

Social immiseration, changing drug use patterns, and HIV risk among community-recruited people who inject drugs in Denver, Colorado and Los Angeles, CA, 2021-23



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Overview

- Describe how social immiseration is contributing to HIV risk among people who inject drugs
- Describe local changes in drug patterns and how they might influence HIV risk
- Discussion harm reduction approaches and structural changes needed to address the HIV epidemic

HIV outbreaks have returned

- Sex work, prescription opioids, and inadequate HIV prevention in the HIV outbreak in Scott County, Indiana
- Intersections of homelessness, drug injection and the HIV outbreak in Seattle, Washington
- HIV outbreaks in West Virginia, Northern Kentucky, Miami, FL and Duluth, MI all related to drug injection

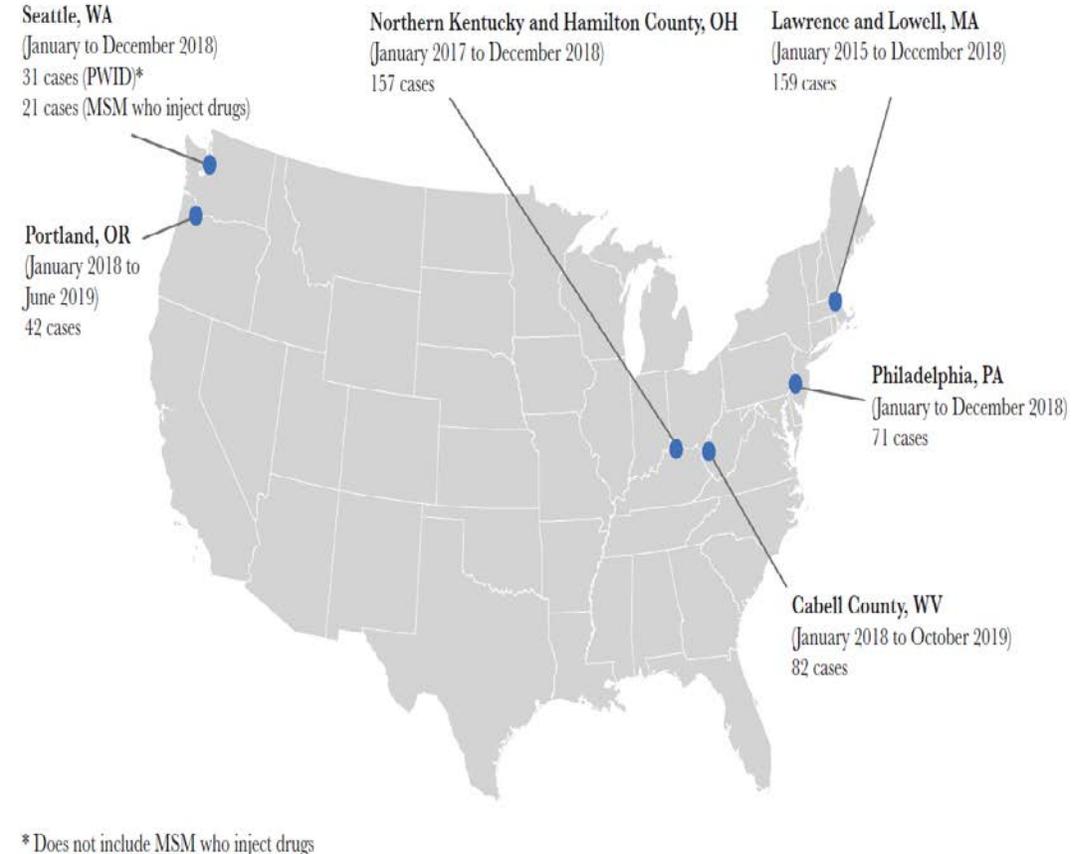


Figure 1. Human immunodeficiency virus outbreaks among persons who inject drugs (United States, 2016–2019). Abbreviations: MSM, men who have sex with men; PWID, persons who inject drugs.

Lyss, S.B., Buchacz, K., McClung, R.P., Asher, A., Oster, A.M., 2020. Responding to Outbreaks of Human Immunodeficiency Virus Among Persons Who Inject Drugs—United States, 2016–2019: Perspectives on Recent Experience and Lessons Learned. *The Journal of Infectious Diseases* 222(Supplement_5), S239-S249.

