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Inspiré par la recherche.
Guidé par la compassion.

CANNABIS-INDUCED PSYCHOSIS AND SCHIZOPHRENIA FOLLOWING NON-MEDICAL CANNABIS LEGALIZATION AND COMMERCIALIZATION IN CANADA

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Faculté de médecine
Département de
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Faculty of Medicine
Department of
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OUTLINE

- Review of Cannabis Policy and Evolution in Canada
- Summarize evidence on changes in healthcare visits after legalization
 1. Cannabis Use Disorder (e.g., addiction)
 2. Cannabis-induced psychosis
- Summarize study on risk of schizophrenia for individuals with health care visits for cannabis
- Discuss public health, clinical and policy implications



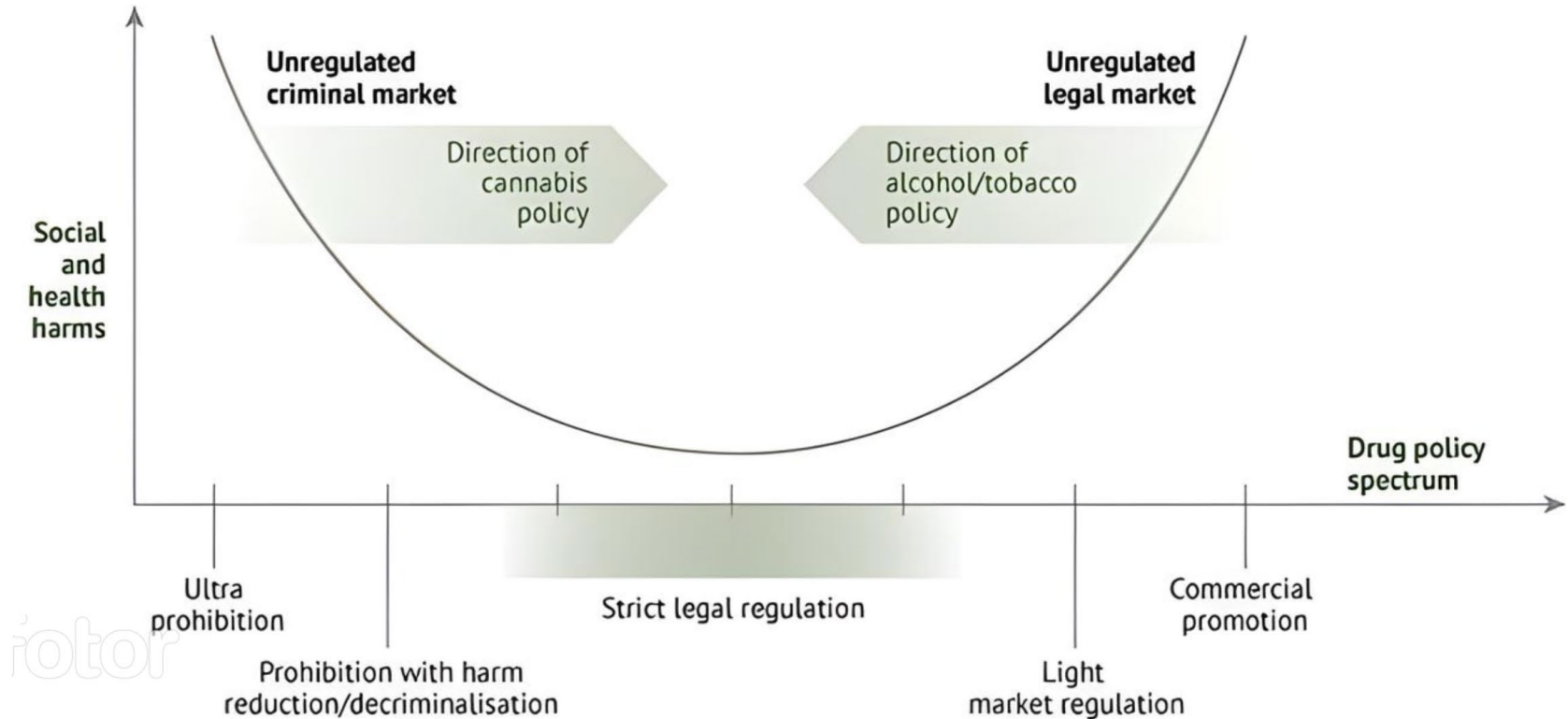
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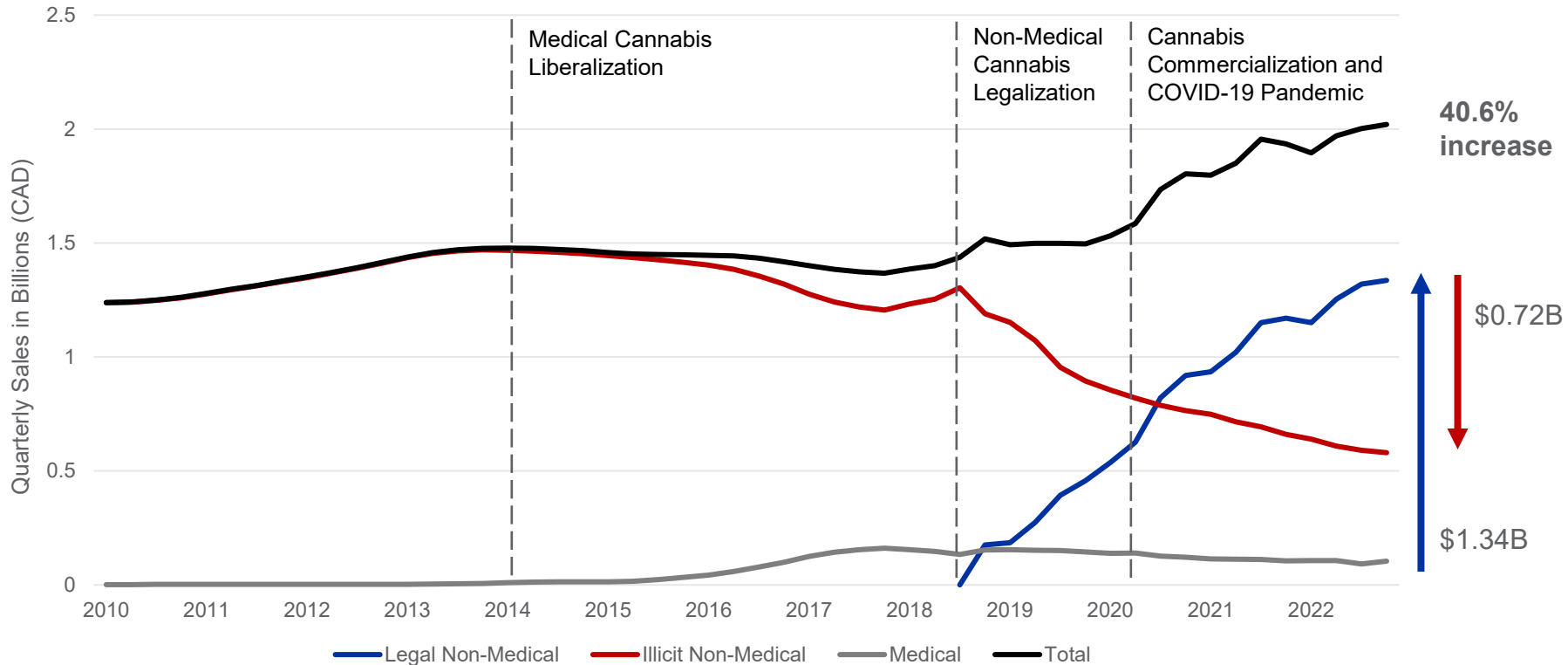
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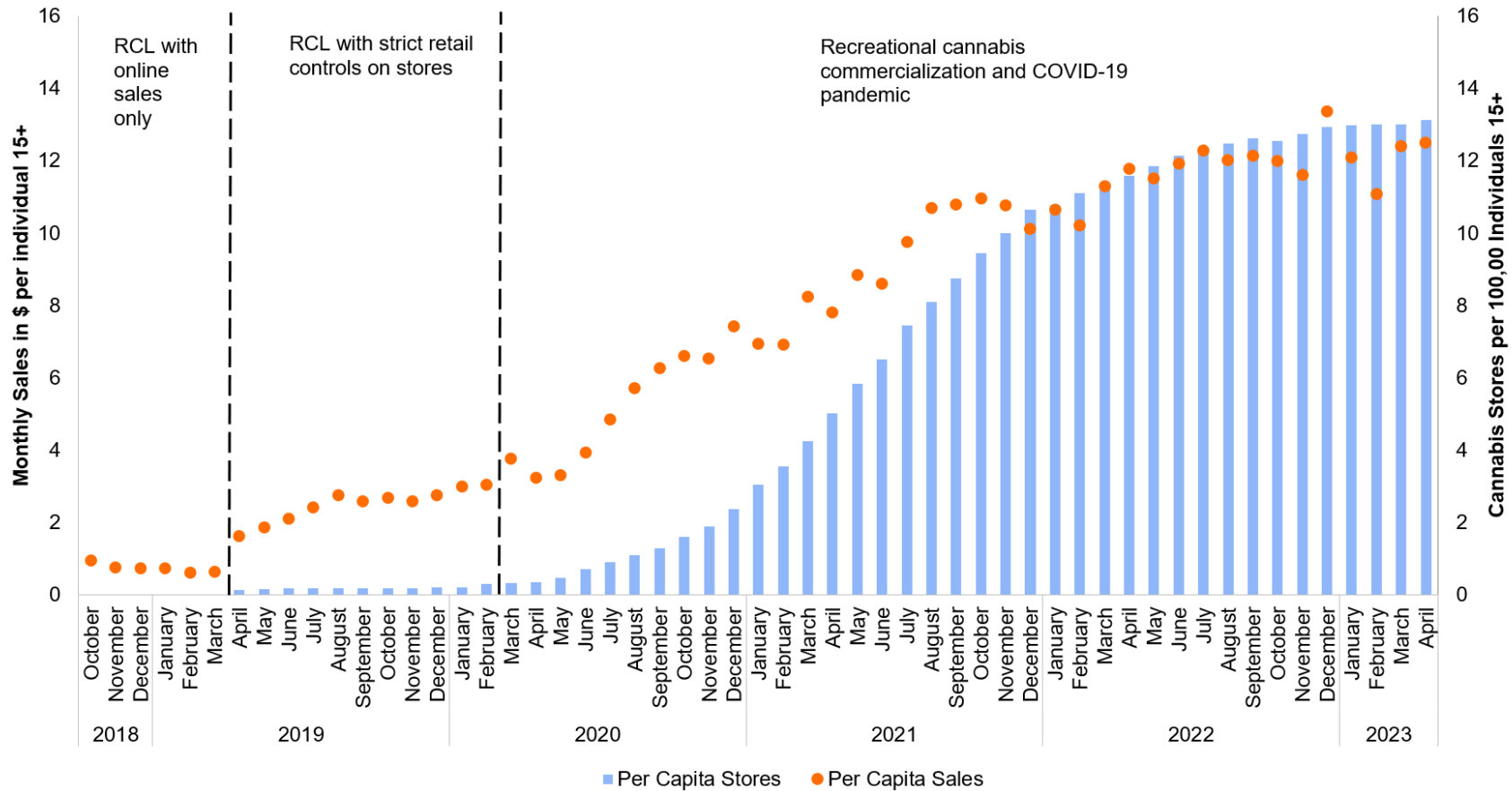
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A Framework for the Legalization and Regulation of Cannabis in Canada: The Final Report of the Task Force on Cannabis Legalization and Regulation

