

# Association between short-term housing patterns and hepatitis C acquisition: findings from a cohort of people who inject drugs in Montréal, Canada

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# Before we get started...

- Welcome to Montréal
- Thanks to INHSU for the opportunity
- Thanks to PWID who participated in this study
- No conflicts of interest to declare

# Background

- Unstable housing:
  - Living on the street or in other types of transitional living arrangements (e.g. hotel/motel room, rooming/boarding house, shelter, etc.)

# Background

- Unstable housing = associated with drug injecting initiation (+), cessation (–), and relapse (+)
- Unstable housing = seems to play a role in the global burden of disease related to drug injecting:
  - ↑ injecting equipment sharing + ↑ public injecting
  - ↑ HCV/HIV acquisition + ↓ HCV/HIV treatment access
  - ↓ addiction treatment access

# Background

- Housing stability = dynamic process + tends to fluctuate over time:
  - Various housing patterns observed in studies of street youth followed up to 2 years (e.g. slow to rapid housing stabilization, fluctuation, or chronic instability)
  - Housing trajectories not studied specifically among PWID

*Examining **housing fluctuations among PWID** and their association with **HCV infection** could help inform clinical and public health **strategies to improve HCV prevention***

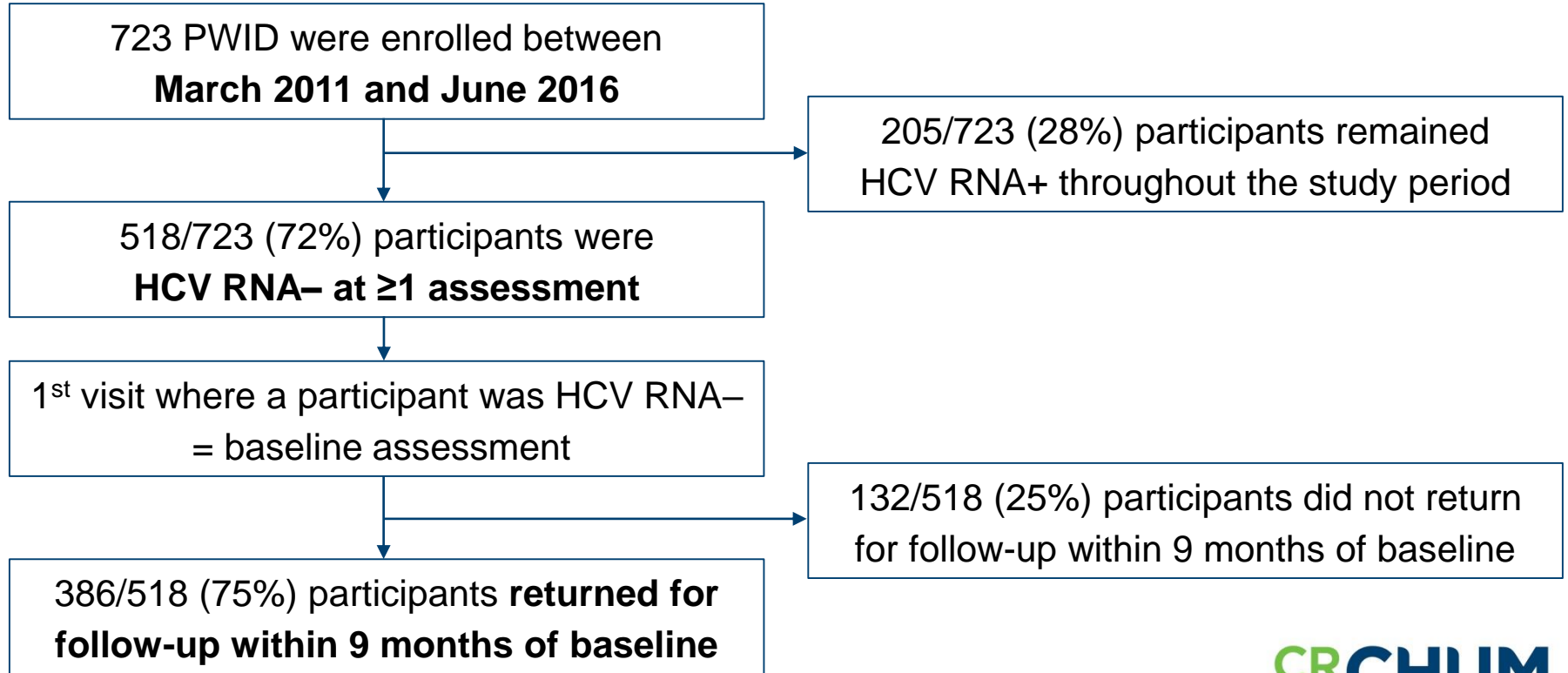
# Objectives

1. To identify distinct **trajectories of housing stability** evolving **over 12 months** among PWID at risk of HCV infection in Montréal, Canada
2. To examine the relationship between trajectories of housing stability and **incident HCV acquisition**