HIV infection double among unhoused & contributes to ~17% of new cases in high income countries

Homelessness, unstable housing, and risk of HIV and hepatitis C virus acquisition among people who inject drugs: a systematic review and meta-analysis

Chiedozie Arum, Hannah Fraser, Andreea Adelina Artenie, Sandra Bivegete, Adam Trickey, Michel Alary, Jacquie Astemborski, Jennifer Iversen, Aaron G Lim, Louis MacGregor, Meghan Morris, Jason J Ong, Lucy Platt, Rachel Sack-Davis, Danida K van Santen, Sunil S Solomon, Vana Syypsa, Jorge Valencia, Wijnand Van Den Boom, Josephine G Walker, Zoe Ward, Jack Stone*, Peter Vickerman*, on behalf of the Homelessness, HIV, and HCV Review Collaborative Group†

Summary

Background People who inject drugs (PWID) are at increased risk for HIV and hepatitis C virus (HCV) infection and also have high levels of homelessness and unstable housing. We assessed whether homelessness or unstable housing is associated with an increased risk of HIV or HCV acquisition among PWID compared with PWID who are not homeless or are stably housed.

Methods In this systematic review and meta-analysis, we updated an existing database of HIV and HCV incidence studies published between Jan 1, 2000, and June 13, 2017. Using the same strategy as for this existing database, we searched MEDLINE, Embase, and PsycINFO for studies, including conference abstracts, published between June 13, 2017, and Sept 14, 2020, that estimated HIV or HCV incidence, or both, among community-recruited PWID. We only included studies reporting original results without restrictions to study design or language. We contacted authors of studies that reported HIV or HCV incidence, or both, but did not report on an association with homelessness or unstable housing, to request crude data and, where possible, adjusted effect estimates. We extracted effect estimates and pooled data using random-effects meta-analyses to quantify the associations between recent (current or within the past year) homelessness or unstable housing compared with not recent homelessness or unstable housing, and risk of HIV or HCV acquisition. We assessed risk of bias using the Newcastle-Ottawa Scale and between-study heterogeneity using the I^2 statistic and p value for heterogeneity.

Findings We identified 14 351 references in our database search, of which 392 were subjected to full-text review alongside 277 studies from our existing database. Of these studies, 55 studies met inclusion criteria. We contacted the authors of 227 studies that reported HIV or HCV incidence in PWID but did not report association with the exposure of interest and obtained 48 unpublished estimates from 21 studies. After removal of duplicate data, we included 37 studies with 70 estimates (26 for HIV; 44 for HCV). Studies originated from 16 countries including in North America, Europe, Australia, east Africa, and Asia. Pooling unadjusted estimates, recent homelessness or unstable housing was associated with an increased risk of acquiring HIV (crude relative risk [cRR] 1.55 [95% CI 1.23–1.95; $p=0.0002$]; $I^2=62.7\%$; $n=17$) and HCV (1.65 [1.44–1.90; $p<0.0001$]; $I^2=44.8\%$; $n=28$) among PWID compared with those who were not homeless or were stably housed. Associations for both HIV and HCV persisted when pooling adjusted estimates (adjusted relative risk for HIV: 1.39 [95% CI 1.06–1.84; $p=0.019$]; $I^2=65.5\%$; $n=9$; and for HCV: 1.64 [1.43–1.89; $p<0.0001$]; $I^2=9.6\%$; $n=14$). For risk of HIV acquisition, the association for unstable housing (cRR 1.82 [1.13–2.95; $p=0.014$]; $n=5$) was higher than for homelessness (1.44 [1.13–1.83; $p=0.0036$]; $n=12$), whereas no difference was seen between these outcomes for risk of HCV acquisition (1.72 [1.48–1.99; $p<0.0001$] for unstable housing, 1.66 [1.37–2.00; $p<0.0001$] for homelessness).

Interpretation Homelessness and unstable housing are associated with increased risk of HIV and HCV acquisition among PWID. Our findings support the development of interventions that simultaneously address homelessness and unstable housing and HIV and HCV transmission in this population.

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Introduction

Globally, HIV and viral hepatitis are leading causes of mortality,^{1,2} with people who inject drugs (PWID) being highly susceptible to HIV and hepatitis C virus (HCV)

infection.^{3–6} Over 2018–30, an estimated 43% of global HCV transmission is projected to be attributed to unsafe injecting practices among PWID.⁶ Approximately 8% of new HIV infections globally and 20% outside



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See [Comment](#) page e265

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The contribution of unstable housing to HIV and hepatitis C virus transmission among people who inject drugs globally, regionally, and at country level: a modelling study

Jack Stone, Adelina Artenie, Matthew Hickman, Natasha K Martin, Louisa Degenhardt, Hannah Fraser, Peter Vickerman

Summary

Background A considerable proportion of people who inject drugs are unstably housed. Although unstable housing is associated with HIV and HCV infection among people who inject drugs, its contribution to transmission is unknown. We estimated the global and national proportions of incident HIV and HCV infections among people who inject drugs attributed to housing instability from 2020 to 2029.