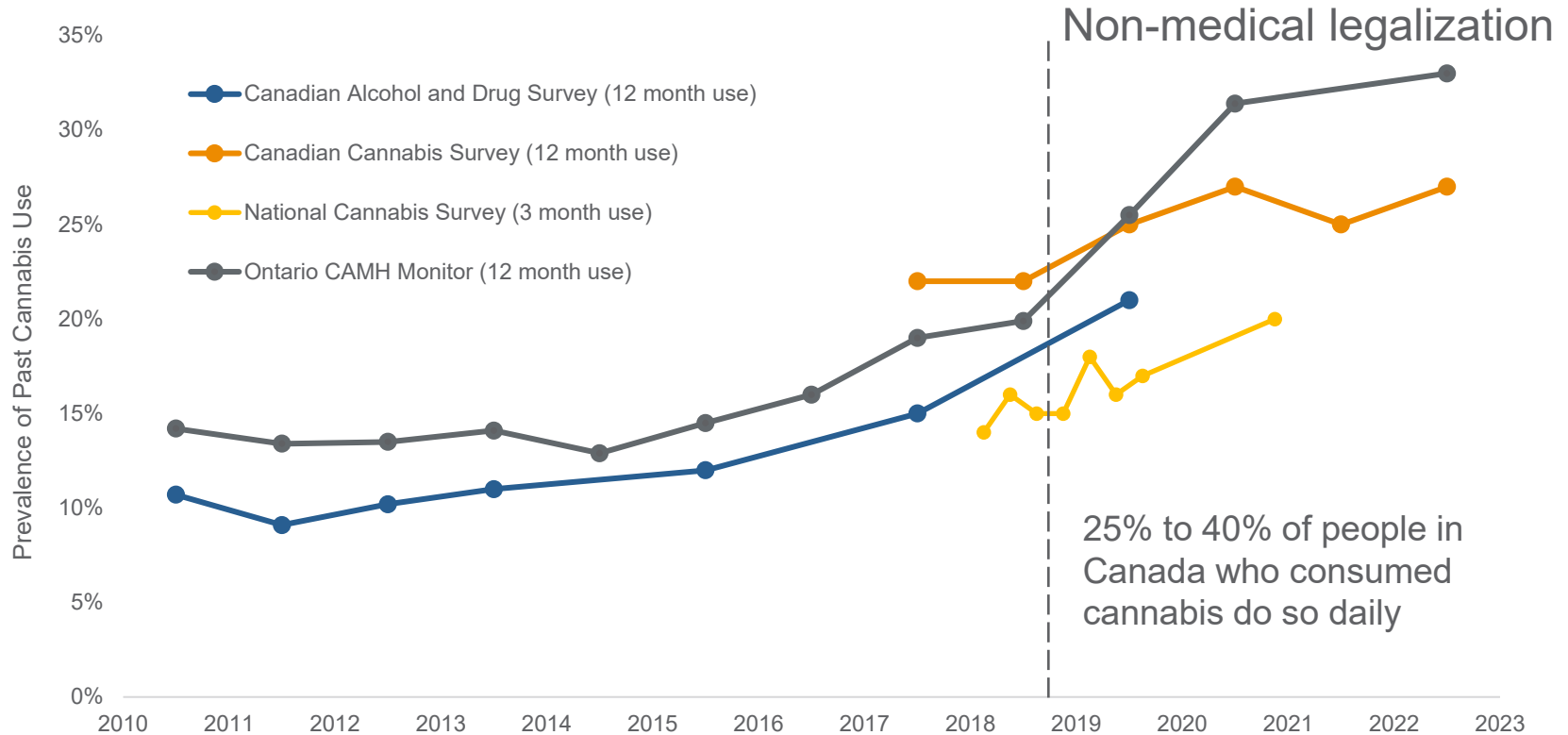


TRACKING CANADA'S CANNABIS MARKET



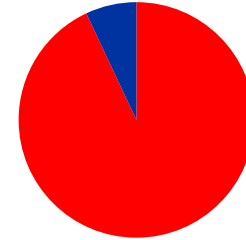
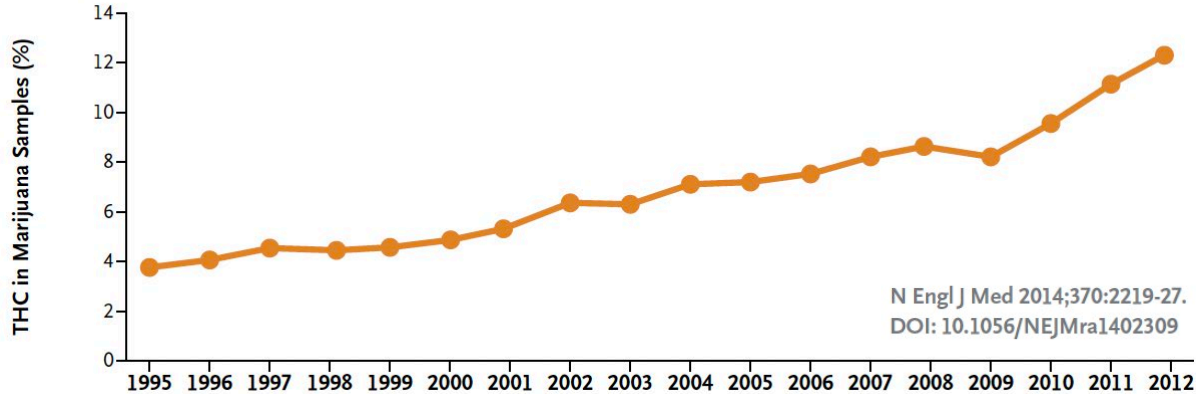


PREVALENCE OF CANNABIS USE IN CANADA



CHANGES IN THC POTENCY IN NORTH AMERICA

A Potency of THC



■ >20% THC ■ <20% THC

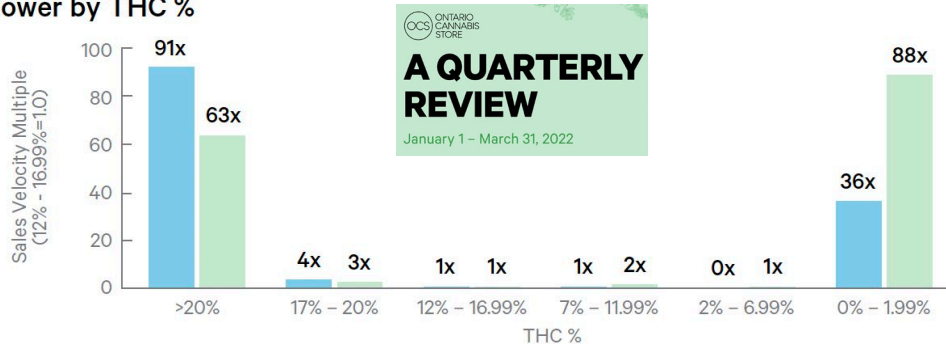
Dried Cannabis Sales In Ontario in 2022

- Overall 71% higher than 20% THC
- Excluding CBD predominant strains 93% higher than 20% THC

Sales velocity for dried flower by THC %

Sales velocity references units per day for OCS.ca and units sold per day per average store for retail.

■ Retail Stores
■ OCS.ca



ONTARIO CANNABIS STORE (OCS*) LANDING PAGE

*OCS IS ONTARIO'S GOVERNMENT RUN ONLINE RETAILER

Bulk Up

Get serious about stocking up your dried flower stash with these ounce options



Bestselling Ounces

[SHOP NOW](#)



High-THC (24%+) Ounces

[SHOP NOW](#)



Ontario-Grown Ounces

[SHOP NOW](#)

TRACKING HEALTHCARE METHODS

▶ Population Level Data

- All residents in Ontario (Canada's largest province) or Canada
- Every outpatient physician visit, ED visit and hospitalization from universal health system covers 97% of residents of Canada

▶ Outcomes

- Healthcare due to cannabis
 - Based on Diagnostic codes
- Diagnosis of Schizophrenia Spectrum Disorder (SSD): validated algorithm to detect individuals who have SSD

