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Cannabis in Pregnancy

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University of Ottawa

PHO Rounds June 10, 2021



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DISCLOSURES

None of the presenters at this session have received financial support or in-kind support from a commercial sponsor.

None of the presenters have potential conflicts of interest to declare.

Learning objectives

After this session, participants will be able to:

1. Describe the effects of cannabis on pregnancy and pregnancy outcomes
2. Provide women with evidence-based messaging about cannabis use during pregnancy
3. Summarize current evidence on trends in use and safety in pregnancy



So what's the deal with the effects of cannabis use during pregnancy?

“Approximately 70% of both pregnant and non-pregnant women believe there is slight or no risk of harm from using marijuana once or twice a week”

It's natural!

It's organic!

It's vegan!

It helps with nausea!





AUTOFLOWERING
SEEDS

FEMINIZED
SEEDS

CBD
SEEDS

MORE
RQS

...ly for your body because you are
...rtin. Type to search
...se of alcohol, ...em(s) - € 0.00 ✓
...cocco and even coffee is frowned upon.

♡ 22 💬 1 2 May 2014

CATEGORIES

- Cannabis Blog
- Cannabis Strains
- Growing Cannabis
- Medical Marijuana
- More

Medical marijuana is an entirely different factor that researchers have tried to study for many years. Marijuana is simply a plant cultivated for hundreds of years. Even with hybrid varieties grown everyday, medical marijuana is not laced with any drugs or chemicals, unlike harmful cigarettes or alcohol. Should you use cannabis during pregnancy? Negative stigma and skewed results in unrelated experiments often scare people away from the benefits of medical marijuana during pregnancy.

The Prenatal Period is Unique

- Development shaped from pre-conception, pregnancy and onwards
- Fetal Alcohol Syndrome (FAS) was an important milestone in bringing the behavioral teratological approach to human studies.
 - Exposure to agents that are relatively harmless to the mother may have adverse effects on the developing fetus
 - All aspects of the CNS is vulnerable to injury from fetal exposure
 - May not be structural, but there may be functional abnormalities that may not be evident at birth

Cannabis Prevalence During Pregnancy

Cannabis is the most commonly used illicit drug in pregnant women, with prevalence rates ranging between 3 and 25% in Western countries

Often used with tobacco

>30% of individuals with FASD also exposed to cannabis

Complex relationships with other substances

Cannabis, Pregnancy and the Fetus

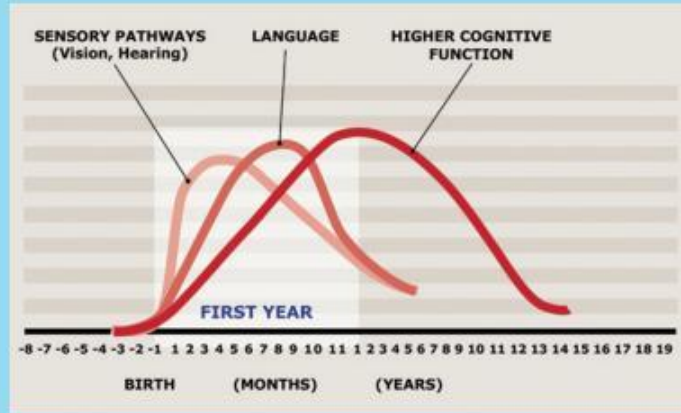
- The potential deleterious effects of cannabis consumption for fertility and pregnancy outcome has been recognized for years....
- THC is able to cross the placenta and accumulate in fetal tissue and maternal milk
- So what?

Endocannabinoid System in Pregnancy



- ECSS deregulation is associated with adverse pregnancy outcomes including, miscarriage and compromised placentation
- Cannabinoids, including THC, CBD, and their metabolic byproducts cross the placenta and rapidly distribute to fetal tissues including the brain
 - THC is measurable in fetal plasma within 15 minutes of maternal exposure. Equilibrates to maternal levels in 3 hr
 - Long half-life in fatty tissues results in low fetal clearance
 - Fetal exposure is prolonged even after maternal discontinuation

Sensitive periods in early brain development



Source: Nelson, C.A. In *Neurons to Neighbourhoods* (2000). Shonkoff, J. & Phillips, D. (Eds.)

Beginning in utero and continuing throughout the first years of life, there are especially sensitive periods for the developing brain.

The “Double Hit” Potential

First “hit” prenatally to endogenous endocannabinoid signalling system

- DOHaD
- CV implications
- Epigenetics
- Neurodevelopment

Second “hit” post-natally

- Increased susceptibility to environmental stressors, nutrition, social determinants of health

What's the Problem with the Research?

- Very difficult to control for concurrent maternal tobacco smoking
- Complex interactions with other substances
- Impact of social determinants of health hard to quantify
- Other pre-natal and post-natal factors important?
- THC levels in cannabis not standard
- Self-report data difficult
 - Quantification, timing of exposure, dose response
- RCTs VERY difficult
- Animal models sometimes do not entirely correspond





Bill C45



From the black market to the Ivory Tower

Marijuana legalization creates a need for 150,000 new workers, from growers to retail clerks. Colleges plan to train them.

BY ROSEMARY COUNTER · Every country in the world will be watching and scrutinizing what happens to the Canadian market after marijuana is legalized. “Canada is going to lead this industry globally,” says David Purcell, director of emerging business at B.C.’s Kwantlen Polytechnic University.

With legalization, a whole underground industry is set to become legit; Statistics Canada says \$5.7 billion was spent on cannabis last year, making it a bigger sector than alcohol or tobacco. Up to 150,000 new workers—growers, sellers, store managers, retail clerks—will need training. Canadian post-secondary institutions will respond with new classes and programs to meet new market demands. But how do you build a cannabis curriculum on short order? And how do you find reputable teachers, given many experts likely gained their wisdom while growing an illegal product? By necessity, colleges and universities are getting creative in their search for talent.

In September 2018, Niagara College Canada launched what some call the country’s first post-secondary credential in commercial cannabis production. Twenty-four students—including Ph.D. candidates, scientists and engineers—were selected from more than 300 applicants to learn best practices for growing marijuana. The program is organized around three core fundamentals: large-scale crop cultivation,

legal issues, and business fundamentals. (For the record, no cannabis will be consumed.)

Though the program has been touted a brand new, Niagara College’s two-year greenhouse technician program has been training growers for three decades—including licensed pot producers. “A couple of years ago, I became clear that the sector was looking a cannabis production in a more substantial way because more people were using it medically,” says Al Unwin, associate dean at Niagara’s school of environmental and horticultural studies. A college needs to respond to future labour market demands, he argues so the school quietly added lessons on pot production to the curriculum three years ago. All teachers were and are legal producers. “We’re not going to employ anyone who’s been illegally producing cannabis—that’s very important,” says Unwin. (Instructors require criminal-record checks through the RCMP.) The new program includes two pro from the horticulture program who enhance their extensive plant knowledge with two years of cannabis-specific training. Pro du

October 2017:

Government of Canada introduced legislation to permit the consumption, sale and distribution of cannabis for non-medical use

