivated question 1

Are adolescents and young adults especially susceptible to harmful physical or mental health outcomes of high concentration cannabis products?

- Policy implications: What policies or regulations, if any, should be put in place to protect adolescents and young adults from the harms of high concentration cannabis products?

Product with Potency	Product without Potency	Potency without Product
596	179	5790
5723	1878	9204
8189	5022	
12621	5129	
24642	5313	
33481	6028	
	9305	
	34703	
	64590	
	66047	

THC Thresholds	mg	%
	<5	<5
	(5-10)	(5-15)
	(10-20)	(15-20)
	>20	(20-40)
		>40

Refers to h

Product with Potency			
All 3	2 of 3	1 of 3	0 of 3
596			
5723			
8189			
12621			
24642			
33481			

Direct	Indirect
5723	596
12621	8189
24642	
33481	

Product without Potency			
	2 of 3	1 of 3	0 of 3
	179	5022	
	1878	6028	
	5129	9305	
	5313	64950	
	34703	66047	

Direct	Indirect
1878	179
5313	5129
34703	

Direct	Indirect
5022	6028
64950	9305
66047	

Potency without Product			
All 3	2 of 3	1 of 3	0 of 3
5790			
9204			

Direct	Indirect
5790	9204

Ranking	Ref	Product	Route	THC	Frequency	Duration	Association	Outcomes
High	5723	Skunk	Inhalation	5-15%	Weekly	12 months	Direct	
High	12621	Flower	Inhalation	5-15%	5 inhalation	4 sessions	Direct	
High	5790	NR	NR	15-20%	Weekly	12 months	Direct	
Medium	1878	Concentrat	NR	NR	Daily	54 days	Direct	
Medium	1878	Edible	Ingestion	NR	Daily	54 days	Direct	
Medium	5313	Edible	Ingestion	NR	Daily	30 days	Direct	
Medium	5313	Vape	Inhalation	NR	Daily	30 days	Direct	
Medium	34703	Hashish	NR	NR	Daily	6-15 mo's	Direct	
Low	24642	Spray	Sublingual	<5mg	6 intervals	2 days	Direct	
Low	33481	Flower	Inhalation	<5%	Daily	21 days	Direct	
Low	5022	Concentrat	NR	NR	Days/mo	NR	Direct	
Low	5022	Edible	Ingestion	NR	Days/mo	NR	Direct	
Low	64950	Vape	Inhalation	NR	NR	14 days	Direct	
Low	66047	Liq/Wax	Inhalation	NR	NR	30 days	Direct	
Low	8189	Oil	Sublingual	>20mg			Indirect	
Low	596	Cigarette	Inhalation	5-15%			Indirect	

Threshold for "High Relevancy"

Threshold for "Medium Relevancy"

Ranking	Ref	Product	Route	THC	Frequency	Duration	Association	Outcomes
High	5723	Skunk	Inhalation	5-15%	Weekly	12 months	Direct	
High	12621	Flower	Inhalation	5-15%	5 inhalation	4 sessions	Direct	
High	5790	NR	NR	15-20%	Weekly	12 months	Direct	
Medium	1878	Concentrat	NR	NR	Daily	54 days	Direct	
Medium	1878	Edible	Ingestion	NR	Daily	54 days	Direct	
Medium	5313	Edible	Ingestion	NR	Daily	30 days	Direct	
Medium	5313	Vape	Inhalation	NR	Daily	30 days	Direct	
Medium	34703	Hashish	NR	NR	Daily	6-15 mo's	Direct	
Low	24642	Spray	Sublingual	<5mg	6 intervals	2 days	Direct	
Low	33481	Flower	Inhalation	<5%	Daily	21 days	Direct	
Low	5022	Concentrat	NR	NR	Days/mo	NR	Direct	
Low	5022	Edible	Ingestion	NR	Days/mo	NR	Direct	
Low	64950	Vape	Inhalation	NR	NR	14 days	Direct	
Low	66047	Liq/Wax	Inhalation	NR	NR	30 days	Direct	
Low	8189	Oil	Sublingual	>20mg			Indirect	
Low	596	Cigarette	Inhalation	5-15%			Indirect	
Low	9204	NR	Inhalation	5-10mg			Indirect	
Low	179	Concentrat	NR	NR			Indirect	
Low	179	Edible	Ingestion	NR			Indirect	
Low	5129	Hashish	NR	NR			Indirect	
Low	6028	Vape	Inhalation	NR			Indirect	
Low	9305	Edible	Ingestion	NR			Indirect	
Low	9305	Vape	Inhalation	NR			Indirect	

Threshold for "High Relevancy"