1) YOUTH AND ADULT HEALTHCARE DUE TO CANNABIS

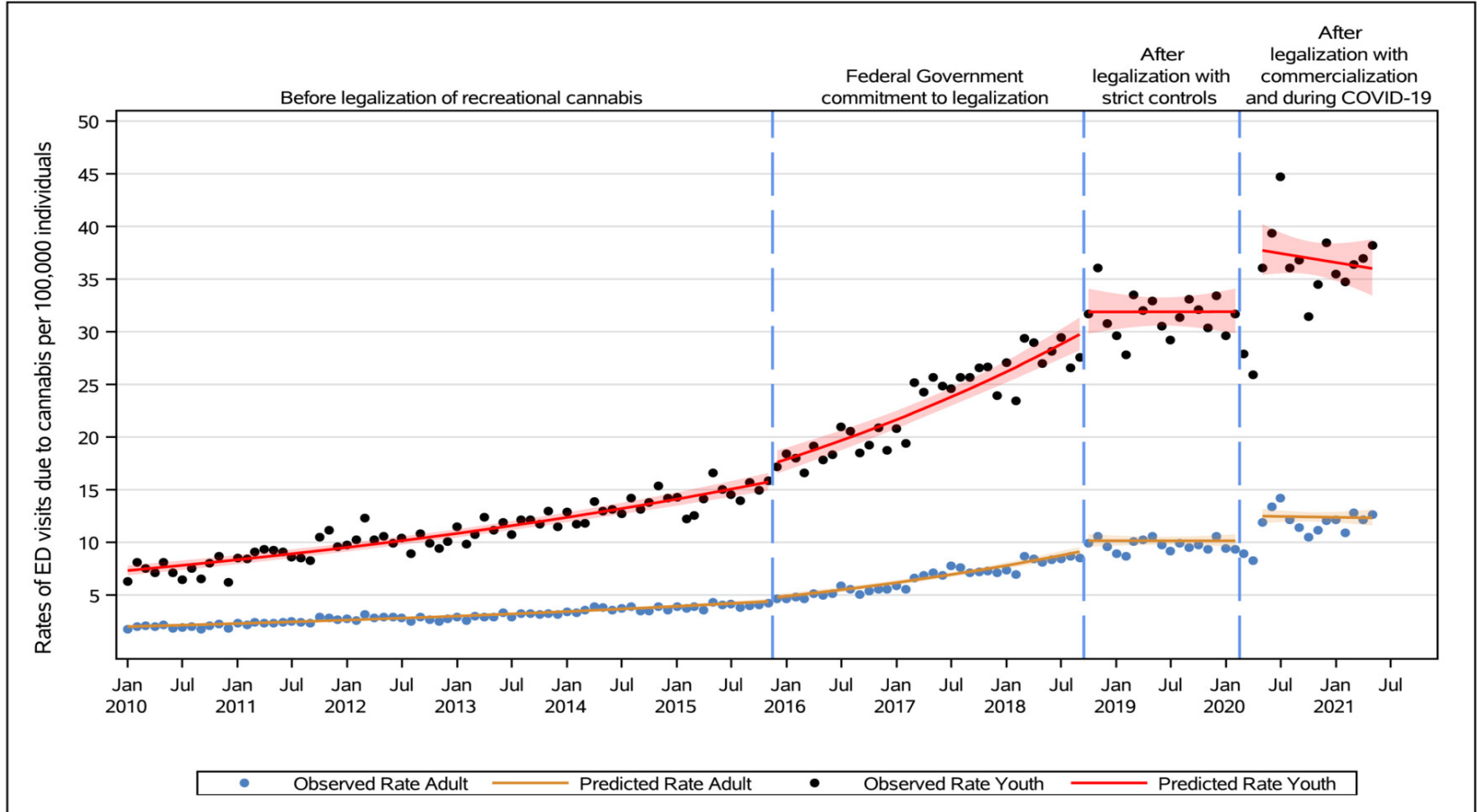
- ▶ All ED visits in Ontario all Hospitalizations in Canada
 - Track changes in visits due to cannabis for a variety of causes across different populations
 - Overall (e.g., intoxication, poisoning, psychosis, withdrawal)
 - Cannabis-induced psychosis
- ▶ Contextualize by changes in market and regulations



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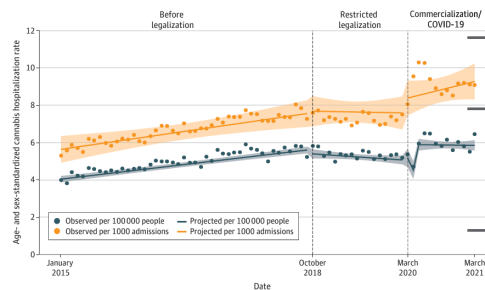
The association between recreational cannabis legalization, commercialization and cannabis-attributable emergency department visits in Ontario, Canada: an interrupted time-series analysis



Changes in Cannabis-Attributable Hospitalizations Following Nonmedical Cannabis Legalization in Canada

Daniel T. Myran, MD, MPH; Adrienne Gaudreault, MPH; Lauren Konikoff, MA; Robert Talarico, MSc; Rosalie Liccardo Pacula, PhD

Figure 1. Age and Sex Standardized Rates of Hospitalizations Due to Cannabis for All of Canada



	Pre-legalization		Commercialization		Percent Change
	No. Visits	Rate	No. Visits	Rate	
Intoxication	1,936	1.96	670	2.23	13.8%
Psychosis	5,828	5.91	2,497	8.30	40.4%
Harmful Use	28,752	29.15	10,577	35.16	20.6%
Poisoning	1,917	1.94	642	2.13	9.8%
Dependence	12,994	13.17	4,103	13.64	3.6%
Withdrawal	763	0.77	318	1.06	37.7%

CHALLENGES AND CRITIQUES

- ▶ Are changes from increased willingness to disclose cannabis or greater clinician detection of cannabis?
- ▶ Increases from commercialization vs pandemic?
 - Changes below vs above minimum legal age
 - Compare to changes in other substances

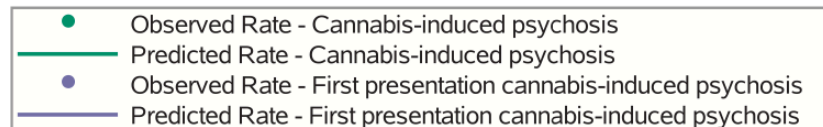
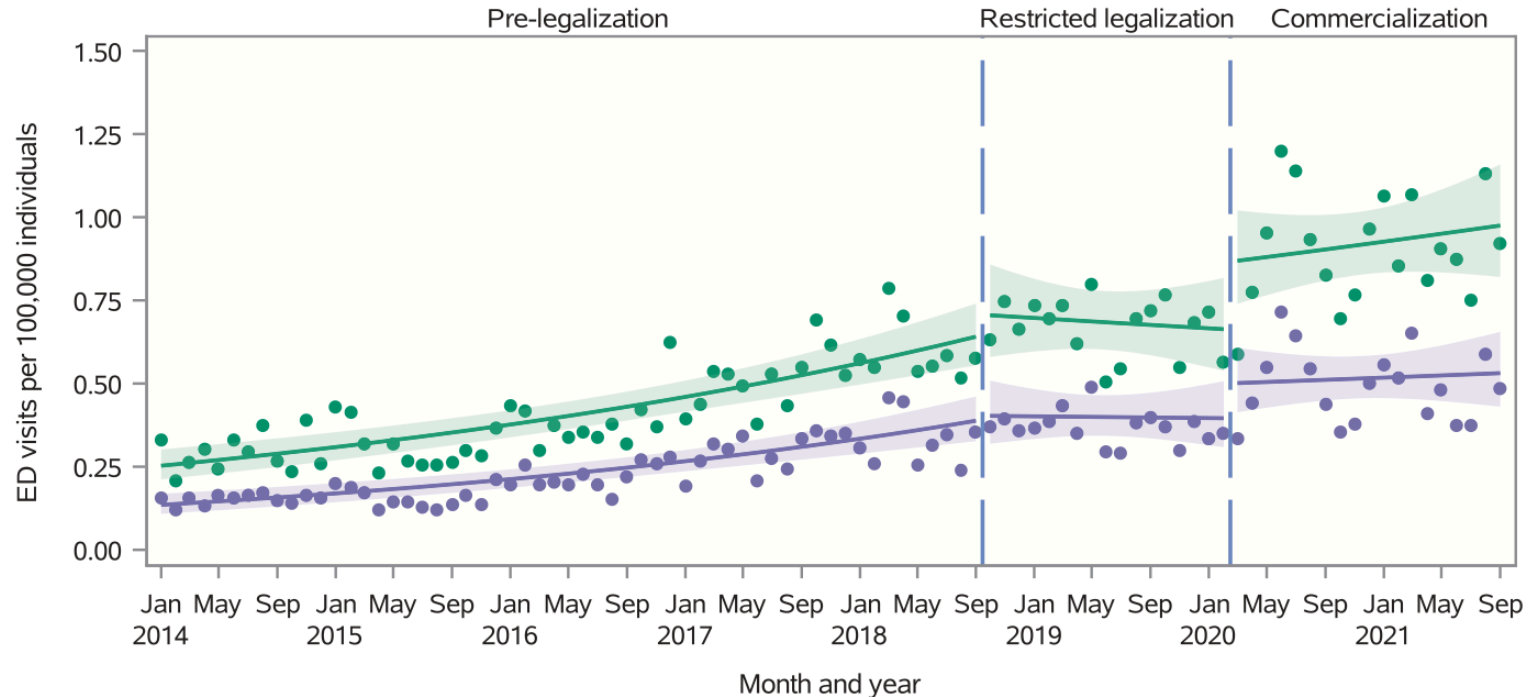


