Effects of Cannabis Legalization on Prenatal Use Rates

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Overview

Background

Health Policy and Impact on Behavior

Norms, Availability, and Promotion of Cannabis

Individual Factors Associated with Prenatal Cannabis Use

Health Impacts of Cannabis Use During Pregnancy

Gaps in the Literature
Background

- Most commonly used illicit drug in the United States (10% report use) 1-3
- Two active components in cannabis 4 cannabidiol (CBD) and tetrahydrocannabinol (THC)
  - CBD: Aids in pain management and reduces inflammation - non-psychoactive
  - THC: psychoactive and contributes to the euphoria associated with use
- Use rates seem to be increasing in the U.S. 1,2
- May be health benefits to use as well as negative health impacts


1 Carliner et al., 2017; 2 Hasin et al., 2015; 3 Schuermeyer et al., 2014; 4 National Academies of Science, 2017
2017 National Academies of Science, Medicine, & Engineering Report found substantial evidence to support:

- Some medical benefit—pain specifically
- Use and associated memory impairment
- Use under age 25 and associated cognitive delay
- Increased chance of motor vehicle accident
- Increased risk of psychosis among heavy users
- Increased risk of low infant birth weight when used during pregnancy

Report advocated for further studies of cannabis especially given the rapidly changing cannabis policy landscape.
United States Cannabis Policy

- **Schedule 1 drug due to “abuse potential, safety concerns, and lack of evidence to support pharmaceutical efficacy”**¹
- **1996 - states began legalizing cannabis for medical use**²
- **2012 - Colorado legalized for recreational use**²
- **Three different types of legalization statuses**³
  - Recreational
  - Medical
  - No broad legalization
- **Legalization may continue to increase - 58% of**

1. SCHEDULES OF CONTROLLED SUBSTANCES, 21 U.S.C & 821; 2. STATE MARIJUANA LAWS, 2018; 3. BLUMENAUER & POLIS, 2013
Prenatal Cannabis Use

- 9% of pregnant women report cannabis use (varies from as 3%-35%) \(^1\text{-}^3\)
- May have impacts on developing fetus -low infant birth weight \(^4\text{-}^6\)
  - Already a current health problem in the U.S.
- American College of Obstetricians & Gynecologists recommends screening for cannabis use among all pregnant women \(^5\)
- Use rates appear to be increasing all women but mechanism poorly understood \(^1\text{-}^2\)
- Several studies call for further research on the impact of policy on use rates and on prenatal use \(^1\text{-}^3,^5\)
State of the Science- Study Methods

- Observational Studies n= 15
  - Cohort Studies
  - Ecological Studies
- Reviews n= 5
  - Meta- Analysis
  - Systematic
  - Other
- Qualitative Studies n= 1
  - In-Depth Interviews
- Primary Data Collection n= 8
  - Cohort Studies
  - Surveys
  - Randomized Control Trial- Animal Models Only
- Experimental Studies n= 4
  - Secondary Data Analysis
  - Reports, Policy Briefs, Viewpoints

2Cerda et al., 2012; 3Schuermeyer et al., 2016; 4Mauro et al., 2017; 5Cerda et al., 2017; 6Ghosh et al., 2017
Outline - Review of the Literature

- Norms (Perception of Harm, Attitudes)
- Availability (Economy (price), Dispensaries, & Social - grows from family & friends)
- Promotion (Advertising, Discount Promotions, Social Media Promotion)

Individual Factors

Cannabis Use During Pregnancy

Health Impacts on Mother and Fetus
Health Policy and Impact on Behavior

- Changes in policy impact health behaviors including substance use
  - As shown in alcohol studies ¹

- Trend appears true for the change in medical cannabis and reported use rates among individuals ²-³
  - 1.92 increase in odds for MCL states compared to non-legal states ²
  - 1.63 increase in odds for ages 18-25 for MCL state compared to non-legal states³
  - 3.1-4.3 % significant increase in use- women over the age of 26 ⁴