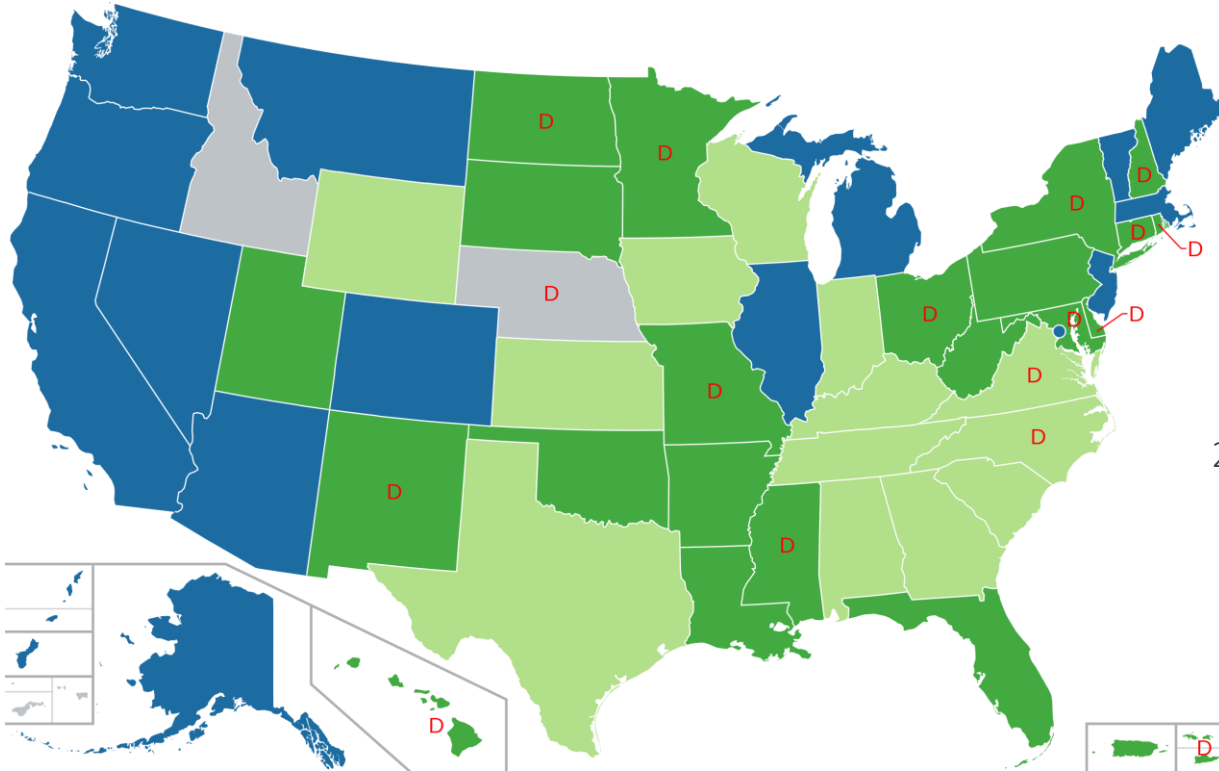
October 2018:

New legislation came into effect

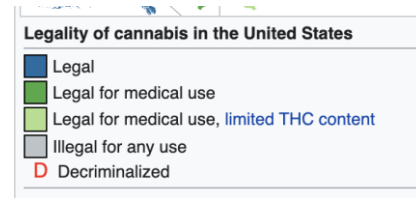
October 2020:

>1000 licensed dispensaries

In the United States...



14 states and Washington, DC, have now legalized cannabis for recreational use for adults over 21, plus decriminalized in another 16 states



Research Questions:

1. What are the trends and correlates of perinatal cannabis use in Canada?
2. What are the associations between cannabis use and adverse perinatal and neonatal outcomes?
3. Are there differences in neurodevelopmental outcomes in children born to mothers with and without cannabis use in pregnancy?

Data source

- Prescribed birth registry with the authority **to collect, use and disclose personal health information without consent** for the purpose of facilitating or improving the provision of health care.
- The largest birth registry in Canada, collects data on ~40% of Canadian pregnancies each year.





Better Outcomes Registry & Network Ontario

BORN data are submitted by health information custodians servicing the maternal child population

- hospitals, fertility clinics, birth centres, midwifery practice groups, primary care organizations and prenatal and newborn screening lab and treatment centres

Data include:

- maternal demographics and health behaviours, preexisting health problems, prenatal screening, obstetric complications, intrapartum events, birth outcomes and newborn screening information

An ongoing program of data quality checks and formal training sessions assures a high level of data quality in all aspects of data collection, analysis, use and disclosure of information

Over 1.3 million
maternal-infant records
captured since 2012

>10,000 records with cannabis use
BORN is the largest Canadian
database with information on
prenatal cannabis exposure.



Question 1


What are the trends in use of cannabis in pregnancy?

Canadian Journal of Public Health (2019) 110:76–84
<https://doi.org/10.17269/s41997-018-0148-0>

QUANTITATIVE RESEARCH



Trends and correlates of cannabis use in pregnancy: a population-based study in Ontario, Canada from 2012 to 2017

Daniel J. Corsi^{1,2,3}  • Helen Hsu⁴ • Deborah Weiss^{2,5} • Deshayne B. Fell^{2,3} • Mark Walker^{1,6}

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Abstract

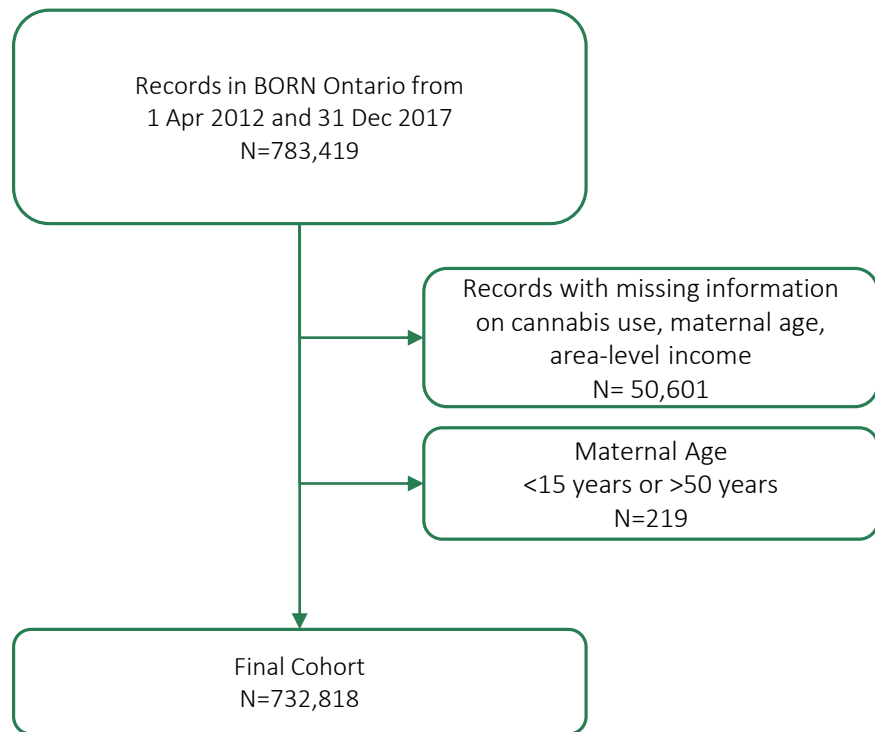
Objective Forthcoming legislative changes will legalize and make cannabis widely available in Canada. We conducted an analysis of Ontario's birth registry to determine recent trends and correlates of cannabis use in pregnancy.

Methods We conducted a population-based retrospective cohort study assembled from the Better Outcomes Registry & Network (BORN) Ontario database, covering live births and stillbirths in Ontario between April 2012 and December 2017. Trends in self-reported cannabis use in pregnancy were analyzed according to maternal age and area-level socio-economic status (SES) using log binomial regression analysis.