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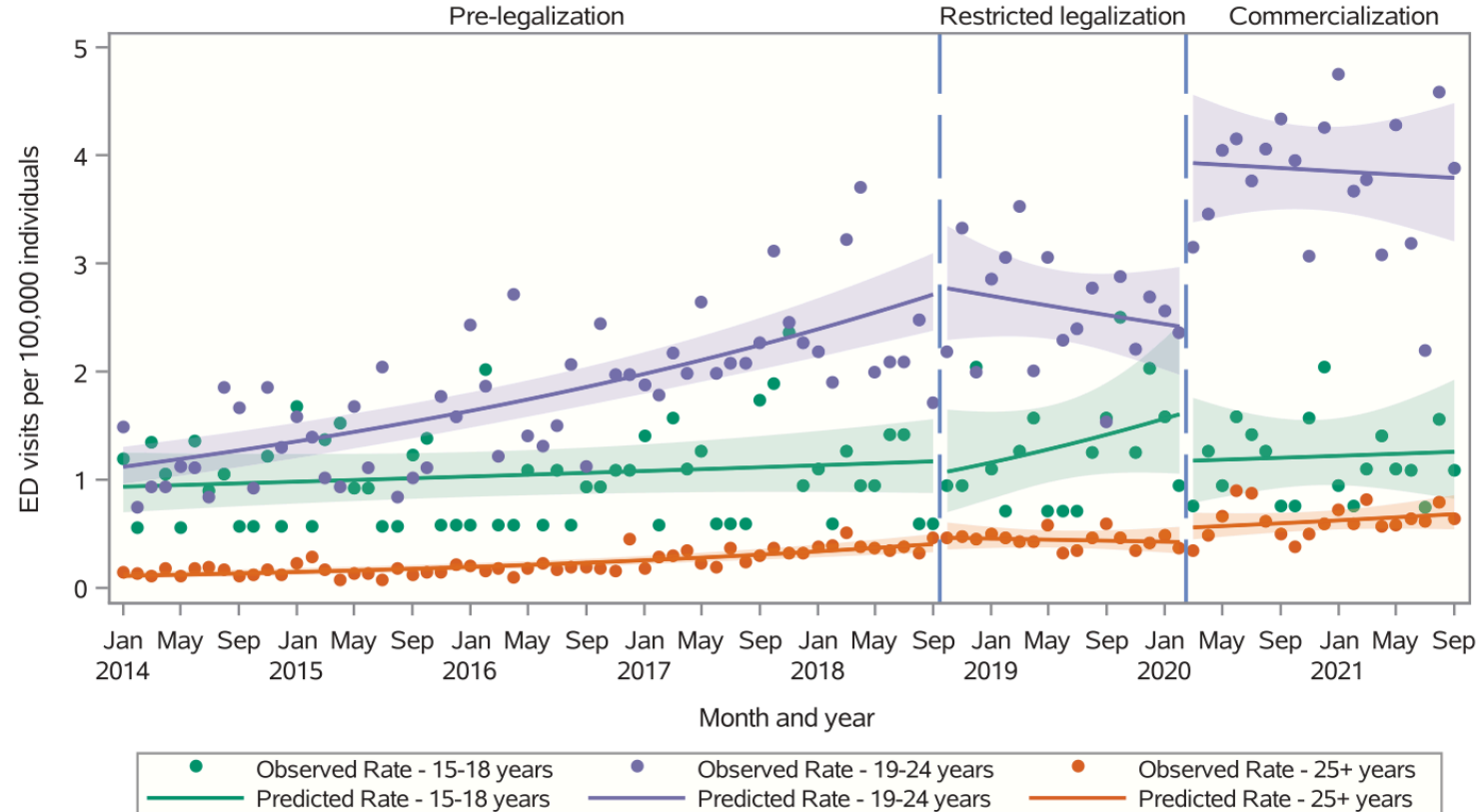
Association between non-medical cannabis legalization and emergency department visits for cannabis-induced psychosis

Daniel T. Myran^{1,2,3,4}, Michael Pugliese³, Rhiannon L. Roberts¹, Marco Solmi^{1,5,6,7,8}, Christopher M. Perlman⁹, Jess Fiedorowicz^{1,5,6,7,10}, Peter Tanuseputro^{1,4,7,11,14} and Kelly K. Anderson^{12,13,14}



