Health Effects of High-Potency Cannabis Products: A Scoping Review

First Progress Report, January 31, 2022

Cannabis Research and Policy Project Team

Colorado School of Public Health

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Submitted to:

House Finance and Public and Behavioral Health and Human Services Committees

and

Senate Finance and Health and Human Services Committees

Overview of Progress to Date

This Progress Report is submitted to meet the reporting requirements of Colorado General Assembly HB 21-1317 (CONCERNING THE REGULATION OF MARIJUANA FOR SAFE CONSUMPTION, AND, IN CONNECTION THEREWITH, MAKING AN APPROPRIATION). The Act called on the Colorado School of Public Health to carry out a systematic review on the effects of high potency THC marijuana and marijuana concentrates. This report, prepared six months after the project was initiated provides an overview of the project to date, laying out how the Colorado School of Public Health is proceeding to complete its task. An initial report of findings is to be provided by July 1, 2022. All materials related to the project are posted at the project website: https://coloradosph.cuanschutz.edu/research-and-practice/practice/cannabis-research/home.

Over the initial six months since project funding was received, the following has been accomplished:

1. The Cannabis Research and Policy Research Team has been assembled (see Table 1). Its members cover the requisite areas for the mandated review including systematic review expertise (Bero and Li) and conduct (Leslie, Rittiphairoi, and Lawrence); information sciences (Piper); subject area expertise (Brooks-Russell, Tung, and Wang); and project administration (Buran, Tung and Samet).
2. The Science Review Council (see Table 2) has been recruited according to the requirements of HB 21-1317 and has met twice: November 17, 2021 and January 24, 2022.
3. The protocol for the review has been developed and published (https://osf.io/wv7e9).
4. The literature search has been carried out, yielding 46,004 candidate articles.
5. Titles and abstracts of 46,004 articles have been screened for eligibility for the review by a team led by Leslie and Rittiphairoi. To screen this large number of titles and abstracts, 16 Colorado School of Public Health students have been hired and trained to carry out the screening process. The task of screening has been facilitated by using an artificial intelligence tool (DistillerSR). After this initial selection process, the full text of 4,983 scientific reports remain for screening.
6. A protocol for full text screening has been tested and is now being applied to select the articles for data extraction.
7. The data abstraction items have been developed and pilot tested.

Detailed Progress

Protocol

The review protocol was published on December 11, 2021 and is publicly available (URL: https://osf.io/wv7e9). It is referenced as follows:

Bero, Lisa, Tianjing Li, Louis Leslie, Thanitsara Rittiphairoj, Christi Piper, Sam Wang, Ashley Brooks-Russell, Gregory Tung, Jon Samet. 2021. "Health Effects of High-potency Cannabis Products: A Scoping Review Protocol." OSF. December 11. doi: 10.17605/OSF.IO/WV7E9

The protocol was finalized and published following input from the Scientific Review Council and consideration of public comments on the draft protocol.

Timeline and workflow

The timeline for a systematic review includes multiple steps (Figure 1) that extend from formulation of the research question to synthesis of the evidence identified and extracted from the articles. Each of these steps proceeds in order as in Figure 1. As described below, we are near completion of screening and beginning data extraction, having finished the previous steps.

Figure 2 is termed a PRISMA diagram where PRISMA refers to Preferred Reporting Items for Systematic Reviews and Meta-Analyses. The PRISMA diagram describes the flow of article inclusion and exclusion from the initial search to the final studies included in the review.

Review Team

The team members are listed in Table 1. To assist with the review process given the massive number of articles identified, we have hired and trained 16 University of Colorado students who are working part time. An additional Professional Research Assistant (50% time) has also joined the team. In addition, students have been employed to assist the Strauss Health Sciences Library with obtaining full text of articles that were not immediately available. We needed to request approximately 5000 articles. With regard to the possibility of bias from the views of the review team regarding cannabis, none of the reviewers involved in screening have published research on cannabis that could be eligible for inclusion and, therefore, they do not bring an a priori basis to introduce bias into study selection.

Screener training

Rigorous training of screeners is essential for assuring comparability across their efforts, particularly given the large number of screeners. To that end, a training set of 100 records was created by two senior screeners. The training set was used for all students hired to screen records following their onboarding process. Group and one-on-one meetings were held to discuss issues with applying the eligibility criteria. Clarifications in applying the eligibility criteria were discussed with the review team. Feedback from the screeners and review team led to the finalized screening form.

The training comprises:

1) Introduction module
    - This module helps students understand the scoping review methodology and cannabis use in the US context.
2) Screening Training Materials module
    - This module helps students familiarize themselves with DistillerSR and the screening process of the project.
3) Student Meeting Recordings module
    - The "10.28.21 – HB 1317 Student Meeting" was the first zoom meeting with student research assistants. The meeting involved a quick introduction about the project presented by Jon Samet and Gregory Tung, an introductory systematic review lecture by Lisa Bero and Tianjing Li, and screening examples in Distiller.
4) Achieving familiarity with the protocol: "Health effects of high potency cannabis products: A Scoping Review Protocol".
5) Screening meetings
    - Examples from titles and abstracts currently in screening. These examples are identified during quality control checks (see below). Canvas message board has been set up for any questions related to screening.