# Study participants / design

- **Hepatitis Cohort (HEPCO):**
  - Established in 2004 in **Montréal**, Canada (i.e. here!)
  - **Ongoing prospective cohort of PWID**
  - Enrolment through community-based programs, word-of-mouth, posters, and cards
  - Inclusion criteria: age  $\geq 18$  y/o, **injecting past 6 months**

# Inclusion criteria for this study





# Data collection

- Visits at baseline and **three-monthly follow-up**:
  - Interviewer-administered **questionnaire**:
    - Socio-demographics, drug use and related behaviors, treatments, service utilization, etc.
  - Venepuncture and **blood collection**:
    - HCV Ab, HIV-1/2 Ab & P24 Ag: AxSYM (Abbott)
    - HCV RNA: COBAS AMPLICOR or COBAS AmpliPrep/ COBAS TaqMan HCV Quantitative Test v2.0 (Roche)

# Housing stability

- Participants questioned on the type of accommodation they lived in the longest for each of the past 3 months
- Categorized on a binary scale:
  - **Unstable housing:** living, for most of the month, in hotel/motel rooms, rooming/boarding houses, shelters, or on the street (squat, park, bus station, car, etc.)
  - **Stable housing:** living in longer-term types of accommodation
- Trajectories estimated using the first 12 months of observations

# HCV acquisition

- Participants initially at risk of:
  - **Primary HCV infection** (HCV Ab– & HCV RNA–)
  - **HCV recurrence** (reinfection or relapse; HCV Ab+ & HCV RNA–)
- Incident HCV case = newly + test for HCV RNA or HCV Ab
- Estimated to occur at the midpoint between last – and first + test
- Incidence analyses conducted using the entire study period (from March 2011 to June 2016; max. 63 months)

