

Trends in amphetamine injection and determinants of initiation among people who inject drugs in Montréal, Canada: 2011-2019

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- This research was conducted in the traditional and unceded territory of the Kanien'keha:ka (Mohawk) and the Abenaki and Wabanaki confederation
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- **SH** receives salary from a Canadian Institutes of Health Research (CIHR) grant.
- **GZ** receives salary from CIHR and National Institutes of Health (NIH) grants.
- **NM** receives doctoral research awards from the Fonds de Recherche du Québec - Santé (FRQS) and the Canadian Network on Hepatitis C (CanHepC).
- **DV** has no interests to declare.
- **JB** has received research grants and advisor fees from Gilead Sciences and Abbvie (unrelated to the present work) and holds a Canada Research Chair in Addiction Medicine.

The background of the slide features a low-angle, upward-looking photograph of a modern skyscraper at night. The building's glass facade reflects the ambient light, creating a grid-like pattern of reflections. The entire image is overlaid with a semi-transparent dark blue filter, which makes the white text stand out prominently. The text is centered horizontally and positioned in the middle of the vertical frame.

Background

Stimulant use in Montréal, Canada



- Stimulant injection contributes substantially to HIV and HCV incidence among people who inject drugs (PWID) ⁽¹⁾
- In Montréal, cocaine injection is highly prevalent among PWID whereas amphetamine injection is uncommon ⁽²⁻⁵⁾



Cocaine injection: 40-60%
Amphetamine injection: 3-7%

- Yet cocaine injection has declined significantly since the early 2000s as local drug markets and trends evolve ^(5,6)
- Across the country, amphetamine use and related harms appears to be rising ^(7,8)

Stimulant use in Canada



6-fold increase

In methamphetamine possession incidents nationwide (2011 to 2017) ⁽⁷⁾



2-fold increase

In hospitalizations related to stimulants other than cocaine (2007 to 2014) ⁽⁸⁾



2-fold increase

In health care costs related to stimulants other than cocaine (2007 to 2014) ⁽⁸⁾

Stimulant use in Canada



6-fold increase

In methamphetamine possession incidents nationwide (2011 to 2017) ⁽⁷⁾



2-fold increase

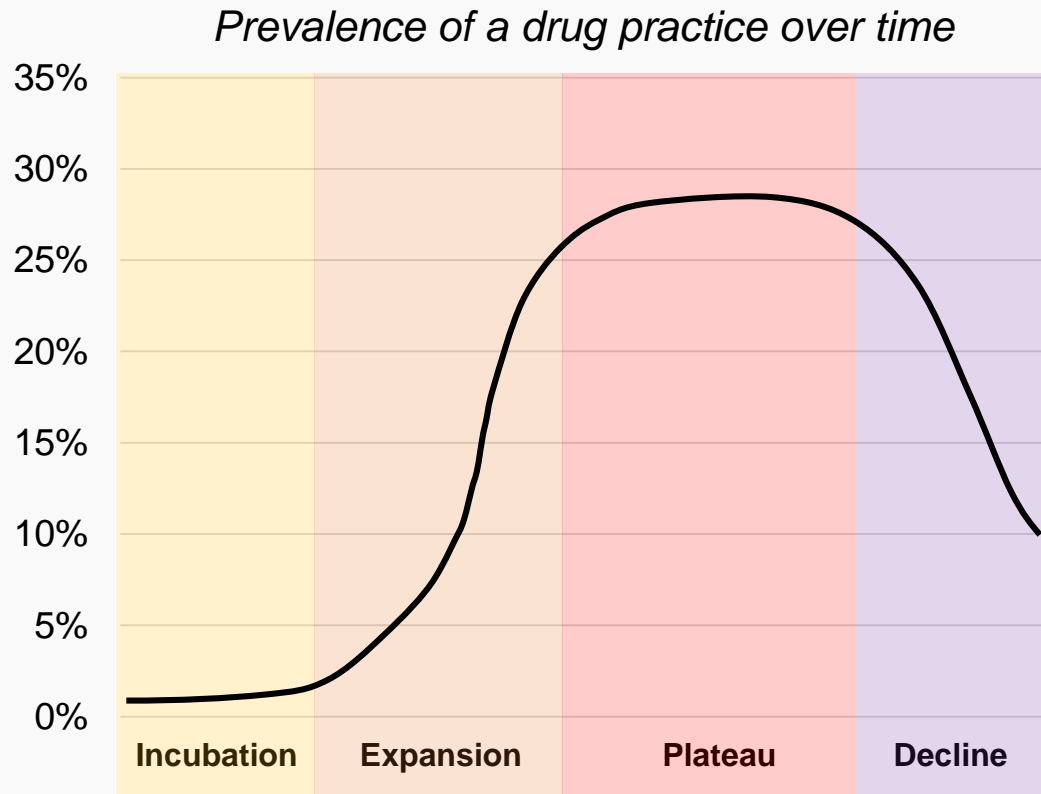
In hospital visits related to stimulants other than cocaine (2011 to 2017) ⁽⁸⁾