Results A total of 10,731 women reported cannabis use in pregnancy. Prevalence increased from 1.2% in 2012 to 1.8% in 2017 (p -trend, < 0.001), equivalent to a relative increase of 61% (relative risk [RR] 1.61, 95% confidence interval [CI] 1.51 to 1.72). The crude prevalence of cannabis use in pregnancy among women aged 15 to 24 years and in the lowest two area-level income quintiles was 6.7%, compared to 0.3% among women aged 35 years and over in the highest three income quintiles (RR 24.59, 95% CI 21.98 to 27.52). A majority (52.0%) of cannabis users were aged 15–24 years and 54.7% of users were in the lowest two income quintiles.

Conclusion Cannabis use in pregnancy has increased since 2012 in Ontario and was reported in about 2% of pregnancies in 2017. Increases were predominately among women of younger ages and those of lower SES, and these groups account for half of users. Promoting cannabis cessation in pregnancy could lead to improved perinatal and later childhood outcomes and reduce health inequalities.

Study Design



- **Data Source:** BORN Ontario
- **Objective:** To evaluate the recent trends and correlates of cannabis use in pregnancy.
- **Exposure:** self reported cannabis use in pregnancy captured using a multi-select variable which collected information on substance use during pregnancy,
 - Includes cannabis, cocaine, hallucinogens, opioids and other substances.

Results

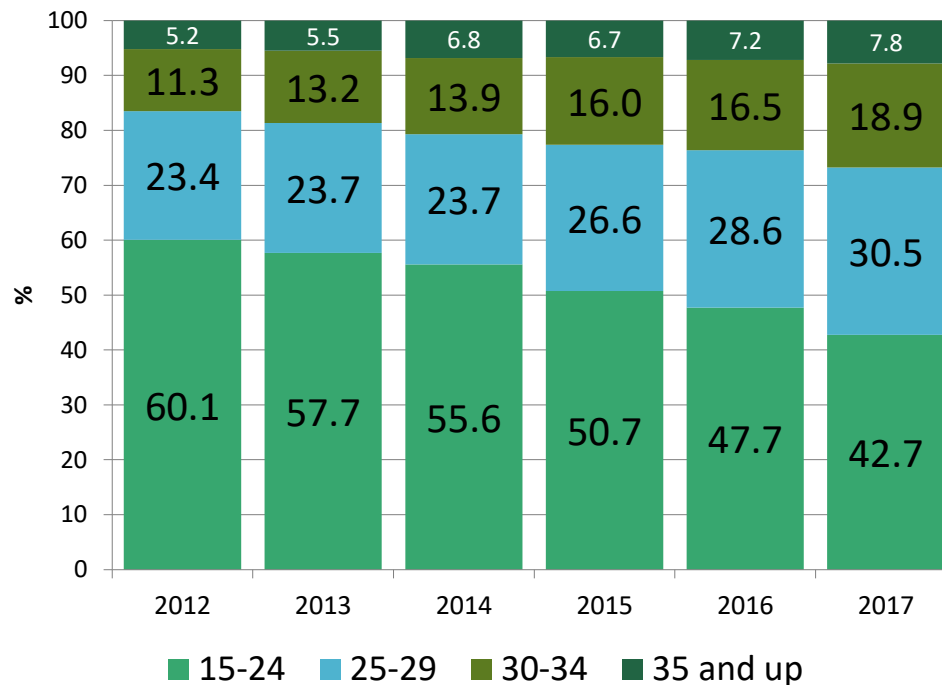
COHORT HIGHLIGHTS

- 1.5% (n = 10,731) of women used cannabis in pregnancy
 - Majority (69.7%) were from urban areas
 - The **lowest two income quintiles** accounted for more than half (55%) of the population of cannabis users
 - Cannabis use was substantially higher among women who reported alcohol and tobacco use in pregnancy (12.0% and 10.3%, respectively).

Results

Age distribution of women using cannabis in pregnancy

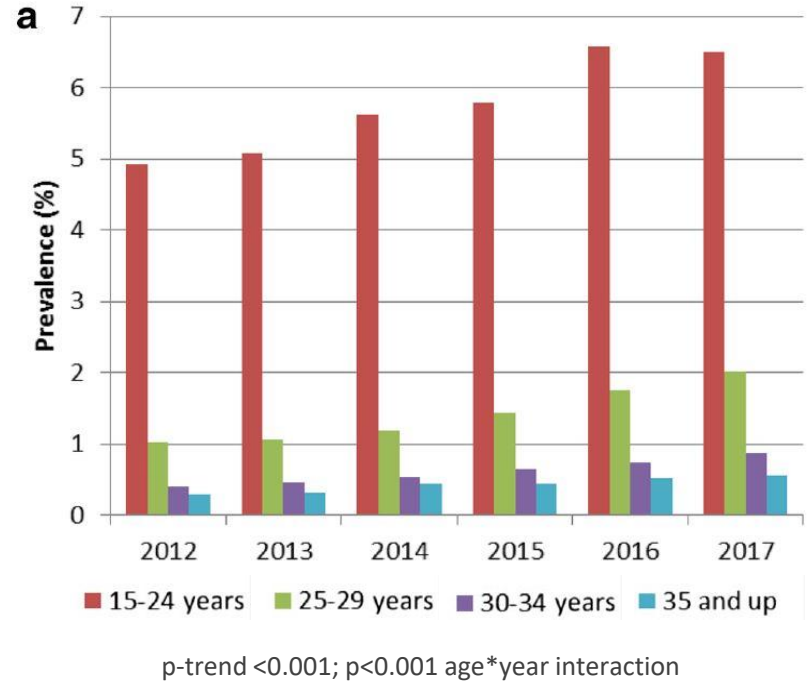
(N = 10,731)