- Very few studies on recreational legalization and use
  - Among youth mixed results on associated increase in use ⁵,⁶
  - Perception of harm of cannabis use is rapidly decreasing in all groups ³

¹ Zhang & Caine, 2011; ²Cerda et al., 2012; ³Schuermeyer et al., 2016; ⁴Mauro et al., 2017; ⁵Cerda et al., 2017; ⁶Ghosh et al., 2017
Norms & Perception of Harm Surrounding Cannabis Use

- Norms (including attitudes) and perception of harm seem to correlate with use rate
  - Appears to be influenced by legalization \(^1\)\(^2\)
  - True across women and pregnant women \(^1\)\(^2\)
  - As time passes since legalization perception of harm decreases (44% vs. 31.1%; \(p < .0001\)) \(^1\)
- May also be influenced by norms of the “pregnant community” - not studied in the literature

\(^1\)Mark et al., 2017; \(^2\)Schuermeyer et al., 2014
Availability of Cannabis

- As states legalize medical cannabis ¹
  - Increase in dispensaries and home grow operations
  - Lower cannabis price
  - Increase in availability

- Policies allowing medical dispensaries were associated with a significant 2% increase in youth reported cannabis use ¹
  - Similar findings in adults ²

- Other studies conclude availability effects use and recommend controlling for allowance of “home grows” and dispensaries ²,³

- Pregnant women report the most common point of access was purchasing when compared to non-pregnant women (43.8% vs. 33%) ⁴

¹ Pacula et al., 2014; ² Schuermeyer et al., 2014; ³ Wen et al., 2017; ⁴ Ko et al., 2015
Promotion of Cannabis

- As recreational or medical legalization occurs most adults report exposure to cannabis advertising.\(^1\)
- Among youth, it appears that exposure to cannabis promotion increases intention to use (OR 2.07).\(^2\)
- Dispensaries may directly promote to pregnant women:
  - Study in Colorado called 400 medical and retail dispensaries asking about cannabis for morning sickness.\(^3\)

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**69%**

Recommended cannabis for morning sickness

**65%**

Recommendation based on personal opinion

**31%**

Stated use was safe during pregnancy

**3%**

Deferred to health care provider

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\(^1\) Fiala et al., 2018; \(^2\) Krauss et al., 2018; \(^3\) Dickson et al., 2018
Individual Factors Associated with Prenatal Cannabis Use

Brown et al., 2017; Ko et al., 2015; Jarelenksi et al., 2015; Mark et al., 2017; Metz & Stickwrath, 2015; National Academies, 2017
Health Impacts of Prenatal Cannabis Use- Animal Models

- Animal models link THC in utero to 1-3
  - Low infant birth weight at gestation
  - Cognitive changes
- Study protocol using THC smoke – possibly better fit to human consumption 3
- Advantages
  - Ability to control for certain variables
  - Ethical
  - Allows for randomization 1-3
- Disadvantages
  - High amounts of THC consumed 2
  - Cannot track higher level cognitive functions nor long term outcomes 1
- Altogether, show THC likely impacts fetal development

El Marroun et al., 20151; Navarro et al., 1994 2; Benevunto et al., 2015 3
Health Impacts of Prenatal Cannabis Use

- Prenatal cannabis use correlated with:
  - Low infant birth weight
  - Smaller head circumference
  - Behavioral issues observed in ages 3-5
  - Higher admittance into NICU

- Lack of agreement on amount of use associated with outcomes \(^1,2\)
- Some effect on maternal health but mechanism and significance poorly understood \(^2\)
- Difficult to control for certain variables
  - Smoking, education, socioeconomic status \(^1-3\)

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\(^1\) Conner et al., 2016; \(^2\) Gunn et al., 2016; \(^3\) Ko et al., 2015
Polysubstance or Concurrent Substance Use

- Cannabis use in pregnancy positively correlated with polystubstance use of tobacco, alcohol or other illicit drugs in the past month \(^1\)\(^-\)\(^2\)
- Women who reported alcohol use and cannabis use were also more likely to engage in binge drinking \(^2\)
- Women who use cannabis also more likely to report difficulties in quitting others substances \(^2\)
- No (known studies) on rates of polystubstance use over time among women of reproductive age