3-fold increase

In proportion of PWID injecting stimulants other than cocaine (2004 to 2016) ⁽⁸⁾

Evolution of drug eras



Subcultural evolution and illicit drug use*

ANDREW GOLUB, BRUCE D. JOHNSON, and ELOISE DUNLAP

Institute for Special Populations Research, National Development and Research Institutes, Inc

Addict Res Theory. 2005 May ; 13(3): 217–229. doi:10.1080/16066350500053497.

Popularity of practices tends to follow a natural and predictable pattern

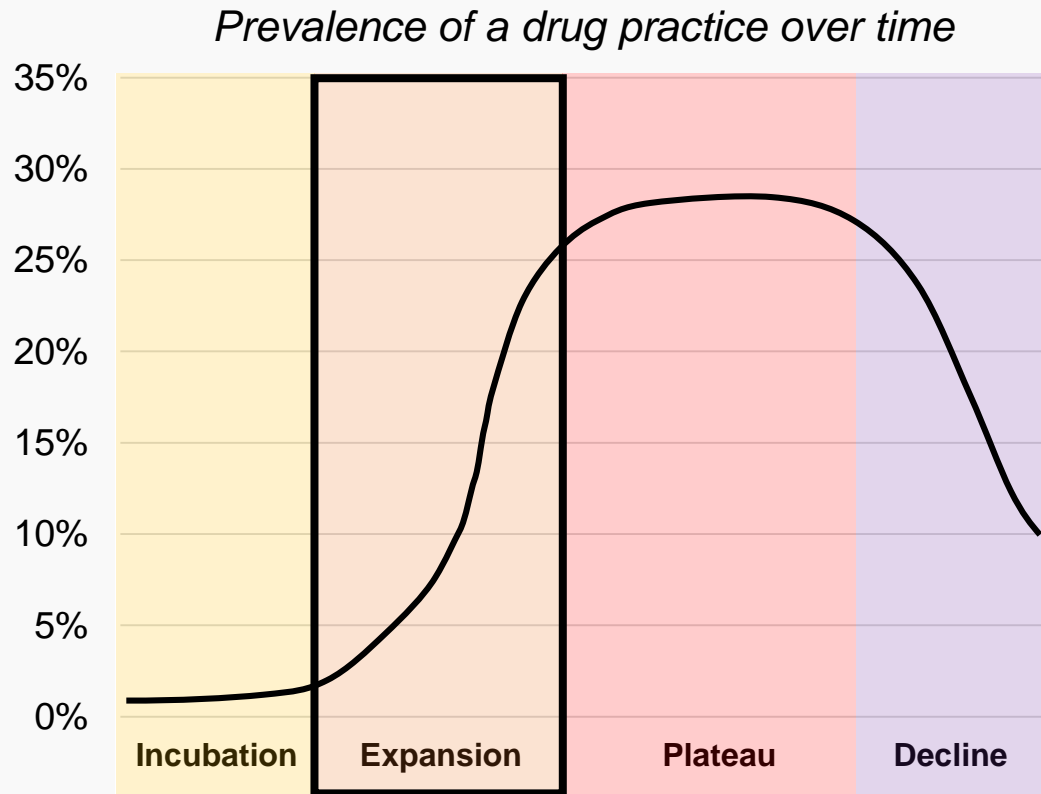
Practice starts within a limited subpopulation and specific subcultural context.