Results

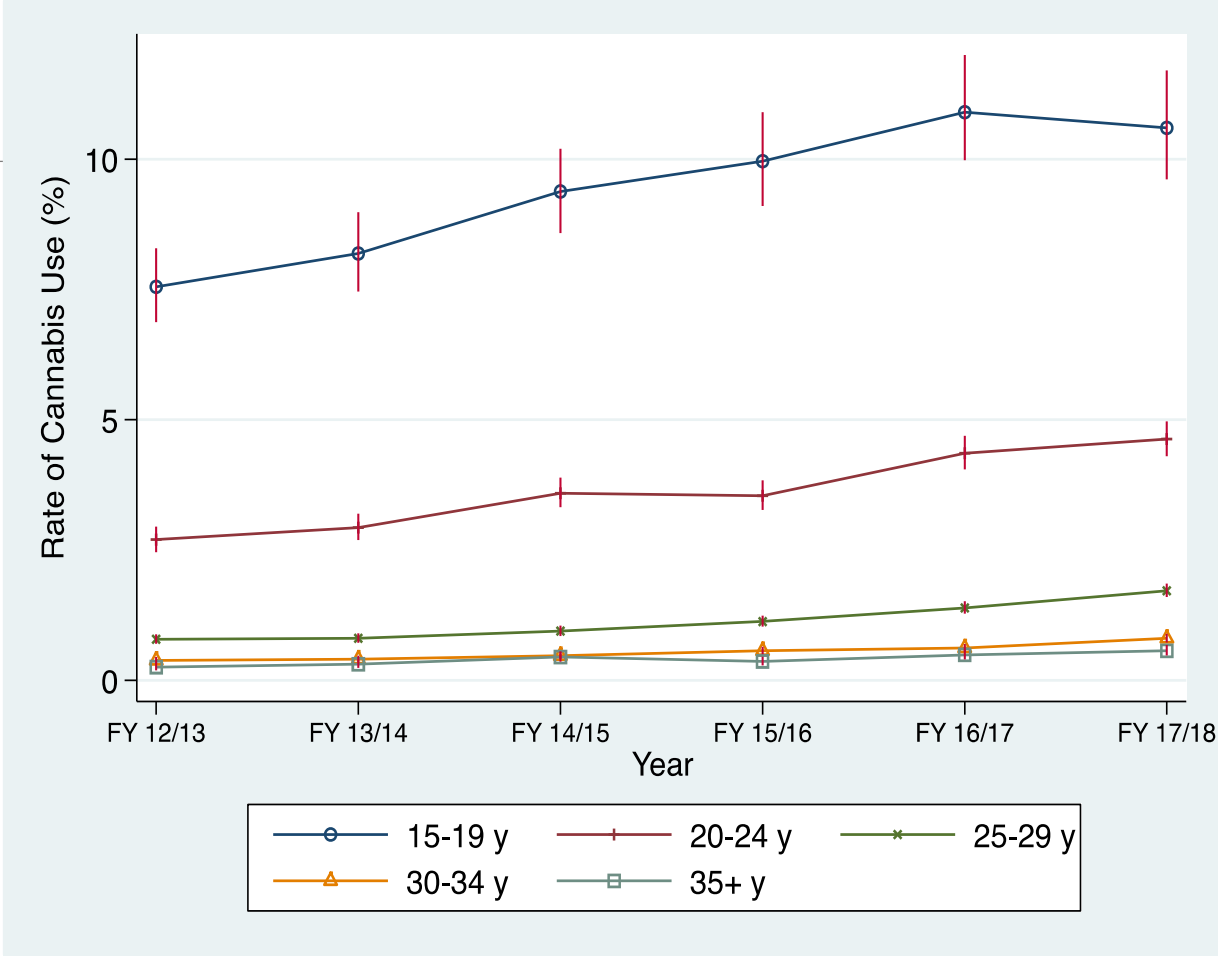
Self-reported cannabis use in pregnancy in Ontario, 2012–2017: Trends by age

- Prevalence of prenatal cannabis use was highest among women aged 15–24 years
 - Increased from 4.9% in 2012 to 6.5% in 2017



Results

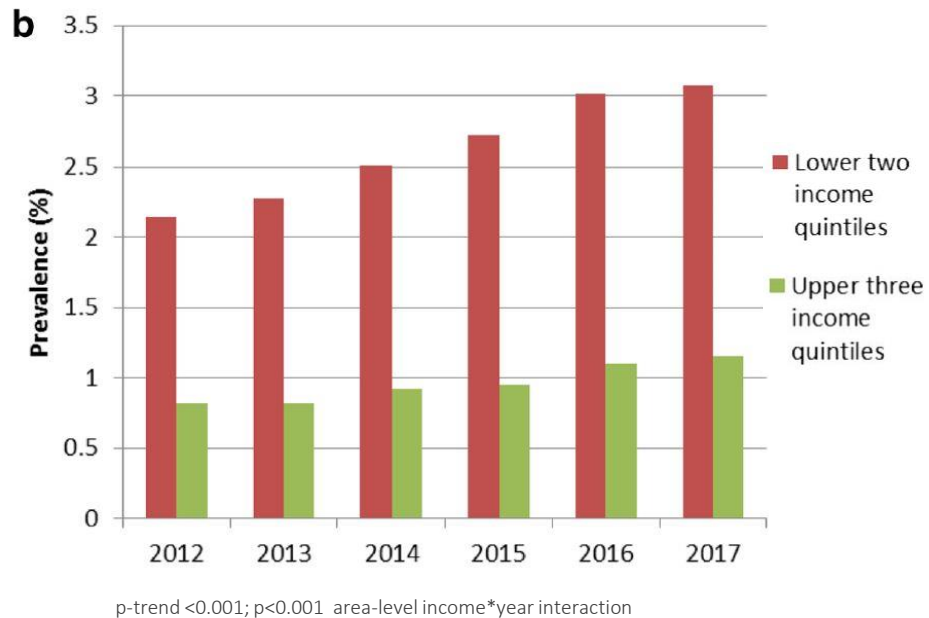
Self-reported cannabis use in pregnancy in Ontario, 2012–2017/18: Trends by age



Results

Self-reported cannabis use in pregnancy in Ontario, 2012–2017: Trends by income

- Women in the lowest two quintiles reported the highest usage
 - Increased from 2.2% in 2012 to 3.1% in 2017
- aRR for cannabis use in the lowest vs the highest income quintile was **3.23 (95% CI 3.02 to 3.46)**
 - after adjusting for maternal age, year, and population size



Question 2

What are the associations between cannabis use and adverse perinatal and neonatal outcomes?

Research

JAMA | [Original Investigation](#)

Association Between Self-reported Prenatal Cannabis Use and Maternal, Perinatal, and Neonatal Outcomes

Daniel J. Corsi, PhD; Laura Walsh, MSc; Deborah Weiss, PhD; Helen Hsu, MD; Darine El-Chaar, MD; Steven Hawken, PhD; Deshayne B. Fell, PhD; Mark Walker, MD

IMPORTANCE Recent evidence suggests that cannabis use during pregnancy is increasing, although population-based data about perinatal outcomes following in utero exposure remain limited.

OBJECTIVE To assess whether there are associations between self-reported prenatal cannabis use and adverse maternal and perinatal outcomes.

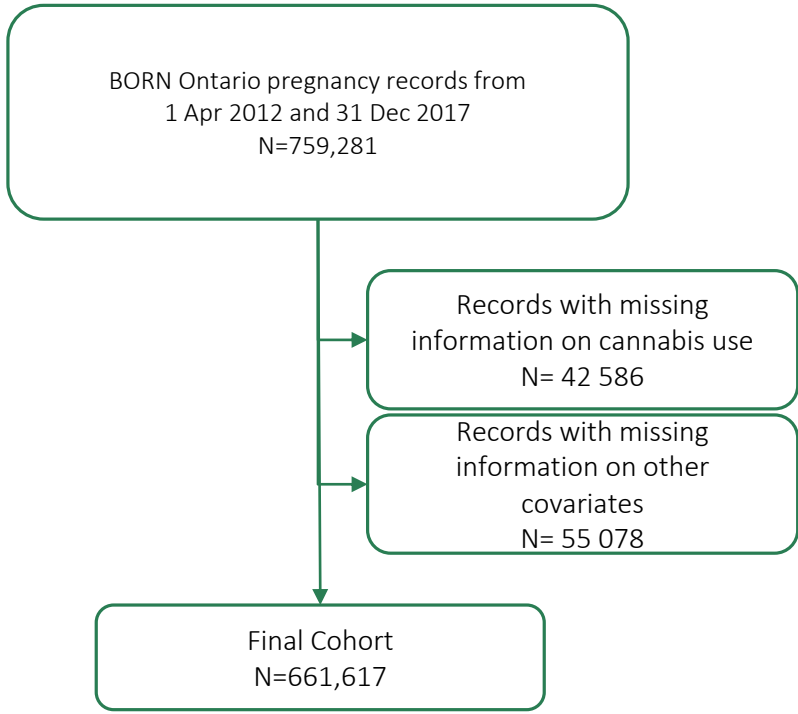
DESIGN, SETTING, AND PARTICIPANTS Population-based retrospective cohort study covering live births and stillbirths among women aged 15 years and older in Ontario, Canada, between April 2012 and December 2017.

EXPOSURES Self-reported cannabis exposure in pregnancy was ascertained through routine perinatal care.