Screening

All screening is conducted according to the "Title and Abstract Screening Manual". We are using artificial intelligence (AI) text-mining features available in DistillerSR to assist in screening at the titles and abstracts stage. The AI classification algorithm in DistillerSR was trained with 1,000 randomly selected records. These records were screened and labeled by two senior screeners, coding independently, with discrepancies adjudicated by discussion or by a third reviewer. A random selection of screening decisions was discussed by the review team in detail to achieve uniformity. We then used the 'trained' DistillerSR's AI algorithm to rank the remaining unreviewed titles and abstracts.

DistillerSR's AI Screener was applied to include titles and abstracts with a high likelihood of inclusion (70 – 100%) and to exclude those with a low likelihood of inclusion (0 – 30%); the AI algorithm did not make screening decisions for unclear likelihood of inclusion (30 – 70%). Dual screening (two people) continued for those ranked in the 30 – 70% range while single person screening (AI plus one person) was performed for records ranked high or low likelihood of inclusion.

Quality control and quality assurance

Senior screeners were assigned all conflicts and 2% of those with a consensus decision to include or exclude consensus were checked (6,623 titles and abstracts). To evaluate AI scores, high and low scores were checked randomly after AI decisions were applied. Multiple checks by DistillerSR's 'Check for screening errors' were run to identify any incorrectly excluded records.

Full text screening

We are retrieving the full text reports of the 4,983 records (see Figure 2). Two screeners will review the full text against the eligibility criteria independently with disagreements decided by a senior screener. Reasons for excluding full text reports will be recorded and reported in the scoping review.

Data extraction

The next step in the scoping review process is to extract the data for the review using a pretested and structured data extraction form. We have developed a draft list of data extraction elements and received feedback from the Scientific Review Council. The data extraction items will be pilot tested before being incorporated into the DistillerSR software. The identified data extraction items are based on our protocol and were selected to assure that we can address all questions we have posed in the analysis section. Following revision based on comments from the Scientific Review Council and the pilot work, the final list of data extraction items will be posted on our website.

Work to Be Accomplished through June 30, 2022

Per the text of HB 21-1317, the Colorado School of Public Health will submit a report to the Scientific Review Council and committees of the House of Representatives and Senate by July 1, 2022. That report will include the findings of the scoping review in progress, an assessment of the scope of evidence available on the scientific questions, initial qualitative findings, and a plan for completing definitive analyses on high THC potency marijuana and marijuana concentrates. Initial recommendations on research needs will be offered.

Tables and Figures

Table 1. 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
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
Jonathan Samet, MD, MS	Administration
Greg Tung, PhD, MPH	Administration, Subject Area Expertise
Sam Wang, MD	Subject Area Expertise

Table 2. Scientific Review Council members

Member	**Role on Council**	**Affiliation(s)**
Gregory Kinney, PhD, MPH	Epidemiologist	Assistant Professor, 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	Chief Medical Officer, Children's Hospital Colorado; Assistant Professor, University of Colorado School of Medicine
Kennon Heard, MD	Medical Toxicologist	Professor, University of Colorado School of Medicine
Archana Shrestha, MD	Neurologist	Associate Professor of Clinical Practice, University of Colorado School of Medicine
Erica Wymore, MD, MPH	Pediatrician	Assistant Professor, University of Colorado, School of Medicine
Paula Riggs, MD	Psychiatrist	Professor, University of Colorado, School of Medicine
Susan Calcaterra, MD, MPH	Internal medicine physician (or other specialist in adult medicine)	Associate Professor, University of Colorado School of Medicine
Chris Urbina, MD, MPH	Preventive medicine specialist (or preventive medicine public health professional)	Medical Officer, Pueblo Department of Public Health and Environment; Former Director of CDPHE
Joseph Schacht, PhD	Licensed Substance Abuse Disorder Specialist	Associate Professor, University of Colorado School of Medicine
Kent Hutchison, PhD	Neuropsychopharmacologist	Professor, 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	Medical Director/Interim Executive Director, North Colorado Health Alliance; Chief of Addiction Medicine, SummitStone Health Partners

Figure 1: Review timeline

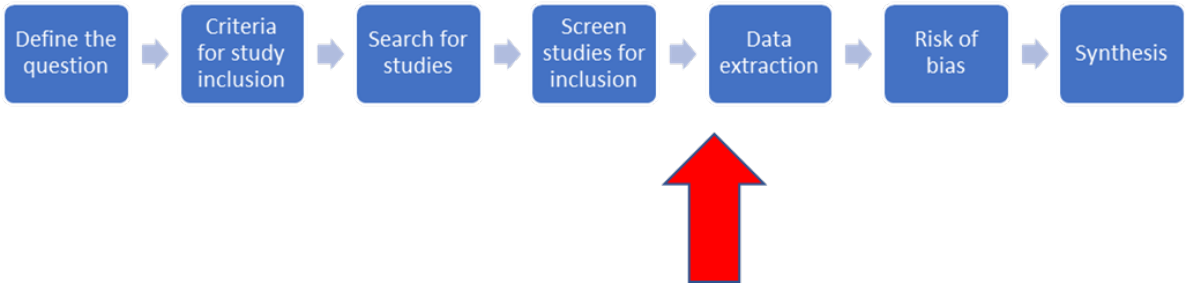

Figure 2: PRISMA flow diagram