Practice introduced to wider subgroups and broader population. People exert agency in adopting the practice; susceptibility varies.

Most people 'at risk' have adopted the new practice or had the opportunity to do so.

Practice loses favour, particularly among youth/new initiates, leading to gradual decline in use.

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Amphetamine use among men who have sex with men (MSM)

Chemsex à Montréal: une réponse concertée

Centre intégré
universitaire de santé
et de services sociaux
du Centre-Sud
de l'île de Montréal
Québec

Nicolas Hamel, Gabriel Girard et Sarah-Amélie Mercure, Direction régionale de santé publique de Montréal
Secteur Prévention et contrôle des maladies infectieuses | Service ITSS et réduction des méfaits

1. Contexte

Des préoccupations de santé publique

- ✓ Risque accru pour les ITSS dans un contexte de sexualité intensive
- ✓ Risque accru de surdoses
- ✓ Pratique plus fréquente d'injection dans une population peu familière avec cette pratique
- ✓ Conséquences sociales et psychologiques importantes

À Montréal, une réalité chez les hommes ayant des relations sexuelles avec des hommes

- 8% des HARSAH ont consommé du Crystal dans les 6 derniers mois (Engage)
- 12% des HARSAH ont consommé du GHB (Engage, MOBILISE!)
- 22% des consommateurs de Crystal ont eu recours à l'injection (Meth@morphose)

Une question régulièrement médiatisée



- ➔ Mobilisation concertée des partenaires montréalais
 - ✓ Table de concertation Meth@morphose (2016-2017)
 - ✓ Création du groupe de travail chemsex (2017-2018)

RÉZO ACCM
CRDM Institut universitaire sur les dépendances
Clinique du Quartier Latin
AIDQ DRSP
Clinique l'Actuel

2. Intervention

Chemsex ?

- ➔ Chemical + Sex
- ➔ Drogues utilisées: Crystal meth, GHB, Kétamine
- ➔ Sexualité amplifiée



Formation Chemsex 101

- Mieux décoder, intervenir et savoir où référer
- Public cible : intervenants de première ligne
- Offerte dès l'hiver 2019



Matériel de prévention

- Adapter le matériel au contexte du chemsex
- Pipes à Crystal, trousses à slam
- Dépliant d'information

Hamel et al. Poster presented at
Journées annuelles de santé publique,
Montréal QC, December 4-5 2018.

Chemsex: Use of specific drugs (e.g. crystal meth) to facilitate, enhance, prolong sexual encounters (9, 10)

Among MSM in Montréal... (11)



7.9% used crystal meth



6.3% used crystal meth in the context of sexual activity



5.6% injected drugs

...in the past 6 months

Objectives

- ① To examine **annual trends** in the prevalence of amphetamine injection among PWID in Montréal, Canada, from 2011 to 2019
- ② To estimate the **incidence** of amphetamine injection and assess **sexual identity** as a risk factor for initiation among male and females



Methods

Data source



COHORTE

H•E•P•C•O

Recherche • Personnes utilisant des substances • Santé

03/2011 to 12/2019

Design: Prospective longitudinal open cohort study

Primary aim: To identify individual & contextual determinants of HCV infection among PWID

Setting: Montréal, QC, Canada

Eligibility: Drug injection in past 6 months, age ≥ 18 years

Recruitment: Combination of street-level strategies and community program referrals

Follow-up: Scheduled every 3 months (HCV RNA-) or yearly (HCV RNA+)

Procedures: Interviewer-administered questionnaires, HCV testing

Primary measures

OUTCOME

Any amphetamine injection in the past three months (yes vs. no)

Self-reported at each visit. Prompts included 'speed', 'crystal', 'meth', 'ice', and Ritalin.