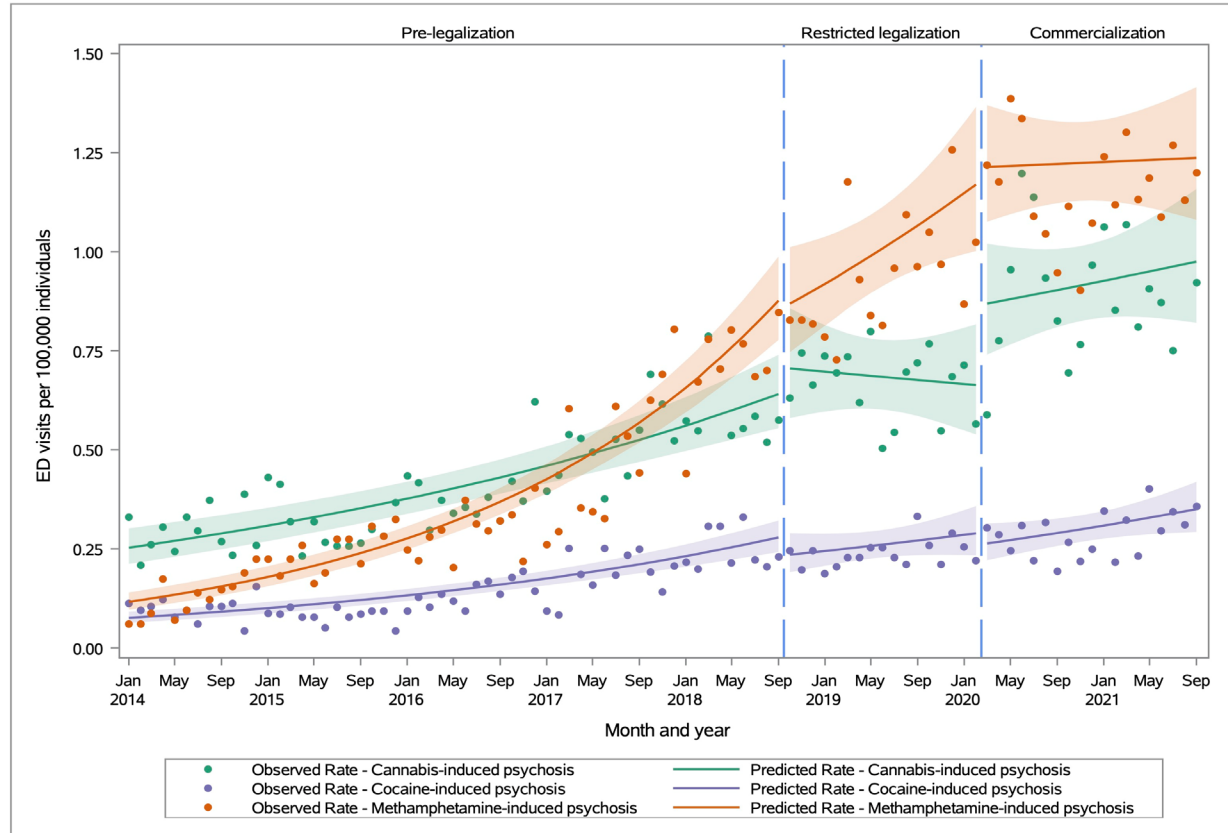
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DISCUSSION

- ▶ Healthcare visits due to cannabis been increasing since 2010
- ▶ Changes in visits have differed by policy period
 - Accelerated in lead up to legalization (medical liberalization + announcement of non-medical legalization)
 - Plateaued during legalization with restrictions period
 - Increased during commercialization/ COVID-19
- ▶ Data may support some commercialization contribution



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2) RISK OF DEVELOPING SCHIZOPHRENIA

- ▶ All individuals aged 14-65 years in Ontario between 2008 and 2022 → excluded history of psychosis/schizophrenia.
 - Identified individuals with a first-time substance use visit
- ▶ Compared development of schizophrenia between individuals with substance use visit and gen population



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Transition to Schizophrenia Spectrum Disorder Following Emergency Department Visits Due to Substance Use With and Without Psychosis

Daniel T. Myran, MD, MPH; Lyndsay D. Harrison, MSc; Michael Pugliese, MSc; Marco Solmi, MD, PhD;
 Kelly K. Anderson, PhD; Jess G. Fiedorowicz, MD, PhD; Christopher M. Perlman, PhD; Colleen Webber, PhD;
 Yaron Finkelstein, MD; Peter Tanuseputro, MD, MHSc

Substance-Induced Psychosis	All-Substances	Cannabis	General Population
Population at Risk	N=13,784	N=3,557	N=9,771,825
Transition in 3 Years, No. (%)	2,552 (18.5%)	925 (26.0%)	11,014 (0.1%)
Crude Transition Per 100,00 Person Yrs	5579.0	9112.6	26.0
Age Sex Adjusted Hazard Ratio	163.2 (156.1 - 170.5)	241.6 (225.5 - 258.9)	Ref
Fully Adjusted Hazard Ratio	62.0 (58.8-65.4)	84.9 (78.7-91.6)	Ref
Substance Use Without Psychosis	All-Substances	Cannabis	General Population
Population at Risk	N=400,144	N=65,904	N=9,771,825
Transition in 3 Years, No. (%)	5,555 (1.4%)	1,277 (1.9%)	11,014 (0.1%)
Crude Transition Per 100,00 Person Yrs	222.7	430.2	26.0
Age Sex Adjusted Hazard Ratio	9.8 (9.5 - 10.2)	14.3 (13.5 - 15.2)	Ref
Fully Adjusted Hazard Ratio	4.8 (4.6-5.0)	5.2 (4.9-5.6)	Ref

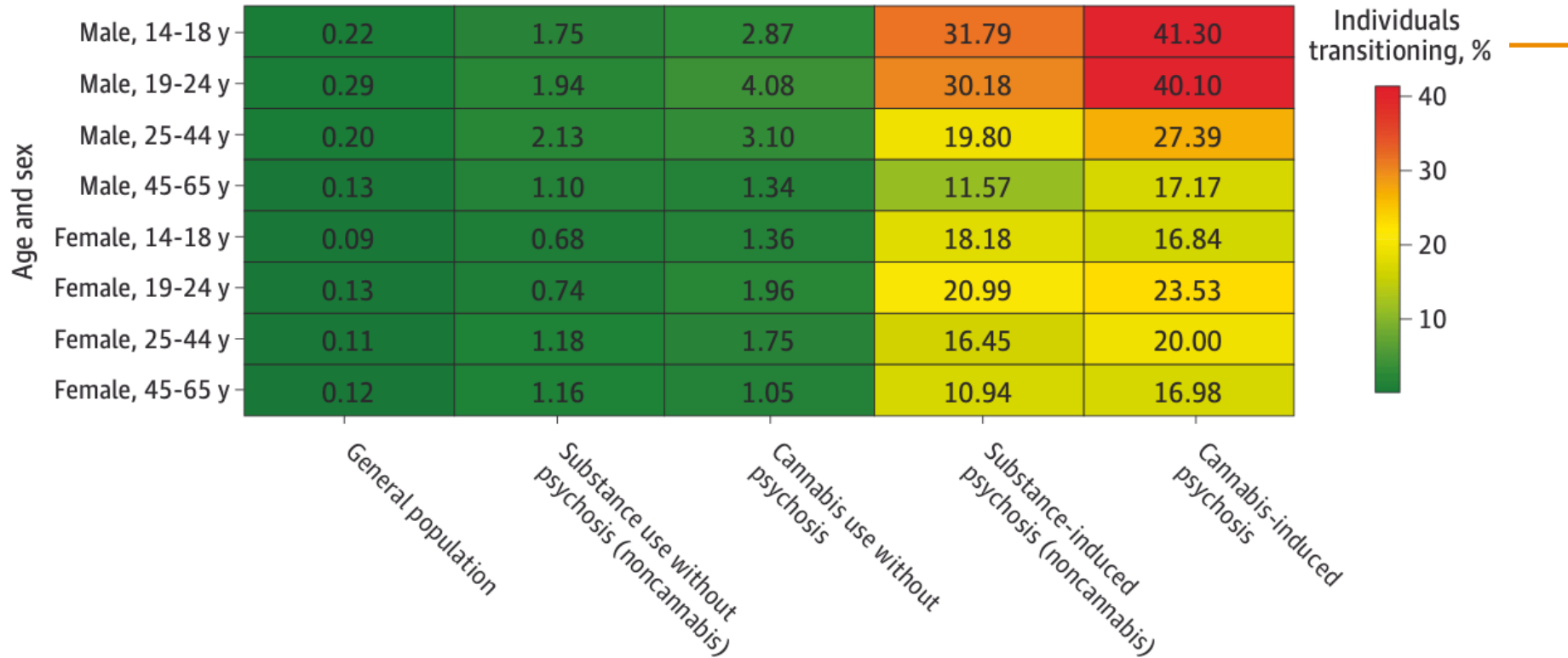


Figure. Visual representation of crude percent of individuals transitioning to a diagnosis of schizophrenia spectrum disorder within 3-years of different types of first-presentation ED visits for substance use and the general population