Methods In this modelling study, we developed country-level models of unstable housing and HIV and HCV transmission among people who inject drugs in 58 countries globally, calibrated to country-specific data on the prevalences of HIV and HCV and unstable housing. Based on a recently published systematic review, unstably housed people who inject drugs were assumed to have a 39% (95% CI 6–84) increased risk of HIV transmission and a 64% (95% CI 43–89%) increased risk of HCV transmission. We used pooled country-level estimates from systematic reviews on HCV and HIV prevalence in people who inject drugs. Our models estimated the transmission population attributable fraction (tPAF) of unstable housing to HIV and HCV transmission among people who inject drugs, defined as the percentage of infections prevented from 2020 to 2029 if the additional risk due to unstable housing was removed.

Findings Our models were produced for 58 countries with sufficient data (accounting for >66% of the global people who inject drugs population). Globally, we project unstable housing contributes 7.9% (95% credibility interval [CrI] 2.3–15.7) of new HIV infections and 11.2% (7.7–15.5) of new HCV infections among people who inject drugs from 2020 to 2029. Country-level tPAFs were strongly associated with the prevalence of unstable housing. tPAFs were greater in high-income countries (HIV 17.2% [95% CrI 5.1–30.0]; HCV 19.4% [95% CrI 13.8–26.0]) than in low-income or middle-income countries (HIV 6.6% [95% CrI 1.8–13.1]; HCV 8.3% [95% CrI 5.5–11.7]). tPAFs for HIV and HCV were highest in Afghanistan, Czech Republic, India, USA, England, and Wales where unstable housing contributed more than 20% of new HIV and HCV infections.

Interpretation Unstable housing is an important modifiable risk factor for HIV and HCV transmission among people who inject drugs in many countries. The study emphasises the importance of implementing initiatives to mitigate these risks and reduce housing instability.

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See [Comment](#) page e98

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Social misery and HIV risk among people who use drugs

Summary of PWID data sources

- Study 1 (2011-13): NIDA funded mixed method study on injection initiation (n=777) **LIN RO1DA027659**
- Study 2 (2016-2018): NIDA funded randomized controlled trial on injection initiation prevention intervention (n=977) – **CTC RO1DA038965**
- Study 3 (2021 to present): NIDA funded observational epidemiological study on interactions between cannabis and opioid use among people who inject drugs (n=309) – **CANOP RO1DA046049**

Study method summary

	Years	Location	Inclusion	Sampling	Design approach
LIN	2011-2013	Los Angeles/SF	PWID	Targeted sampling	Cross-sectional
CTC	2016-2018	Los Angeles/SF	PWID	Targeted sampling	Cohort
CANOP	2021-2023	Los Angeles/ Denver	PWID	Community recruitment	Cohort

Ontological security as framework for understanding the impact of being unhoused on health

- Argues is “the confidence that most human beings have in the continuity of their self-identity and in the constancy of the surrounding social and material environments” and involves “a sense of reliability in persons and things that contribute to an individual’s sense of trust.” (Giddens 1990; 1991)
- From this perspective, “policies and programs that disrupt physical and social conditions inhibit the capacity of individuals to achieve well-being” (Stonehouse et al., 2021).

Goal & Measures of Immiseration

- Examine the associations amongst homelessness, displacement, subsistence and health risk for people who inject drugs in LA & Denver, 2021-22.
- Homelessness or unstable housing
- Displacement while unhoused
- Subsistence measured as difficulty obtaining basic needs (i.e., food, clothing, toilets, showers & shelter) based on Gelberg et al. 1997

Gelberg, L., Gallagher, T.C., Andersen RM, P.K., 1997. Competing priorities as a barrier to medical care among homeless adults in Los Angeles. *Am J Public Health* 87(2), 217-220.

Homelessness has increased among people who use drugs in Los Angeles and elsewhere

Changes in reported housing instability among people who inject drugs in Los Angeles, 2001 to 2017

	2001-03	2003-05	2011-13	2016-17
Skid Row	81%	81%	92%	91%
East LA	35%	34%	63%	77%
Hollywood	63%		63%	77%
South LA	42%		68%	

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Trends in homelessness and injection practices among young urban and suburban people who inject drugs: 1997-2017

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ABSTRACT

Background: Among young people who inject drugs (PWID) homelessness is associated with numerous adverse psychosocial and health consequences, including risk of relapse and overdose, psychological distress and suicidality, limited treatment access, and injection practices that increase the risk of HIV and hepatitis C (HCV) transmission. Homeless PWID may also be less likely to access sterile syringes through pharmacies or syringe service programs.