# Statistical analyses

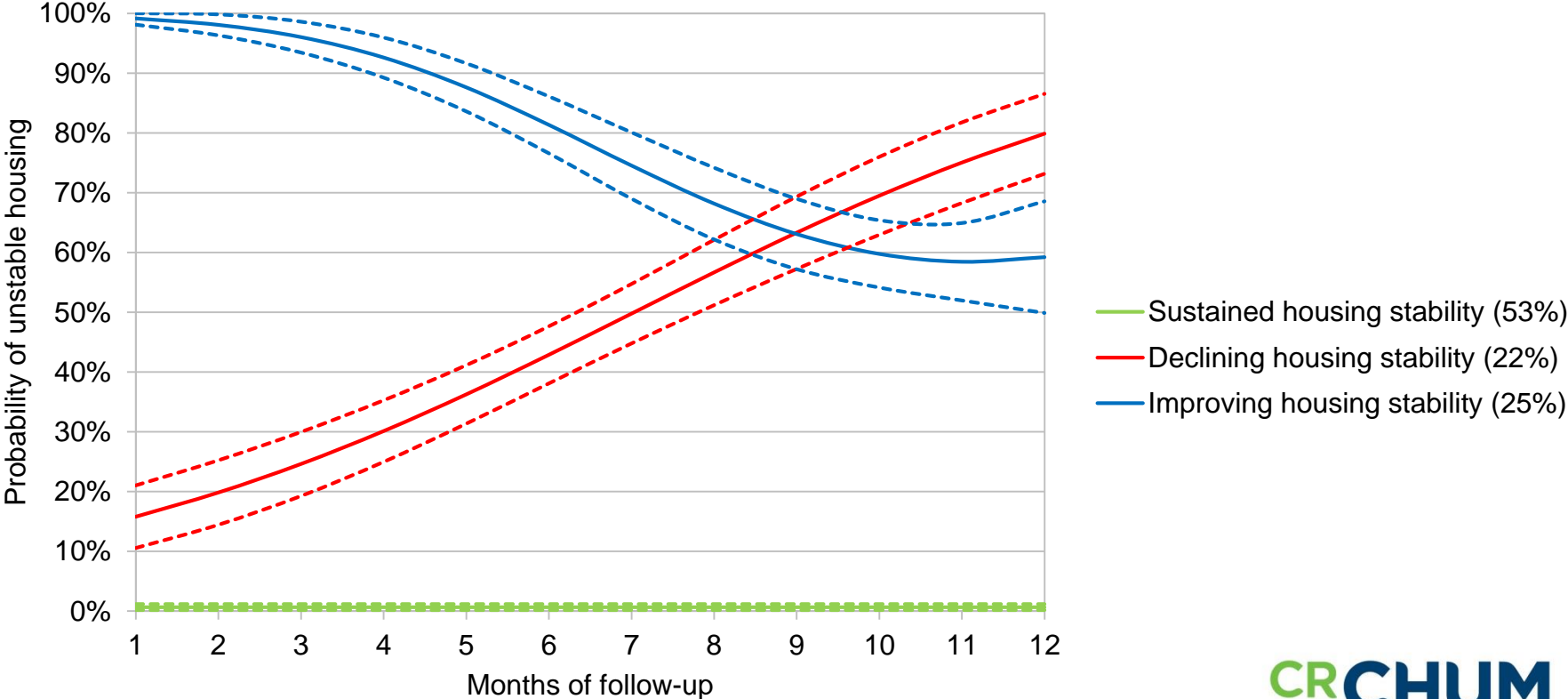
- Estimation of housing stability trajectories:
  - **Group-based trajectory modeling (logistic model)**: identification of latent groups of individuals who share similar trajectories of housing (approximation of archetypal tendencies over time)
- HCV acquisition analyses:
  - Participants divided into groups based on their most likely trajectory
  - **HCV incidence** according to trajectories (Poisson distribution)
  - **Cumulative incidence curves** according to trajectories (log-rank test)

# Baseline characteristics

Characteristics, n (%)	Included (n=386)	Excluded (n=132)	<i>P</i>
Mean age ( $\pm$ standard deviation)	<b>40.0</b> ( $\pm$ 10.4)	<b>36.9</b> ( $\pm$ 10.9)	<b>0.007</b>
Female gender	70 (18)	28 (21)	0.436
Did not complete high school	150 (39)	57 (43)	0.405
Incarceration, past 3 months	41 (11)	15 (11)	0.813
Opioid injecting, past 3 months	214 (55)	70 (53)	0.613
Cocaine injecting, past 3 months	211 (55)	74 (56)	0.781
Amphetamine injecting, past 3 months	27 (7)	12 (9)	0.431
Opioid agonist treatment, past 3 months	137 (35)	39 (30)	0.213
Other addiction treatment, past 3 months*	29 (8)	16 (12)	0.105
Positive HCV antibody status	201 (52)	61 (47)	0.276
Positive HIV status	28 (7)	5 (4)	0.160