MAIN OUTCOMES AND MEASURES The primary outcome was preterm birth before 37 weeks' gestation. Indicators were defined for birth occurring at 34 to 36 6/7 weeks' gestation (late

- [← Editorial page 121](#)
- [← Related article page 167](#)
- [+ Supplemental content](#)
- [+ CME Quiz at
 \[jamanetwork.com/learning\]\(http://jamanetwork.com/learning\)](#)

Study Design

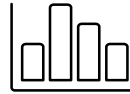


- **Data Source:** BORN Ontario
- **Study population:** Women ≥ 15 years who delivered a singleton infant at ≥ 20 weeks gestation in an Ontario Hospital
- **Exposure:** maternal self-reported cannabis use in pregnancy
- **Primary Outcome:** preterm birth < 37 weeks
- **Secondary outcomes:**
 - **Perinatal outcomes:** SGA ($< 10^{\text{th}}$ tile, $< 3^{\text{rd}}$ tile), placental abruption, stillbirth
 - **Maternal outcomes:** Preeclampsia, Gestational diabetes, Mode of delivery
 - **Neonatal outcomes:** Transfer to NICU, 5 min Apgar < 4

Unmatched cohort



- Unmatched cohort, N= 661,617
- Cannabis use, N=9,427 (1.4%)
 - No Cannabis use, N=652,190 (98.6%)



Cohort highlights

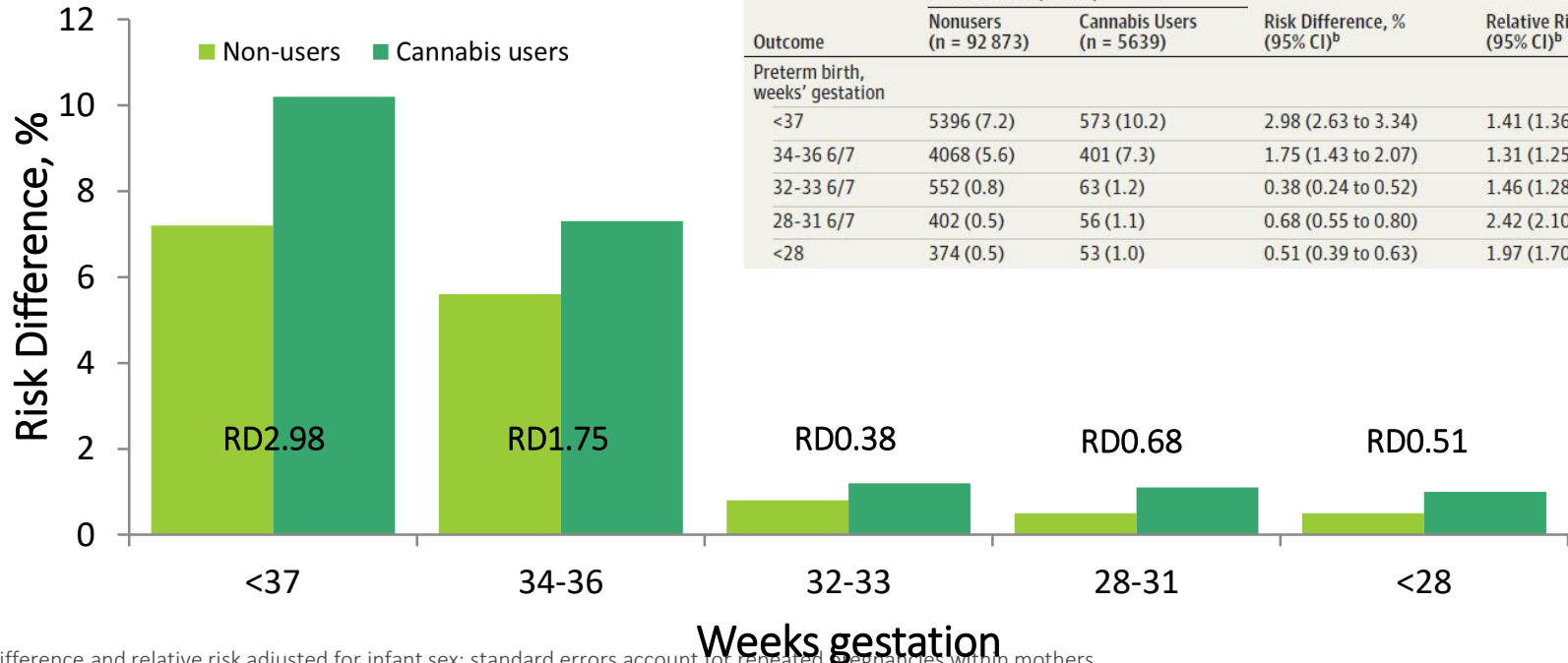
- Mean gestational age: 39.3 weeks
- Mean maternal age: 30.4 years
- % male infants: 51.4%

Matched cohort

- To account for significant imbalance across covariates between cannabis users and nonusers, we created a matched cohort based on baseline covariates such that all SMD < 0.001. Example below:

Characteristic	Unmatched Cohort, No. (%)		SMD	Matched Cohort, No. (%)		SMD
	Nonusers (n = 652 190)	Cannabis Users (n = 9427)		Nonusers (N = 92 873)	Cannabis Users (n = 5639)	
Age, y						
15-19	22 784 (3.5)	2272 (24.1)		7490 (23.4)	1317 (23.4)	
20-24	88 722 (13.6)	3233 (34.3)		25 736 (37.1)	2093 (37.1)	
25-29	207 418 (31.8)	2290 (24.3)	1.03	37 829 (24.9)	1405 (24.9)	<0.001
30-34	223 058 (34.2)	1197 (12.7)		18 592 (11.5)	647 (11.5)	
≥35	110 208 (16.9)	435 (4.6)		3226 (3.1)	177 (3.1)	
Area-level income quintile						
1	99 436 (15.2)	3060 (32.5)		19 313 (32.9)	1858 (32.9)	
2	101 843 (15.6)	2111 (22.4)		16 158 (21.7)	1226 (21.7)	
3	135 695 (20.8)	1841 (19.5)	0.58	21 131 (20.3)	1143 (20.3)	<0.001
4	154 329 (23.7)	1486 (15.8)		18 680 (15.4)	868 (15.4)	
5	160 887 (24.7)	929 (9.9)		17 591 (9.6)	544 (9.6)	
Self-reported substance use during current pregnancy^c						
Tobacco smoking	48 260 (7.4)	5554 (58.9)	1.31	7743 (47.5)	2679 (47.5)	<0.001
Alcohol use	13 185 (2.0)	1787 (19.0)	0.58	611 (6.0)	341 (6.0)	<0.001
Opioid use	6538 (1.0)	1047 (11.1)	0.43	134 (1.8)	103 (1.8)	<0.001
SSRI use	8745 (1.3)	439 (4.7)	0.20	101 (1.2)	67 (1.2)	<0.001
Other drug use	1844 (0.3)	436 (4.6)	0.28	6 (0.1)	5 (0.1)	<0.001
Mental health conditions ^d	97 779 (15.0)	5348 (56.7)	0.97	11 343 (46.0)	2595 (46.0)	<0.001

Results (matched cohort)