3) CHANGES IN OVERALL INCIDENCE OF SCHIZOPHRENIA

- ▶ Tracking changes in incidence of schizophrenia spectrum disorder

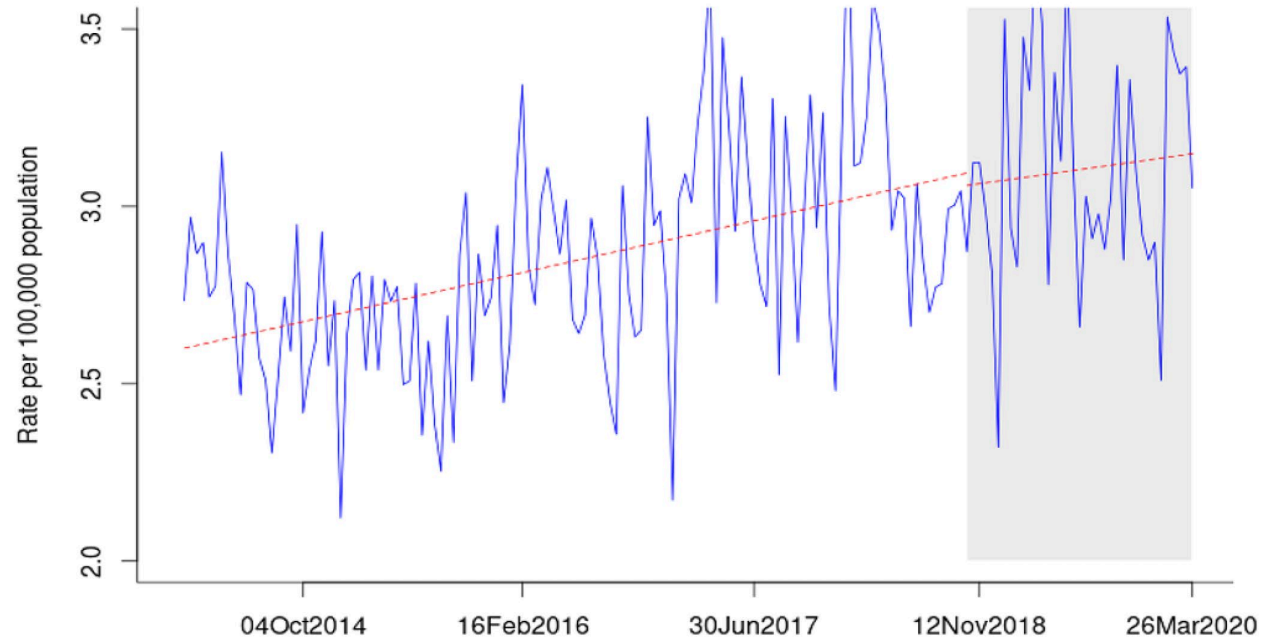
INCIDENT NON-AFFECTIVE PSYCHOSIS IN ONTARIO AGES 14-60 TO MARCH 2020

Research Paper

Impact of non-medical cannabis legalization with market restrictions on health service use and incident cases of psychotic disorder in Ontario, Canada

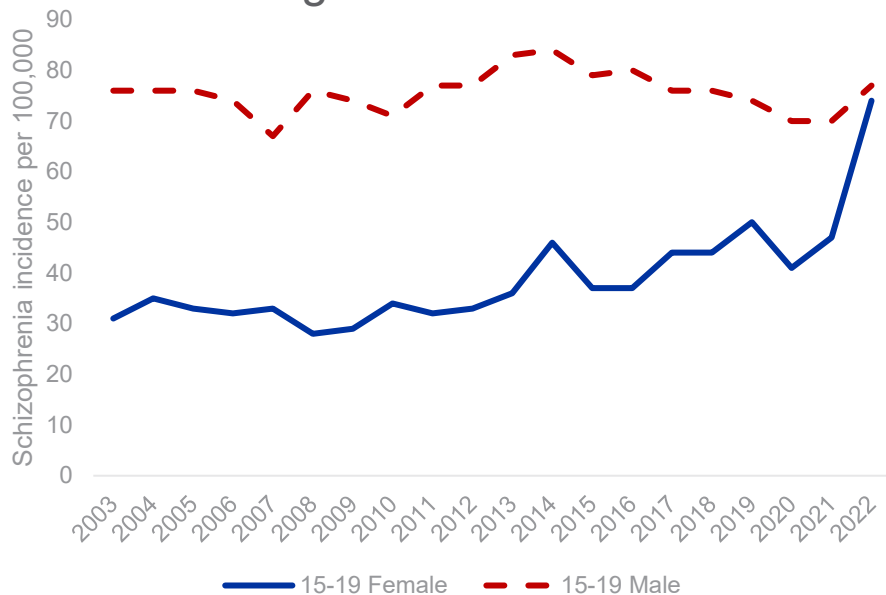
Kelly K. Anderson ^{a b f g} , Rebecca Rodrigues ^a, Britney Le ^f, Maliha Mamun ^a, Suzanne Archie ^h, Jordan Edwards ^h, Tara Elton-Marshall ^{a i k l}, Jason Gilliland ^{a c d}, Daniel Thomas Myran ^{j m n}, Lena Palaniyappan ^{b o}, Christopher M. Perlman ^p, Jamie A. Seabrook ^{a c q}, Robin M. Murray ^r, Salimah Z. Shariff ^{e f g}