\*Detoxification, inpatient therapy, or therapeutic community participation

# Short-term housing stability trajectories



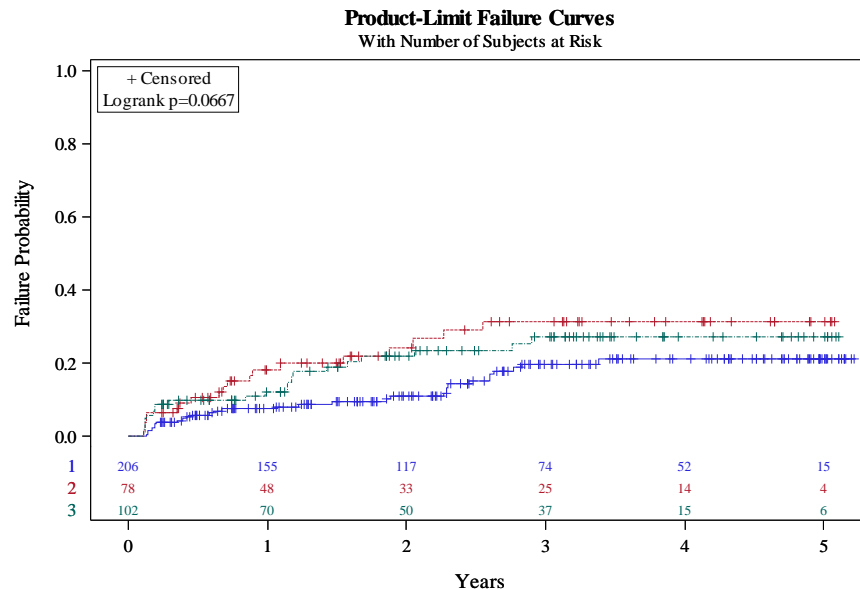
# Baseline characteristics

Characteristics, n (%)	Housing stability trajectories			P
	Sustained (n=206)	Declining (n=78)	Improving (n=102)	
Mean age ( $\pm$ standard deviation)	38.9 ( $\pm$ 10.0)	39.1 ( $\pm$ 10.6)	<b>42.8</b> ( $\pm$ 10.8)	<b>0.006</b>
Female gender	47 ( <b>23</b> )	11 (14)	12 (12)	<b>0.035</b>
Did not complete high school	73 (35)	36 (47)	41 (41)	0.207
Incarceration, past 3 months	19 (9)	13 (12)	13 (13)	0.613
Opioid injecting, past 3 months	126 ( <b>61</b> )	41 (49)	47 (48)	<b>0.040</b>
Cocaine injecting, past 3 months	95 ( <b>46</b> )	53 (64)	63 (64)	<b>0.003</b>
Amphetamine injecting, past 3 months	9 ( <b>4</b> )	11 (13)	7 (7)	<b>0.028</b>
Opioid agonist treatment, past 3 months	102 ( <b>50</b> )	16 (21)	19 (19)	<b>&lt;.001</b>
Other addiction treatment, past 3 months*	15 (7)	8 (10)	6 (6)	0.535
Positive HCV antibody status	114 (55)	36 (46)	51 (50)	0.341
Positive HIV status	15 (7)	7 (9)	6 (6)	0.730

\*Detoxification, inpatient therapy, or therapeutic community participation

# HCV incidence analyses

Housing trajectories	No. at risk	No. infected	Incidence per 100 PY (95%CI)
Sustained	206	31	6.0 (4.2-8.5)
Declining	78	19	12.0 (7.4-18.3)
Improving	102	22	10.0 (6.4-14.9)
<i>Overall</i>	<i>386</i>	<i>72</i>	<i>8.1 (6.4-10.1)</i>



- (1) Sustained housing stability
- (2) Declining housing stability
- (3) Improving housing stability



# Discussion

- Among the 1<sup>st</sup> studies to evaluate housing patterns among PWID:
  - **47% followed trajectories with high probability of experiencing unstable housing** at some point over one year (declining or improving housing)
  - Consistent with previous evidence that **housing stability is problematic among PWID:**
    - Cross-sectional survey conducted among Canadian PWID from 2010–12: 39% currently experiencing unstable housing

# Discussion

- HCV incidence appeared to differ across housing stability trajectories:
  - **Declining > improving > sustained housing stability**
    - However: overlaps between 95% CIs; log-rank test 0.067; no adjustment for confounding due to limited power
- Previous research on housing stability in association with HCV:
  - Collaboration between two prospective cohorts of PWID based in Vancouver, Canada:
    - **Unstable housing associated with HCV acquisition:**  
HR=1.47, 95%CI=1.02–2.13