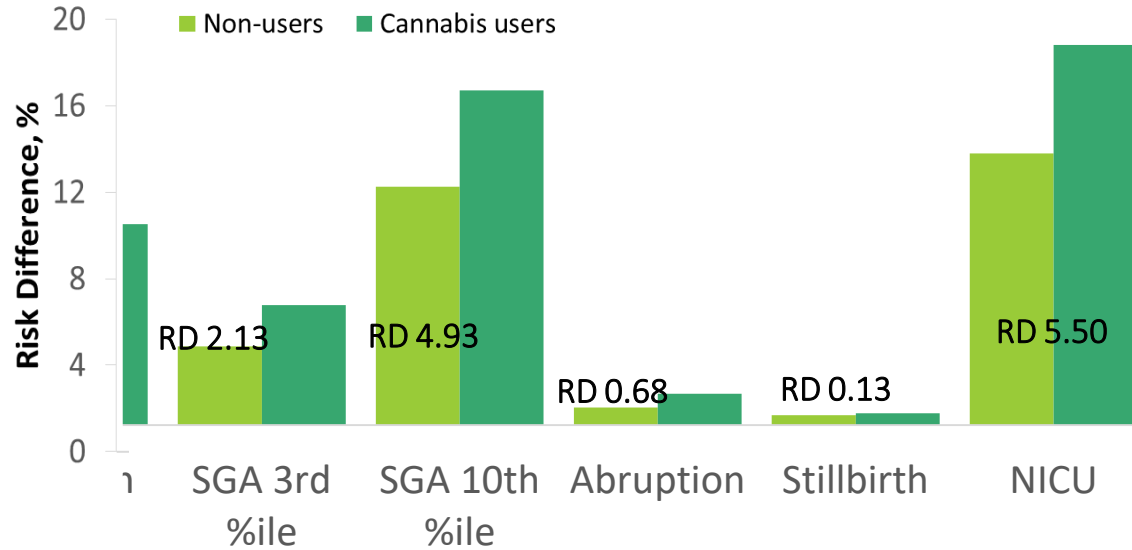


Weeks gestation

^bRisk difference and relative risk adjusted for infant sex; standard errors account for repeated pregnancies within mothers.

*Matched for maternal age, parity, area level income, pre-pregnancy BMI, maternal smoking and substance use, psychiatric disorders, antenatal care, year of birth

Results (matched cohort)



Outcome	No. of Events (% Risk)		Risk Difference, % (95% CI) ^b	Relative Risk (95% CI) ^b
	Nonusers (n = 92 873)	Cannabis Users (n = 5639)		
Maternal Outcomes				
Preeclampsia	4869 (4.9)	248 (4.4)	-0.46 (-0.71 to -0.22)	0.90 (0.86 to 0.95)
Gestational diabetes	5131 (4.7)	240 (4.3)	-0.41 (-0.66 to -0.17)	0.91 (0.86 to 0.96)
Delivery Type				
Cesarean	24 166 (24.1)	1337 (23.7)	-0.33 (-0.85 to 0.18)	0.98 (0.96 to 1.00)
Assisted vaginal	11 546 (9.3)	538 (9.5)	0.27 (-0.08 to 0.62)	1.02 (0.99 to 1.06)
Perinatal Outcomes				
SGA (third percentile)	2564 (4.0)	346 (6.1)	2.13 (1.84 to 2.41)	1.53 (1.45 to 1.61)
SGA (10th percentile)	9434 (12.1)	958 (17.0)	4.93 (4.48 to 5.38)	1.41 (1.36 to 1.45)
Placental abruption	685 (0.9)	88 (1.6)	0.68 (0.53 to 0.82)	1.72 (1.54 to 1.92)
Stillbirth	319 (0.5)	33 (0.6)	0.13 (0.03 to 0.22)	1.25 (1.05 to 1.48)
Neonatal Outcomes				
Transfer to NICU	11 553 (13.8)	1089 (19.3)	5.50 (5.04 to 5.97)	1.40 (1.36 to 1.44)
Apgar score <4 (5 min) ^c	638 (0.9)	62 (1.1)	0.24 (0.12 to 0.37)	1.28 (1.13 to 1.45)

^bRisk difference and relative risk adjusted for infant sex; standard errors account for repeated pregnancies within mothers.

*Matched for maternal age, parity, area level income, pre-pregnancy BMI, maternal smoking and substance use, psychiatric disorders, antenatal care, year of birth

Question 3

Are there differences in neurodevelopmental outcomes in children born to mothers with and without cannabis use in pregnancy?

LETTERS

<https://doi.org/10.1038/s41591-020-1002-5>

nature
medicine



Maternal cannabis use in pregnancy and child neurodevelopmental outcomes

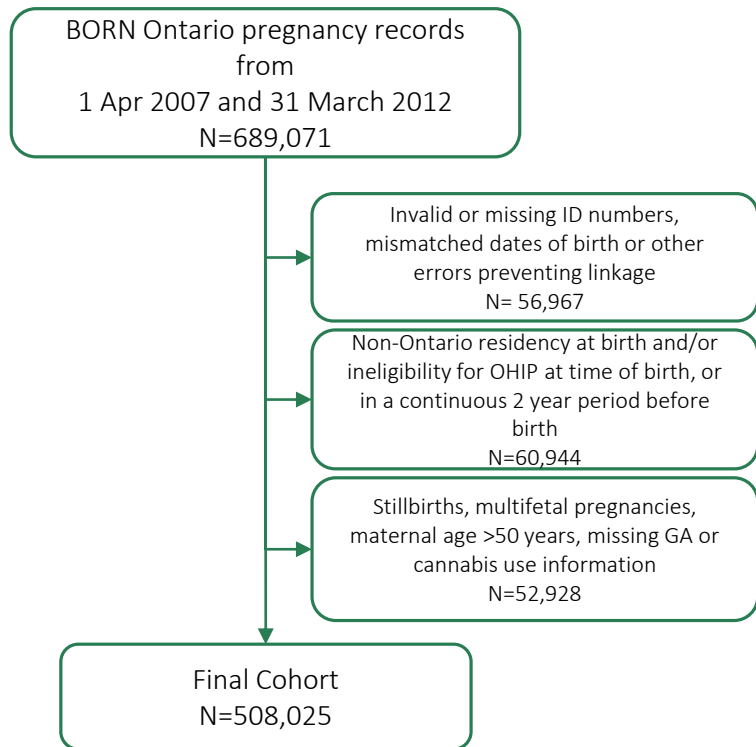
Daniel J. Corsi^{1,2,3}✉, Jessy Donelle⁴, Ewa Sucha⁴, Steven Hawken^{1,3}, Helen Hsu⁵, Darine El-Chaâr^{1,6}, Lise Bisnaire⁷, Deshayne Fell^{2,3}, Shi Wu Wen^{1,3,6} and Mark Walker^{1,6}

Cannabis use in pregnancy has increased^{1,2}, and many women continue to use it throughout pregnancy³. With the legalization of recreational cannabis in many jurisdictions, there is concern about potentially adverse childhood outcomes related to prenatal exposure⁴. Using the provincial birth registry containing information on cannabis use during pregnancy, we perform a retrospective analysis of all live births in Ontario, Canada, between 1 April 2007 and 31 March 2012. We link pregnancy and birth data to provincial health administrative databases to ascertain child neurodevelopmental outcomes. We use matching techniques to control for confounding and Cox proportional hazards regression models to examine associations between prenatal cannabis use and child neurodevelopment. We find an association between maternal cannabis use in pregnancy and the incidence of autism spectrum disorder in the offspring. The incidence of autism spectrum disorder diagnosis was 4.00 per 1,000 person-years among children with exposure compared to 2.42 among unexposed children, and the fully adjusted hazard ratio was 1.51 (95% confidence interval: 1.17–1.96) in the matched cohort. The incidence of intellectual disability and learning disorders was higher among offspring of mothers who use cannabis in pregnancy, although less statistically robust. We emphasize a cautious interpretation of these find-

Health Insurance eligibility or died before 18 months ($n=4,960$) or 4 years ($n=10,204$) of age were excluded from the primary analyses of autism spectrum disorder (ASD) and secondary analyses of neurodevelopmental outcomes, yielding analytical cohorts of 503,065 and 497,821, respectively (Supplementary Table 1). The mean age of mothers was 30.1 years (s.d.=5.6), the mean gestational age at delivery was 38.9 weeks (s.d.=1.7) and 51.4% of children were male. The rate of reported cannabis use in pregnancy was 0.6%. An analysis comparing excluded records to the analytical cohort indicated some modest differences by maternal age, area-level income, parity, maternal health conditions, rural residence and drug and medication use in pregnancy (Supplementary Table 2). An analysis by year of birth indicates that the rates of exclusion were lower among the cohort born after 2010 (Supplementary Table 3). Maternal cannabis use was lower among excluded records (0.3%). The first prenatal consultation, where cannabis use information is collected, occurred at a median of the 79th gestational day (11 weeks and 2 d) overall, and the 94th day (13 weeks and 3 d) among women with reported cannabis use.