Methods: This study applied random-effects meta-regression to examine trends over time in injection risk behaviors and homelessness among young PWID in Chicago and surrounding suburban and rural areas using data from 11 studies collected between 1997 and 2017. In addition, subject-level data were pooled to evaluate the effect of homelessness on risk behaviors across all studies using mixed effects logistic and negative binomial regression with random study effects.

Results: There was a significant increase in homelessness among young PWID over time, consistent with the general population trend of increasing youth homelessness. In mixed-effects regression, homelessness was associated with injection risk behaviors (receptive syringe sharing, syringe mediated sharing, equipment sharing) and exchange sex, though we detected no overall changes in risk behavior over time.

Conclusions: Increases over time in homelessness among young PWID highlight a need for research to understand factors contributing to youth homelessness to inform HIV/STI, HCV, and overdose prevention and intervention services for this population.

Frequent relocation among PWID increases health risk

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BMC Public Health

RESEARCH

Open Access

Health risk associated with residential relocation among people who inject drugs in Los Angeles and San Francisco, CA: a cross sectional study

Joey C. Chiang^{1*}, Ricky N. Bluthenthal², Lynn D. Wenger³, Colette L. Auerswald¹, Benjamin F. Henwood⁴ and Alex H. Kral³

Abstract

Background: Given the housing instability and frequent residential relocation (both volitional and hegemonic) of people who inject drugs, we sought to determine whether residential relocation (defined as sleeping in a different place in the past 30 days) is associated with health outcomes in a sample of people who inject drugs (PWID).

Methods: We recruited 601 PWID using targeted sampling and interviewed them between 2016 and 2018 in San Francisco and Los Angeles, CA about housing, drug use practices, and service utilization. We then developed multivariable regression models to investigate how residential relocation is associated with violence, health outcomes, and social service access. We analyzed our data between June 2018 and October 2019.

Results: Participants who relocated in the past 30 days had lower odds of being in substance use treatment (Adjusted Odds Ratio [AOR] = 0.62, 95% Confidence Interval [CI] = 0.42, 0.89) and higher odds of nonfatal overdose (AOR = 2.50, CI = 1.28, 4.90), receptive syringe sharing (AOR = 2.26, CI = 1.18, 4.32), severe food insecurity (AOR = 1.69, CI = 1.14, 2.50), having belongings stolen (AOR = 2.14, CI = 1.42, 3.21), experiencing physical assault (AOR = 1.58, CI = 1.03, 2.43), arrest (AOR = 1.64, CI = 1.02, 2.65), and jail (AOR = 1.90, CI = 1.16, 3.13) in the past 6 months when compared to those who did not relocate.

Conclusions: PWID who have relocated in the past 30 days have higher odds of experiencing violence and life-threatening adverse outcomes, and policies that disrupt living circumstances of PWID should be ended in favor of those that support housing stability.

Keywords: Residential relocation, Overdose, Violence, Injection drug use, Incarceration



Table 5 Multivariable analysis of residential relocation and outcomes among PWID in San Francisco and Los Angeles (N = 590)^d

Outcome	Any relocation in the past 30 days Adjusted Odds Ratio (95% Confidence Interval)
Overdose	2.50 (1.28, 4.90) ** a,b
Receptive syringe sharing	2.26 (1.18, 4.32) * c
Severe food insecurity	1.69 (1.14, 2.50) **
Substance use treatment	0.62 (0.42, 0.89) *
Having belongings stolen	2.14 (1.42, 3.21) *** a,b,c
Experiencing physical assault	1.58 (1.03, 2.43) * a
Experiencing weaponized assault	1.56 (0.91, 2.67) a,b
Arrest	1.64 (1.02, 2.65) * a
Jail	1.90 (1.16, 3.13) * a

* = Significant at $p < 0.05$

** = Significant at $p < 0.01$

*** = Significant at $p < 0.001$

^a Controlled for age

^b Controlled for White race

^c Controlled for self-identification as gay, lesbian, or bisexual

^d fewer than 601 individuals responded to this question

Displacement in Denver/Los Angeles, 2021/22 (n=429)

- Participants reported being unhoused in the last 3 months
- &
- If unhoused, how many times did they move in the last 3 months

	Los Angeles & Denver PWID, 2021/22 N (%)
Housed	70 (16%)
Not housed & not moved	95 (22%)
Not housed & move 1 to 3x	84 (20%)
Not housed & moved 4 to 13x	79 (18%)
Not housed & moved 14x or +	101 (24%)

Data from *R01DA046049*
(Bluthenthal/contact]/Corsi)