# Discussion

- **New supportive housing interventions targeting PWID** are needed:
  - Addressing effectively **drug addiction and drug injecting**; focusing on **stimulant use**; using **gender-specific approaches**
- **Housing First programs** provide housing and support to marginalized populations, including PWUD:
  - No requirement to stop drug use or undergo addiction treatment
  - Addiction services made available on-site
  - Promising results with **programs offering more robust addiction services**: reduction of drug use at 12 months (opioids, stimulants)
  - Less conclusive results in the presence of co-morbidities, e.g. mental health problems, among clinical trials in Canada

# Discussion

- Supportive housing may not be sufficient to prevent risk behaviors and HCV:
  - A sample of American homeless people remained **socially excluded** after being provided with supportive housing:
    - People with improved housing tend to be less involved with peers and community-based services and staff
    - People with improved housing tend to desire autonomy/privacy and to fear being exploited/negatively influenced by others, conflicting with development of close relationships
  - To reduce PWID isolation: **improve access to/engagement in care**, including primary care, long-term addiction therapies, and other harm reduction services

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**Thank you!  
Questions?**

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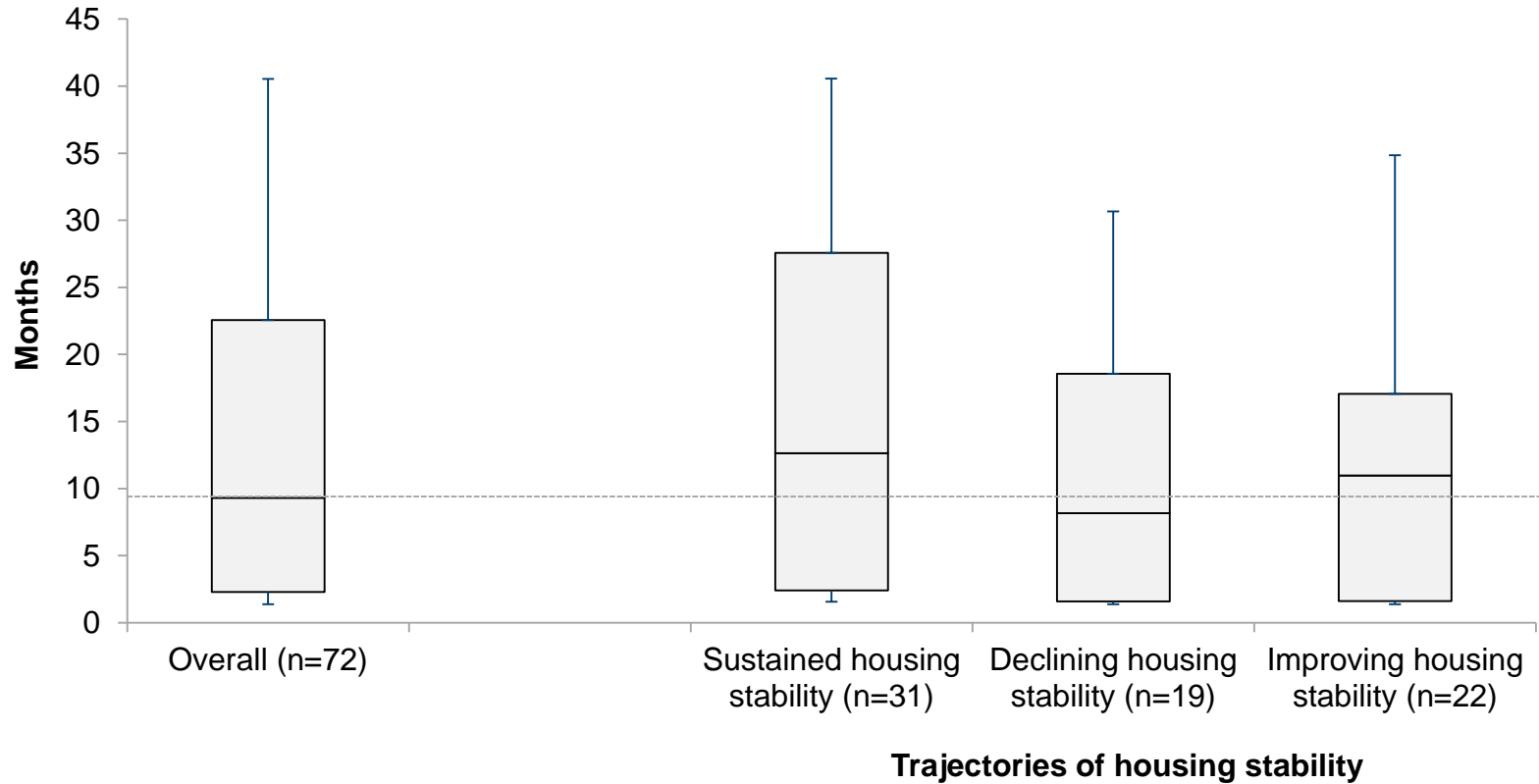