Significant imbalance in covariates was identified between cannabis users and nonusers. The L_1 statistic, a global measure of imbalance, was 0.77 in the unmatched cohort, but this was reduced to 0.02 following coarsened exact matching (CEM). Imbalance in the distribution of baseline covariates was reduced in the matched cohort

Study Design



- **Data Source:** BORN Ontario and ICES
- **Study population:** Women 16-50 years of age who were continuously eligible for OHIP in the 2 years before pregnancy.
- **Exposure:** maternal self-reported cannabis use in pregnancy
- **Primary Outcome:** Autism spectrum disorder
- **Secondary Outcomes:**
 - Intellectual disability and learning disorders
 - ADHD and conduct disorders

Results

- **Incidence of ASD diagnosis** (per 1,000 person-years):
 - Exposed children: 4.00 (95%CI: 3.65-4.38)
 - Unexposed children 2.42 (95% CI: 2.39-2.44)
- **Incidence of intellectual disabilities and learning disorders** (per 1,000 person-years):
 - Exposed children: 10.3 (95% CI: 9.4-11.2)
 - Unexposed children: 4.9 (95% CI: 4.80-4.93)
 -
- **The incidence of ADHD** (per 1,000 person-years):
 - Exposed children: 45.0 (95% CI: 42.2-48.1)
 - Unexposed children: 17.1 (95% CI: 16.90-17.2)

Table 2 | Hazard ratios and 95% CIs for the association between prenatal cannabis exposure and study outcomes

Outcome	Crude HR (95% CI)	Adjusted HR (95% CI) ^c	Additionally adjusted HR (95% CI) ^{c,d}
Primary outcome			
ASD ^a	1.63 (1.29-2.06)	1.53 (1.18-1.98)	1.51 (1.17-1.96)
Secondary outcomes ^b			
Intellectual disability and learning disorders	2.04 (1.68-2.49)	1.23 (0.97-1.55)	1.22 (0.97-1.54)
ADHD	2.60 (2.35-2.86)	1.11 (0.99-1.25)	1.11 (0.98-1.25)

^aDiagnosed after 18 months of age, n = 503,065 children. ^bDiagnosed after age 4 years, n = 497,821 children. ^cModels adjusted using CEM method: n = 173,035 children for primary outcome, n = 170,271 children for secondary outcomes. ^dAdjusted for placental abruption, placenta previa, preeclampsia, eclampsia, gestational diabetes, gestational hypertension and preterm birth.

- **Cannabis use in Canada is increasing**, including among pregnant individuals
- Increases in cannabis use during pregnancy are socially patterned.
 - **most notable among younger individuals, and individuals of lower socioeconomic status**
- Cannabis use during pregnancy is **associated with adverse perinatal outcomes** including preterm birth, small for gestational age, placental abruption, still birth, and infant transfer to NICU
- Prenatal cannabis exposure may have **life-long neurodevelopmental implications** for exposed children

Take home messages

So What?

- Prenatal cannabis exposure may have selective deleterious consequences on executive functions/higher cognitive abilities
 - Like EtOH may not be evident until later in life
 - Like EtOH, may be life-long
 - Like EtOH, this may be an “invisible disability”
 - Like EtOH, there may be structural and functional impacts



THE SOCIETY OF
OBSTETRICIANS AND
GYNAECOLOGISTS
OF CANADA

May 9th, 2017

SOGC Position Statement: Marijuana Use during Pregnancy

Cannabis (*marijuana*) is the most commonly used illicit drug among pregnant women. Legalization of cannabis in Canada may reinforce the reputation of cannabis being a harmless drug and result in an increase of use among pregnant women.

Evidence-based data has shown that cannabis use during pregnancy can adversely affect the growth and development of the baby, and lead to long-term learning and behavioural consequences. There have been sufficient studies with comparable results, showing that cannabis use during pregnancy raises concerns of impaired neurodevelopment of the fetus, in addition to the adverse health consequences related to maternal and fetal exposure to the effects of smoking. Pregnancy is a critical time for the brain development of the baby and the adverse effects caused by cannabis exposure can be life-long.

The SOGC recommends that women who are pregnant or contemplating pregnancy should abstain from cannabis use during pregnancy.

Next steps...



Multidisciplinary research program to investigate cannabis use in pregnancy and **neurodevelopmental outcomes in children**

1. Interprovincial analyses of birth registry and health administrative data
2. Analysis of bio-specimens and data from Canadian birth cohorts
3. Identifying and addressing knowledge gaps among Canadians and care providers
4. Laying foundation for a long-term perinatal cannabis research in Canada

Reserve Slides



There may be a time and a place but is pregnancy one?

Weeding out the myths from the facts to help make informed choices about cannabis use in pregnancy

Common limitations

- Misclassification of cannabis exposure due to underreporting, self-report
- No data on frequency, trimester and duration of use
- Misdiagnosis of outcomes
 - ASD and other outcomes including ADHD
- Observational studies on behavioral exposures, such as cannabis use, are not readily testable in randomized trials and are at risk of residual confounding biases.
- Data predate legalization of cannabis in Canada

Interprovincial analyses using birth registry and health administrative data



Objective: To determine the risk of *in utero* cannabis exposure on neurodevelopment



Study Design: population cohort study assembled using existing provincial birth registry data from **3 Canadian provinces**



Exposure: self-reported cannabis use in pregnancy



Outcome of interest: differences in neurodevelopment based on scores received on select domains of the Early Development Index



A 103-item questionnaire
completed by teachers for all primary school
students (5 years of age)

Routinely administered
in regular cycles across ON, BC, NS

Assesses child performance in five domains:
physical health and well-being; social competence;
emotional maturity; language and cognitive
development; communication skills and general
knowledge

Scores robustly predict later school performance

Analysis of bio-specimens and data from Canadian birth cohorts (in development)

- Toxicological analysis of human matrices provides the most objective measure of cannabis exposure.
- Canadian birth cohorts can be used to address knowledge gaps



MIREC

Maternal-Infant Research
on Environmental Chemicals

Timeframe:

2008 – 2011

Sample size:

2001 mother-infant dyads

Biospecimens:

Maternal urines, plasma, whole blood across trimesters; newborn meconium; breastmilk

Child measures of neurodevelopment:

SRS-2, BRIEF-P



Oak Birth Cohort

Timeframe:

2002 – 2009

Samples collected for:

7241 mothers; 2175 infants

Biospecimens:

maternal serum, plasma; cord blood

Outcome measures:

data may be linkable to health administrative and EDI data (TBD)