STRATIFICATION VARIABLE

Self-identified gender (male vs. female)

Recorded at enrolment

PREDICTOR VARIABLE

Self-identified sexual orientation (gay/bisexual vs. heterosexual)

Recorded at enrolment

Covariates

- ❖ Age (years)
- ❖ Ethnicity (white vs. non-white)
- ❖ Ever injected amphetamine

↳ *Recorded at enrolment, not updated*

- ❖ Opioid agonist therapy
- ❖ Unstable housing
- ❖ Incarceration
- ❖ Public injecting
- ❖ Sex work
- ❖ Average monthly income (\$)

Any injection of:

- ❖ Cocaine
- ❖ Heroin
- ❖ Other opioids

Any non-injection use of:

- ❖ Amphetamine
- ❖ Crack cocaine
- ❖ Alcohol
- ❖ Cannabis

- ❖ Frequent injection (≥ 30 past month)

Unless otherwise indicated, all variables:

- Coded yes vs. no
- Updated at each visit
- Refer to the 3 months preceding the visit

Analysis: Objective 1

Objective 1: Examine annual trends in the prevalence of amphetamine injection among PWID (2011 to 2019)

Sample

All participants with a cohort visit during the study period

Data selected

First questionnaire completed by participant in each calendar year

Stratification

By self-identified gender

Statistical analysis

- ❖ Estimated and plotted prevalence of past 3-month amphetamine injection by calendar year
- ❖ Linear trends assessed for statistical significance using Generalized Estimating Equations (GEE)
 - *Continuous term for calendar year*
 - *Adjusted for age at enrolment*
 - *2-sided p-values, $\alpha=0.05$*

Analysis: Objective 2

Objective 2: Estimate incidence of amphetamine injection and assess sexual identity as a risk factor for initiation

Sample

- ❖ No amphetamine injection in 6 months prior to enrolment
- ❖ Completed ≥ 1 follow-up visit.

Data selected

All questionnaires completed by included participants

Stratification

By self-identified gender

Statistical analysis

- ❖ Incidence of amphetamine injection computed using person-time method
- ❖ Cox regression to estimate hazard ratios (and 95% CIs) reflecting the relationship of sexual identity to initiation risk
 - *Multivariable model adjusted for age, lifetime amphetamine injection, and covariates significant ($p < 0.10$) in bivariate models*
 - *Covariates modelled as time-dependent*
Except sexual identity, age, ethnicity, lifetime amphetamine injection



Results

Participant characteristics at enrolment

	OBJECTIVE 1	
% or Median (IQR)	Males (n=662)	Females (n=145)
Age (years)	42.1 (33.0 – 48.9)	35.3 (27.3 – 43.0)
Non-white ethnicity	8.9	13.2
Gay or bisexual identity	9.1	31.7
Ever injected amphetamine	20.8	17.1
≥30 injections in past month	42.6	47.6
Cocaine injecting	63.3	49.0
Amphetamine injecting	10.1	14.5
Heroin injecting	30.9	47.9
Prescription opioid injecting	38.7	44.8
Amphetamine use (non-injected)	26.4	29.0
Crack cocaine use (non-injected)	56.5	49.0
Alcohol use	68.9	70.0
Cannabis use	69.5	56.6
Opioid agonist treatment	30.4	46.9
Unstable housing	42.2	24.1
Incarceration	13.9	6.2
Public injecting	47.0	42.8
Sex work	2.7	20.7
Average monthly income (\$CAD)	985 (740 – 1800)	1000 (736 – 1650)

past three months

n=807 (Objective 1)

Bold figures indicate statistically significant differences ($p < 0.05$) between males and females.

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% or Median (IQR)	Males (n=662)	Females (n=145)
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past three months

n=807 (Objective 1)

133 had no follow-up visits

73 had injected amphetamine at baseline

n=601 (Objective 2)

Loss-to-follow-up associated with...