a. Non-Affective Psychotic Disorder: Incident Cases

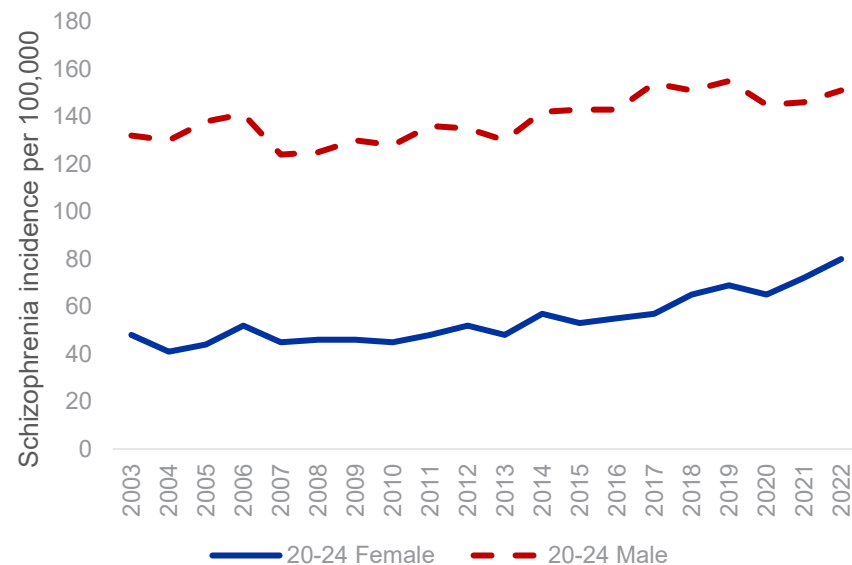


INCIDENCE OF HOSPITALIZATIONS FOR SCHIZOPHRENIA IN CANADA

Age 15-19 Years



Age 20-24 Years



From <https://health-infobase.canada.ca/ccdss/data-tool/>

PSYCHOSIS AND SCHIZOPHRENIA DISCUSSION

- ▶ ED visits due to cannabis increasing & associated with elevated risk schizophrenia
- ▶ Average time between first cannabis use and diagnosis of schizophrenia is 6 years
- ▶ Unknown long-term implications on chronic psychoses



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CLINICAL IMPLICATIONS

- ▶ Ongoing debates about causality of cannabis use on mental health, psychosis and other harms
- ▶ Regardless of causality at very high risk and may benefit from monitoring and intervention
 - Early psychosis intervention (EPI) programs
- ▶ A precautionary approach likely warranted



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POLICY IMPLICATIONS - 1

- ▶ Legalization with strict control did not accelerate increases in adult cannabis use and harms
- ▶ However visits began increasing after medical liberalization/ announcement
- ▶ Commercialization may increase a wide variety of cannabis harms in young adults and adults



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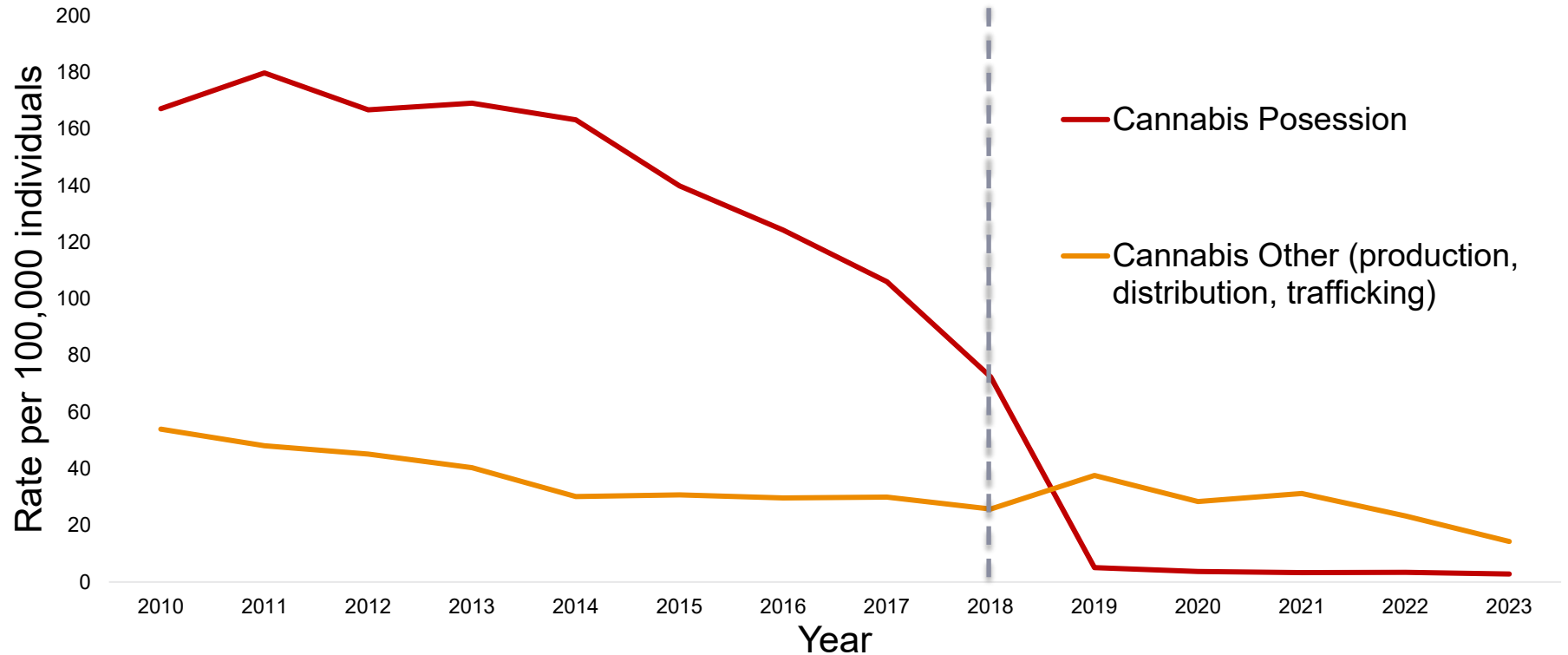
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POLICE REPORTED CANNABIS ARRESTS IN CANADA

Non-Medical Legalization



POLICY IMPLICATIONS - 2

- ▶ Public health benefits from decriminalization
 - Reduces criminal justice harms promotes equity
- ▶ Can be achieved without legalization and definitely achieved without commercialization

Birthday Cake White Chocolate

Blend



THC
10 mg

CBD
0 - 0.2 mg

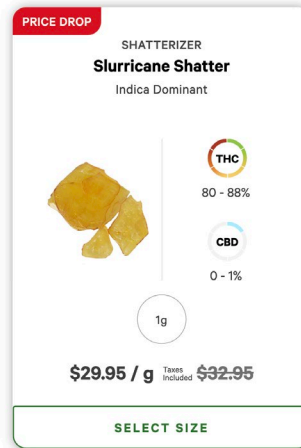
Fully Blasted Blue Raspberry Watermelon Gummy

Indica Dominant



THC
10 mg

CBD
0 - 1 mg



3:1 Razy Pink Lemonade CBG/THC

Blend



THC
10 mg

CBD
0 - 1 mg

FINAL THOUGHTS

- ▶ Cannabis use and harms were high and increasing well before legalization
 - Room for debate about the impact of legalization
- ▶ The market will continue to evolve and expand
- ▶ Opportunity to use regulations to reduce use and harms



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- ▶ Collaborators
 - Peter Tanueputro, Monica Taljaard, Rosalie Pacula, Marco Solmi, Jess Fiedorowicz, Kelly Anderson