Identifying and addressing knowledge gaps among Canadians and care providers



Scoping Review of open-access and publicly available Canadian educational resources on cannabis use and fertility, pregnancy and breastfeeding

Open access

Protocol

BMJ Open Canadian educational resources about cannabis use and fertility, pregnancy and breast feeding: a scoping review protocol

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ABSTRACT

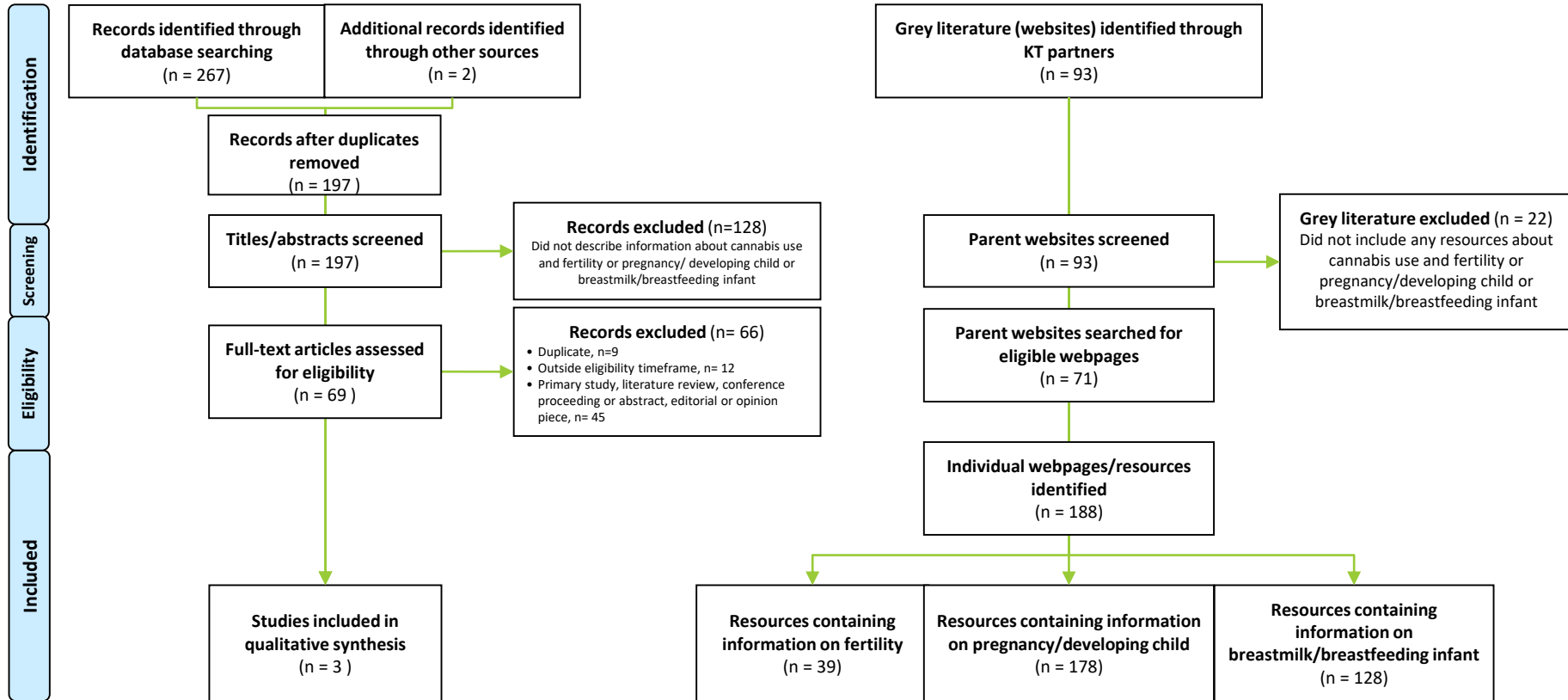
Introduction Cannabis use in Canada is becoming more prevalent across all demographic groups due to increases in accessibility and lowered perceptions of harm. These patterns are mirrored among women of reproductive age, including women who are pregnant. Given increasing evidence for detrimental short- and long-term impacts of cannabis exposure on fetal, newborn and child outcomes, there is a need for high-quality, accessible resources providing reliable guidance and recommendations on this topic for both the public and healthcare providers. We will conduct a scoping review to identify and characterise all publicly available online educational resources discussing cannabis use related to fertility, pregnancy and breastfeeding developed by Canadian organisations.

Strengths and limitations of this study

- The search strategy will identify resources available from both the medical literature and online sources.
- The study design and search strategy are strengthened by guidance and expertise from a methodologist, information specialist, clinicians and a patient partner.
- The review will not consider international resources potentially transferable to the Canadian setting.
- The review will not include an analysis of social media content.

Clinical Guidelines

Online resources from public health organizations and clinical societies



Identifying and addressing knowledge gaps among Canadians and care providers



National surveys of new and expectant parents for knowledge, attitudes and beliefs related to perinatal cannabis use; preferred information sources and modalities, as well as barriers to information access



Survey of obstetrical and maternity care providers for perceived barriers to identifying and counselling women who use or want to use cannabis in pregnancy

Laying foundation for a long-term perinatal cannabis research in Canada



Barriers and facilitators to participating in cannabis use research: a lifestyles survey at The Ottawa Hospital

- A single-centre survey study to assess factors influencing receptiveness and motivation to participating in research related to cannabis use in pregnancy (n=84)
- Data showed a **high degree of willingness to participate in cannabis-related research** via sharing data and biological samples.
- **Receptivity to providing biological samples varied by type.**
- The most frequently cited motivating and deterring factors were a desire to contribute to science and health information (79%) and fear of privacy invasion (17%), respectively.

Laying foundation for a long-term perinatal cannabis research in Canada



A pilot cohort to track perinatal cannabis exposure and obstetrical, newborn and child health outcomes (in development)

- A prospective pilot study to assess feasibility of recruitment and participation.
- 100 pregnant individuals in the 1st trimester who identify with cannabis use in pregnancy
- 100 non-users matched by age, tobacco use etc.

Study design, Setting:

- Prospective longitudinal pregnancy and birth cohort
- Two-centre centre



Population

- Individuals using cannabis for any reason (chronic pain or other indications, struggling with nausea and vomiting, recreational)
- Non-users matched for maternal age, parity, tobacco use, trimester of pregnancy

Outcomes

- Implementation outcomes including: recruitment rate, appropriateness of eligibility criteria, protocol compliance and retention
- Health outcomes including: maternal, pregnancy and newborn outcomes; early child growth and development; pediatric neurodevelopment

Comprehensive data collection on cannabis use

- Current or recent use cannabis use, the reasons for use frequency and mode of consumption
- Source of cannabis products, cannabinoid content and/or brand (if available), second-hand exposures
- Nature of counselling received from HCP on cannabis use during pregnancy or lactation (if any)



	Baseline	1st Trimester	2nd Trimester	3rd Trimester	Delivery admission	1-3 mo. Postpartum	6-8 mo. Postpartum	12 mo. Postpartum	18 mo. postpartum
Primary Data Collection									
Baseline Questionnaire	X								
Parental cannabis use questionnaire*		X	X	X	X	X	X		
Child nutrition, growth and development						X	X	X	X
Maternal Bio-specimens									
Blood	X	X	X	X	X	X			
Urine	X	X	X	X	X	X			
Breastmilk					X	X			
Newborn Specimens									
Cord blood					X				
Cord tissue					X				
Meconium/stool					X	X			
Urine					X	X			



OMNI

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Thank you

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