Age (-)
Unstable housing (+)
Heroin injecting (+)



Gay/bisexual identity (+)
Income (+)
Incarceration (+)
Crack cocaine use (-)

Participant characteristics at baseline

	OBJECTIVE 1		OBJECTIVE 2	
% or Median (IQR)	Males (n=662)	Females (n=145)	Males (n=501)	Females (n=100)
Age (years)	42.1 (33.0 – 48.9)	35.3 (27.3 – 43.0)	42.8 (34 – 50)	36.2 (39 – 44)
Non-white ethnicity	8.9	13.2	9.18	12.1
Gay or bisexual identity	9.1	31.7	8.58	24.0
Ever injected amphetamine	20.8	17.1	12.0	3.00
≥30 injections in past month	42.6	47.6		
Cocaine injecting	63.3	49.0		
Amphetamine injecting	10.1	14.5		
Heroin injecting	30.9	47.9		
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past three months

n=807 (Objective 1)

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73 had injected amphetamine at baseline

n=601 (Objective 2)

Loss-to-follow-up associated with...



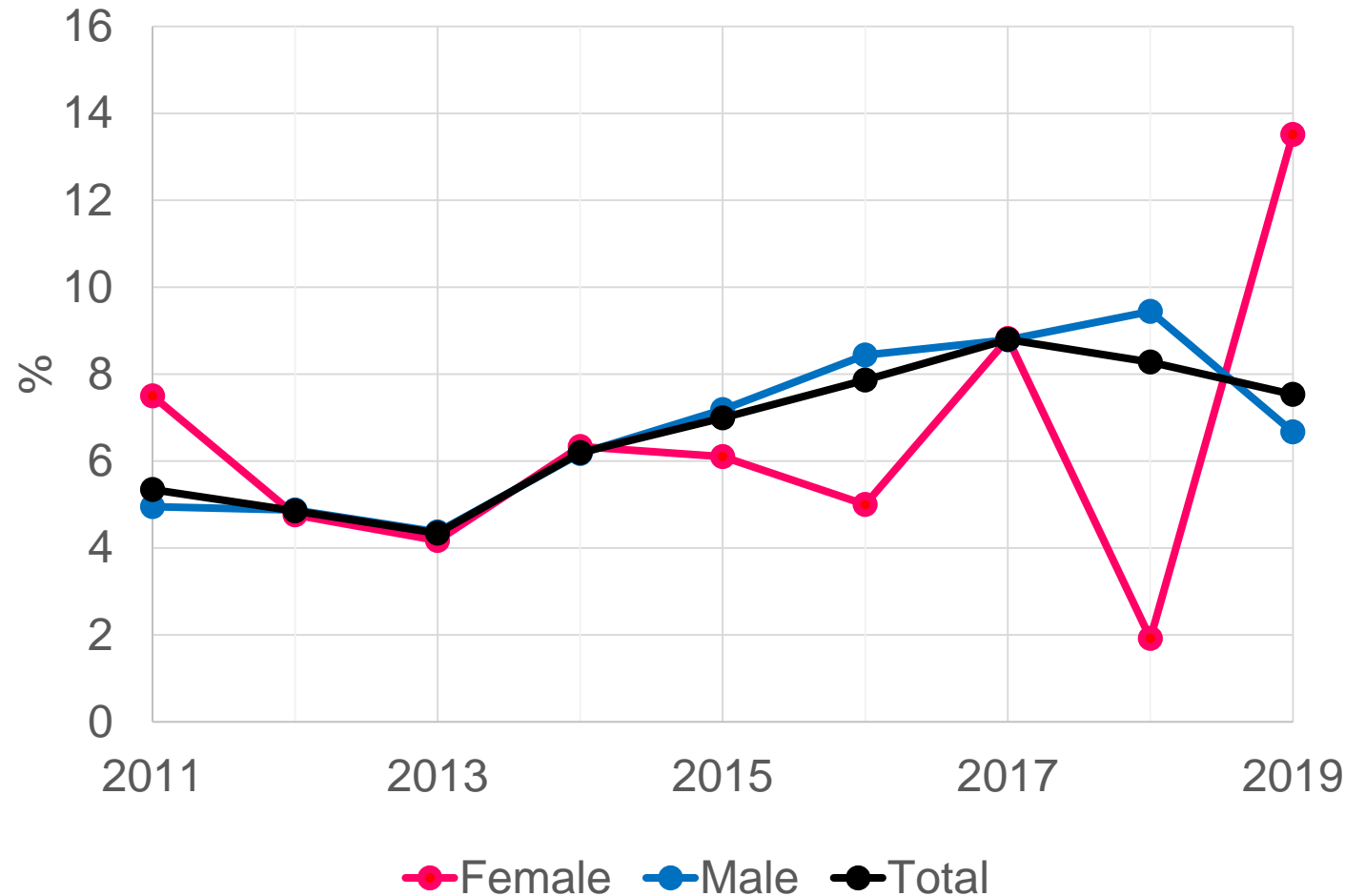
Age (-)
Unstable housing (+)
Heroin injecting (+)