\(^1\)Ko et al., 2015  \(^2\)Conner et al., 2016; \(^3\)Gunn et al., 2016
Recreational Legalization and Prenatal Use Rates

Evidence Gap
• No (known) research on recreational cannabis legalization and its potential effects on use rates among pregnant women or women of reproductive age

Methodological Gap
• Few studies using regression methods to address changes over time- prevalence rates do not control for state-level covariates nor policy changes
Recreational Cannabis Legalization and Prenatal Use Rates

Evidence Gap
- No (known) specific examination of cannabis legalization and reported rates of other substances (in conjunction with cannabis) during pregnancy.

Methodological Gap
- Previous studies only look at how strengthening enforcement impacts polysubstance use rates and not changes to less stringent policies.
Research Question:

- To what extent does cannabis legalization impact self-reported cannabis use and concurrent use of other substances among pregnant women ages 18-44?

Purpose:

- To examine the relationship between state cannabis legalization policies and self-reported cannabis use rates among pregnant
- To examine the effect of recreational cannabis legalization on co-occurring use of alcohol, and tobacco among the same groups.
General Causal Model for Alcohol, Tobacco and Other Drugs-Adapted for Cannabis Policies

State Level Cannabis Policies
(Recreational Use, Medical Use, No legal Use)

Norms
(Perception of Harm, Attitudes)

Availability
(Economy(price), Dispensaries, & Social - grows from family & friends)

Promotion
(Advertising, Discount Promotions, Social Media Promotion)

Individual Factors

Cannabis Use During Pregnancy

Health Impacts on Mother and Fetus

Birckmeyer et al., 2004
Study Design & Dataset

Design

- Natural Experiment
- Retrospective cross-sectional study
- Secondary datasets

Dataset

Pregnancy Risk Assessment Monitoring System (PRAMS)

- A population-based surveillance system
- Used to better understand mother and infant health outcomes through surveillance of maternal behaviors and experiences using state-specific data
- Allows for comparison between states
- 83% of all U.S births represented
- Application directly through PRAMS data application portal

Sample

PRAMS- Pregnant Women ages 18-44 living in selected recreational cannabis, medical cannabis and non-legal states who report past 30-day cannabis use
Study Importance

Has the potential to inform policy makers of the effects cannabis policy change on self-reported use rates in women of reproductive age.

Extends the application of difference-in-difference analysis to assess potential changes in women of reproductive age—previously only used in youth and adults overall.

Takes an empirically theory driven approach and applies elements of the General Causal Model for Alcohol Tobacco and Other Drugs to understand how legalization potentially impacts use.

Assessment of the effects of recreational cannabis legalization on the use of cannabis in addition to other substances during pregnancy.
Takeaways from Possible Outcomes

- Use rates stay the same
- Use rates increase
- Use rates decrease
Implications for Public Health

- Advocating for changes to local and state policy to educate and inform
- Mandatory labeling
- Training for dispensary workers
- Posted warnings in dispensaries
- Accurate and easily accessible information for pregnant women
- Awareness about the potential effects of cannabis legalization on prenatal use rates
- Advancing future research into the field of less stringent substance use policies on health behaviors specifically among pregnant women
- Potential to support changes to federal rulings to allow more research in order to better understand the impact of cannabis on infant and maternal health
Study Limitations

Cannot fully account for other state level variables and environmental differences (i.e. tax, local availability, exposure to promotion, environment).

Secondary data that lacks randomization

Conducting an natural study which may result in problems detecting subtle or complicated relationships

Use self-reported could underestimate the actual prevalence of prenatal use of cannabis especially given social desirability or conversely higher reporting in legal states due to less fear of consequences

There also may be recall bias mainly involving the question of frequency of use and use at different time intervals

Cannot determine causality - it is possible states with more favorable attitudes toward cannabis would be targeted for legalization and increase rates may be a result of favorable attitudes and not the policy itself
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