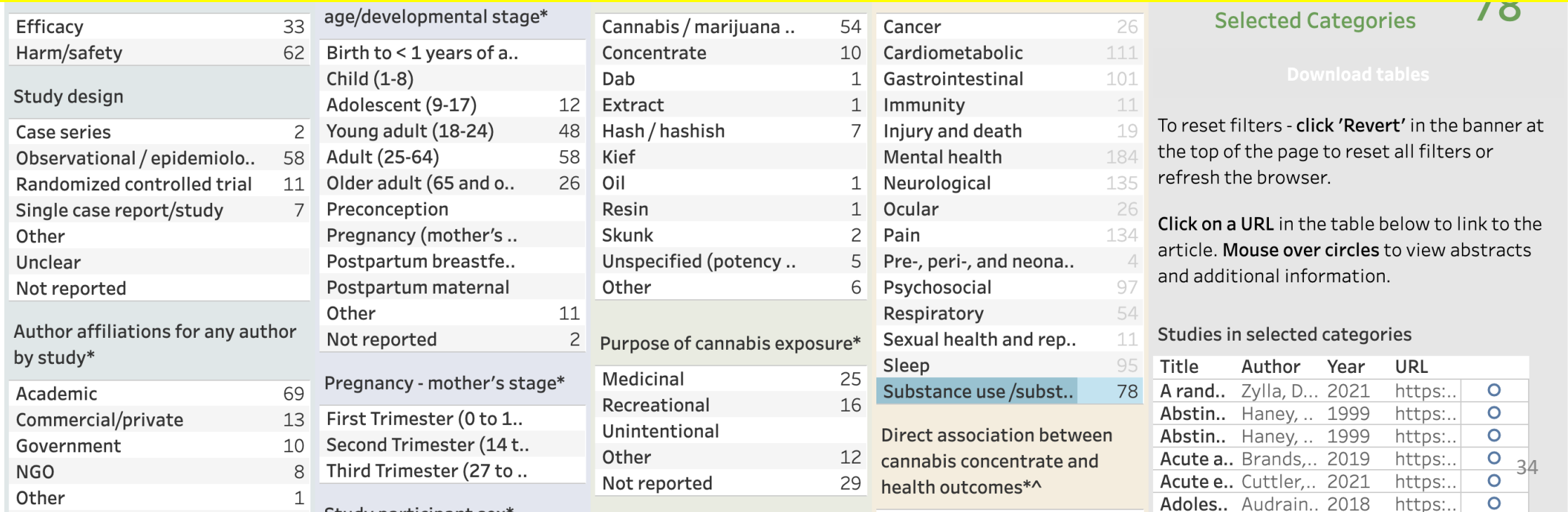
Threshold for "Medium Relevancy"

Bottom-up approach

- Summarize the characteristics of each study (for example, by outcome type)
- Determine which studies are similar enough to be grouped within each characteristics of interest (for example, by age of population)
- Determine which data are available for synthesis
- Determine if modification to the planned outcomes is necessary

Explore page of cannabis evidence map

A potential systematic review question:
Does exposure to higher concentration, higher frequency, and higher duration of THC increase the risk of cannabis use disorder, psychological problems (including psychosis), and other substance dependence (e.g., alcohol, cigarette, illicit drug use)?



Efficacy	33
Harm/safety	62

Study design

Case series	2
Observational / epidemiolo..	58
Randomized controlled trial	11
Single case report/study	7
Other	
Unclear	
Not reported	

Author affiliations for any author by study*

Academic	69
Commercial/private	13
Government	10
NGO	8
Other	1

age/developmental stage*

Birth to < 1 years of a..	
Child (1-8)	
Adolescent (9-17)	12
Young adult (18-24)	48
Adult (25-64)	58
Older adult (65 and o..	26
Preconception	
Pregnancy (mother's ..	
Postpartum breastfe..	
Postpartum maternal	
Other	11
Not reported	2

Pregnancy - mother's stage*

First Trimester (0 to 1..	
Second Trimester (14 t..	
Third Trimester (27 to ..	

Cannabis / marijuana ..	54
Concentrate	10
Dab	1
Extract	1
Hash / hashish	7
Kief	
Oil	1
Resin	1
Skunk	2
Unspecified (potency ..	5
Other	6

Purpose of cannabis exposure*

Medicinal	25
Recreational	16
Unintentional	
Other	12
Not reported	29

Cancer	26
Cardiometabolic	111
Gastrointestinal	101
Immunity	11
Injury and death	19
Mental health	184
Neurological	135
Ocular	26
Pain	134
Pre-, peri-, and neona..	4
Psychosocial	97
Respiratory	54
Sexual health and rep..	11
Sleep	95
Substance use /subst..	78

Direct association between cannabis concentrate and health outcomes*^

Selected Categories 78

Download tables

To reset filters - **click 'Revert'** in the banner at the top of the page to reset all filters or refresh the browser.

Click on a URL in the table below to link to the article. **Mouse over circles** to view abstracts and additional information.

Studies in selected categories

Title	Author	Year	URL
A rand..	Zylla, D...	2021	https:..
Abstin..	Haney, ..	1999	https:..
Abstin..	Haney, ..	1999	https:..
Acute a..	Brands,..	2019	https:..
Acute e..	Cuttler,..	2021	https:..
Adoles..	Audrain..	2018	https:..

Next Steps

Jonathan M. Samet, MD, MS
Dean, Colorado School of Public Health

Initial perspective

- The identified scientific literature is highly diverse in its methods, populations, and outcomes
- With the scoping review, general limitations of the literature are evident that will be problematic:
  - Variable approaches to ascertaining specific outcomes
  - Non-uniform approaches to exposure assessment
  - Only more recent literature relevant to questions related to high potency marijuana and THC concentrates
- For some outcomes, the literature appears sufficiently robust to complete systematic reviews.

Next steps: scoping review to systematic reviews

- Complete the bottom-up review for the main outcomes with sufficient data.
  - Compile list of potential systematic reviews for SRC review
  - Identify those most likely to provide informative results concerning high potency marijuana and THC concentrates
- Complete the list of “top-down” policy questions and evaluate scoping review findings to target one or more systematic reviews.

Educational campaign—steps ahead

- Complete background reviews
- Identify key target groups for the campaigns
- Plan campaign logistics
- Determine key messages for target groups
- Launch campaigns
- Ongoing evaluation and refinement

Overall timelines

- Scoping and systematic reviews
  - December 15: completion of decision-making concerning systematic reviews
  - December 15: review by the SRC
  - December 31: further report to legislature regarding final decisions
  - March—June: roll-out of reviews with reports to the legislature
- Educational campaign
  - Spring 2023: in the field

SRC Discussion

Christopher E. Urbina, MD, MPH
Chair, HB 21-1317 Scientific Review Council

Closing Remarks

Christopher E. Urbina, MD, MPH
Chair, HB 21-1317 Scientific Review Council