Gay/bisexual identity (+)
Income (+)
Incarceration (+)
Crack cocaine use (-)

Prevalence of amphetamine injection (2011-2019)

Prevalence of amphetamine injection (past 3m)
at first interview of each calendar year



n=3587 observations from 807 participants

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019
n	262	371	438	452	472	471	432	338	292

	2011 estimate (%)	2019 estimate (%)	Mean linear trend	p*
Total	5.41	7.53	+ 0.48	0.022
Male	5.02	6.67	+ 0.51	0.027
Female	7.50	13.5	+ 0.39	0.510

* p-value from GEE term for calendar year (adjusted for age)

Crude incidence of amphetamine injection

	Number of participants	Number initiating	Person-years (p-y) follow-up	Incidence rate per 100 p-y	95% CI
Total	601	95	2585.73	3.67	2.99 – 4.47
Male	501	83	2186.23	3.80	3.04 – 4.68
Female	100	12	399.50	3.00	1.63 – 5.11

Relative hazards of initiation by sexual identity

	MALES (n=501)		FEMALES (n=100)	
	Crude Hazard Ratio (95% CI)	p	Crude Hazard Ratio (95% CI)	p
Gay or bisexual identity	2.17 (1.18 – 4.01)	.013	2.20 (1.17 – 4.14)	.015

Relative hazards of initiation by sexual identity

	MALES (n=501)		FEMALES (n=100)	
	Crude Hazard Ratio (95% CI)	p	Crude Hazard Ratio (95% CI)	p
Gay or bisexual identity	2.17 (1.18 – 4.01)	.013	2.20 (1.17 – 4.14)	.015
	Adjusted Hazard Ratio (95% CI)	p	Adjusted Hazard Ratio (95% CI)	p
Gay or bisexual identity	2.20 (1.17 – 4.14)	.015	2.33 (0.55 – 9.85)	.249

Relative hazards of initiation by sexual identity

	MALES (n=501)		FEMALES (n=100)	
	Crude Hazard Ratio (95% CI)	p	Crude Hazard Ratio (95% CI)	p
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	Adjusted Hazard Ratio (95% CI)	p	Adjusted Hazard Ratio (95% CI)	p
Gay or bisexual identity	2.20 (1.17 – 4.14)	.015	2.33 (0.55 – 9.85)	.249
Age (years)	0.97 (0.94 – 0.99)	.005	0.98 (0.90 – 1.06)	.585
Lifetime amphetamine injection	1.33 (0.73 – 2.43)	.357	4.37 (0.45 – 42.6)	.205
Year of interview	1.16 (1.01 – 1.33)	.030		
≥30 injections in past month	1.03 (0.62 – 1.72)	.912		
Cocaine injecting			2.40 (0.52 – 11.0)	.262
Heroin injecting	1.27 (0.75 – 2.15)	.372		
Prescription opioid injecting	1.44 (0.86 – 2.40)	.167	1.11 (0.27 – 4.65)	.887
Amphetamine use (non-injected)	2.81 (1.73 – 4.56)	<.001	1.88 (0.48 – 7.29)	.362
Crack cocaine use (non-injected)			3.36 (0.71 – 15.9)	.126
Alcohol use	0.65 (0.41 – 1.03)	.064		
Opioid agonist treatment	1.81 (1.13 – 2.89)	.014		
Unstable housing	1.62 (1.01 – 2.61)	.046		
Public injecting	1.88 (1.08 – 3.27)	.025	2.89 (0.72 – 11.5)	.133