**Backup slides**

# HCV acquisition

	No. at risk of HCV infection	No. who got infected	Incidence per 100 PY (95%CI)	Median no. months to infection (Q1-Q3)
<b>Type of HCV infection</b>				
Primary HCV infection	185	29	7.0 (4.8-9.9)	8.5 (2.4-17.1)
HCV recurrence	201	43	9.0 (6.6-12.0)	10.4 (2.2-27.3)
<i>Overall</i>	386	72	8.1 (6.4-10.1)	9.3 (2.3-22.6)
<b>Housing trajectories</b>				
Sustained	206	31	6.0 (4.2-8.5)	12.7 (2.4-27.6)
Declining	78	19	12.0 (7.4-18.3)	8.2 (1.6-18.6)
Improving	102	22	10.0 (6.4-14.9)	11.0 (1.6-17.1)
<i>Overall</i>	386	72	8.1 (6.4-10.1)	9.3 (2.3-22.6)

# Time to HCV infection



# Age

Housing trajectory groups were further differentiated by a few baseline sociodemographic characteristics:

- Participants with **improving housing** were more likely to be **older**:
  - Older age associated with stable housing in an Australian cross-sectional study of PWID
  - However: older participants were less likely to be included in study
  - *No conclusions can be drawn from this result*

# Gender

- Participants with **sustained stability** were more likely to be **female**:
  - Female gender associated with stable housing in cross-sectional studies of PWID
  - Female (vs. male) homeless street youth tend to rely more on their social networks to deal with unstable housing and reach stability
  - Homeless women (vs. men) are, however, generally more victimized
  - ✓ *Housing interventions should target both male and female PWID using gender-specific approaches*

# Opioid agonist treatment

- Participants with **sustained housing stability** were more likely to have recently undergone **OAT**:
  - Recent evidence has associated retention in OAT with stable housing

# Injecting drugs

- Participants with **sustained stability** were **more likely to inject opioids** and **less likely to inject cocaine** + those with **declining housing** were **more likely to inject amphetamines**:
  - PWID who use cocaine or methamphetamines as primary drugs are more likely to be unstably housed compared to PWID who primarily inject heroin
  - ✓ *Efforts to develop treatments for stimulant use disorders should be intensified, given limited effective treatment options*

# HCV reinfection

- Incidence of primary HCV infection (8.5 per 100 PY)  
< incidence of HCV recurrence (10.4 per 100 PY)
- Previous studies on HCV reinfection generally reported the opposite:
  - Participants mostly recruited from clinical settings and underwent interferon-based treatments
- ✓ *Need for studies with clinical and community-based samples to examine reinfection trends as direct-acting antivirals become increasingly available to active PWID*



# Limitations

- **Recruitment methods:**
  - (–) Non-random: reduced generalizability to PWID who are underserved
  - (+) Various recruitment strategies
- **Losses to follow-up:**
  - (–) Reduced generalizability to younger PWID
  - (+) Retention rates acceptable for a drug-using population
- **Social desirability bias:**
  - (–) Drug use/behaviors were evaluated
  - (+) Self-reported drug use/behaviors generally reliable/valid among samples of PWUD
- ✓ *Reminder: trajectories are statistical approximations of archetypal tendencies for a behavior over time; not literal depictions of reality*