Discussion

Conclusions

- Amphetamine injection has been expanding in Montreal at a rate of 0.5% per year
- Similar trends were observed among PWID identifying as male and female, suggesting expansion is not limited to either gender
- PWID identifying as gay or bisexual appeared to be at increased risk of initiating amphetamine injection regardless of their gender identity
- Other variables associated with initiation were less consistent across genders; for example, cocaine injection and crack cocaine use appeared to be potential risk factors among females but not males
- Risk of initiation increased with each calendar year, suggesting the drug era could expand at an increasing rate in the coming years.

Implications & future directions

- We should anticipate further increases in amphetamine injection among PWID
- Public health action should seek to stabilise this trend by preventing initiation among susceptible persons
- Qualitative and ethnographic research is needed to better understand the contexts in which initiation occurs and the intersections between gender, sexual identity and sexual behaviour in determining susceptibility
- This work can also serve to identify harm reduction needs related to locally evolving subcultures around amphetamine injection (e.g. 'slam kits').

Limitations

- Findings may not be generalizable to all PWID in Montreal or to other settings
- Loss-to-follow up introduces a risk of selection bias in longitudinal analyses
- Outcome did not reflect true « initiation » in some cases (12% of males and 3% of females reported prior lifetime amphetamine injection). Analyses adjusted for this.
- We did not assess the relative contribution of sexual identity versus sexual behaviour; not all MSM identify as gay or bisexual.
- Conclusions for females are limited by a small sample size; we are addressing this with expanded recruitment strategies in the cohort. Experiences of transgendered individuals were not assessed.



Thank you for your attention

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COHORTE

H.E.P.C.O.

Recherche · Personnes utilisant des substances · Santé

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Supplementary slides

Sample descriptions (supplementary)

	OBJECTIVE 1			OBJECTIVE 2	
% or Median (IQR)	Males (n=662)	Females (n=145)		Males (n=501)	Females (n=100)
Gay or bisexual identity	9.1	31.7		8.58	24.0
Ever injected amphetamine	20.8	17.1		12.0	3.00
Age (years)	42.1 (33.0 – 48.9)	35.3 (27.3 – 43.0)		42.8 (34 – 50)	36.2 (39 – 44)
Non-white ethnicity	8.9	13.2		9.18	12.1
≥30 injections in past month	42.6	47.6		38.5	41.0
Cocaine injecting	63.3	49.0		62.9	44.0
Amphetamine injecting	10.1	14.5		0	0
Heroin injecting	30.9	47.9		28.1	45.0
Prescription opioid injecting	38.7	44.8		33.9	41.0
Amphetamine use (non-injected)	26.4	29.0		21.8	24.0
Crack cocaine use (non-injected)	56.5	49.0		55.1	54.0
Alcohol use	68.9	70.0		69.1	69.0
Cannabis use	69.5	56.6		68.5	50.0
Opioid agonist treatment	30.4	46.9		29.5	53.0
Unstable housing	42.2	24.1		39.1	23.0
Incarceration	13.9	6.2		13.6	5.00
Public injecting	47.0	42.8		43.3	36.0
Sex work	2.7	20.7		2.20	22.0
Average monthly income (\$CAD)	985 (740 – 1800)	1000 (736 – 1650)		950 (735 – 1800)	1070 (800 – 1800)

Relative hazards of initiation (supplementary)

	MALES (n=501)			
% or Median (IQR)	Crude HR (95% CI)	p	Adjusted HR (95% CI)	p
Gay or bisexual identity	2.17 (1.18 – 4.01)	.013	2.20 (1.17 – 4.14)	.015
Age (years)	0.94 (0.92 – 0.96)	<.001	0.97 (0.94 – 0.99)	.005
Lifetime amphetamine injection	1.58 (0.89 – 2.80)	.121	1.33 (0.73 – 2.43)	.357
Non-white ethnicity	0.95 (0.41 – 2.17)	.897		
Year of interview	1.15 (1.01–1.31)	.030	1.16 (1.01 – 1.33)	.030
≥30 injections in past month	1.79 (1.15 – 2.77)	.001	1.03 (0.62 – 1.72)	.912
Cocaine injecting	1.32 (0.85 – 2.05)	.217		
Heroin injecting	2.34 (1.49 – 3.68)	<.001	1.27 (0.75 – 2.15)	.372
Prescription opioid injecting	2.88 (1.87 – 4.45)	<.001	1.44 (0.86 – 2.40)	.167
Amphetamine use (non-injected)	2.70 (1.69–4.30)	<.001	2.81 (1.73 – 4.56)	<.001
Crack cocaine use (non-injected)	1.31 (0.85 – 2.01)	.225		
Alcohol use	0.63 (0.41 – 0.97)	.037	0.65 (0.41 – 1.03)	.064
Cannabis use	1.11 (0.71 – 1.72)	.199		
Opioid agonist treatment	2.05 (1.33 – 3.16)	.001	1.81 (1.13 – 2.89)	.014
Unstable housing	1.65 (1.07 – 2.55)	.024	1.62 (1.01 – 2.61)	.046
Incarceration	1.30 (0.69 – 2.44)	.426		
Public injecting	3.34 (2.15 – 5.20)	<.001	1.88 (1.08 – 3.27)	.025
Sex work	1.95 (0.48 – 7.98)	.353		
Average monthly income (\$CAD)	0.95 (0.78 – 1.16)	.618		

Relative hazards of initiation (supplementary)

	FEMALES (n=100)			
% or Median (IQR)	Crude HR (95% CI)	p	Adjusted HR (95% CI)	p
Gay or bisexual identity	3.86 (1.24 – 12.0)	.020	2.33 (0.55 – 9.85)	.249
Age (years)	0.97 (0.91 – 1.03)	.304	0.98 (0.90 – 1.06)	.585
Lifetime amphetamine injection	7.12 (1.54 – 33.0)	.012	4.37 (0.45 – 42.6)	.205
Non-white ethnicity	1.20 (0.26 – 5.49)	.816		
Year of interview	1.30 (0.91–1.84)	.149		
≥30 injections in past month	1.50 (0.48 – 4.67)	.481		
Cocaine injecting	5.66 (1.52 – 21.1)	.010	2.40 (0.52 – 11.0)	.262
Heroin injecting	1.42 (0.91 – 1.84)	.149		
Prescription opioid injecting	3.08 (0.97 – 9.81)	.057	1.11 (0.27 – 4.65)	.887
Amphetamine use (non-injected)	3.37 (0.999 – 11.3)	.050	1.88 (0.48 – 7.29)	.362
Crack cocaine use (non-injected)	4.53 (1.21 – 17.0)	.025	3.36 (0.71 – 15.9)	.126
Alcohol use	0.93 (0.30 – 2.95)	.904		
Cannabis use	1.57 (0.50 – 4.88)	.440		
Opioid agonist treatment	1.06 (0.34 – 3.35)	.921		
Unstable housing	2.26 (0.67 – 7.59)	.186		
Incarceration	1.56 (0.08 – 32.2)	.775		
Public injecting	4.30 (1.35 – 13.7)	.014	2.89 (0.72 – 11.5)	.133
Sex work	2.56 (0.81 – 8.10)	.110		
Average monthly income (\$CAD)	1.05 (0.77 – 1.42)	.759		