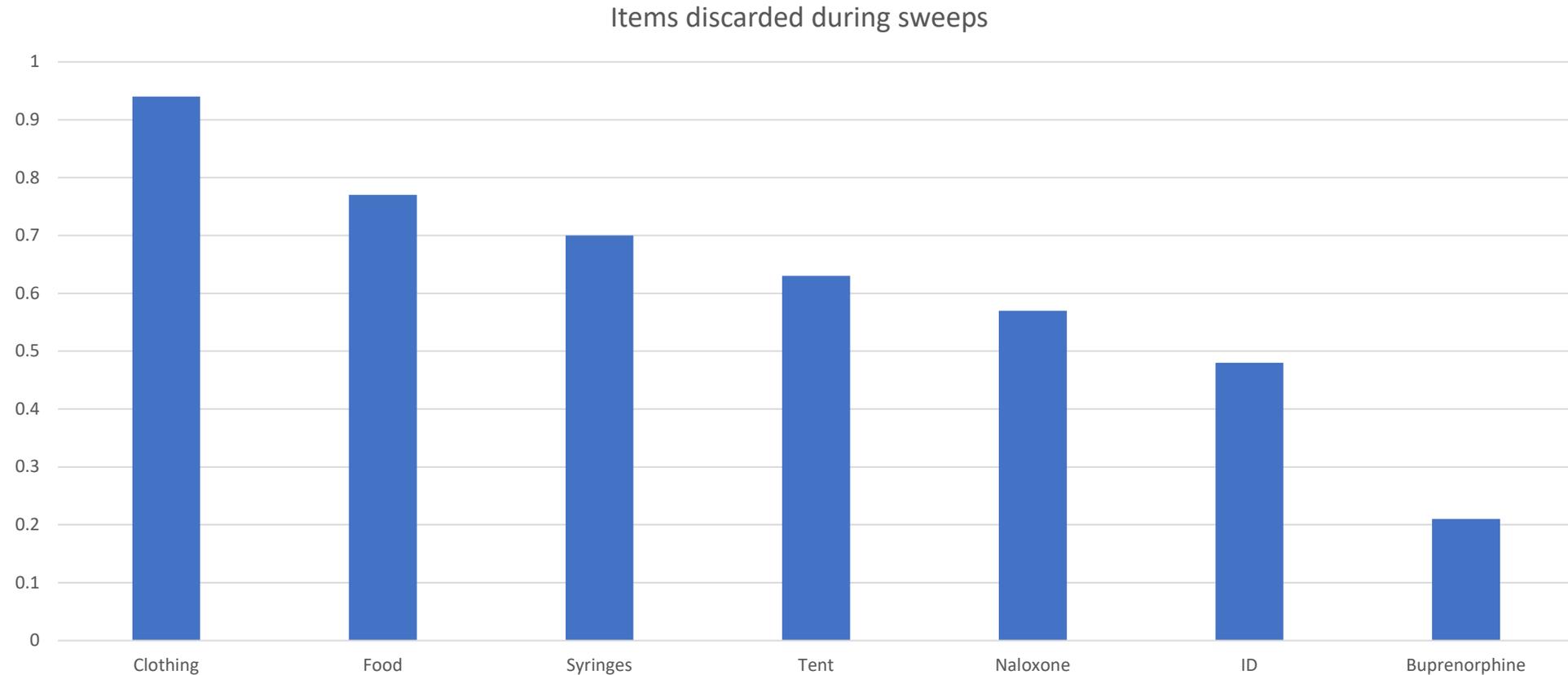
Health risk are high and basic needs are not met for unhoused and displaced PWID, Los Angeles & Denver, 2021/22 (n=429)

	Overdosed	Receptive syringe sharing	Usually have difficulty clothing	Usually have difficulty eating	Usually have difficulty washing	Usually have difficulty finding restroom
Housed	7%	6%	4%	4%	0%	1%
Not housed & not moved	17%	19%	20%	17%	24%	28%
Not housed & move 1 to 3x	24%	24%	23%	19%	39%	36%
Not housed & moved 4 to 13x	27%	29%	28%	20%	47%	54%
Not housed & moved 14x or +	28%	29%	36%	31%	53%	55%

Exposure to violence among PWID in the last 3 months, Los Angeles & Denver, 2021/22 (n=429)

	Threatened	Punched	Belongings Stolen	Attacked by stranger	Raped*
Housed	11%	4%	34%	6%	0%
Not housed & not moved	37%	31%	76%	22%	7%
Not housed & move 1 to 3x	39%	38%	86%	31%	2%
Not housed & moved 4 to 13x	60%	44%	92%	35%	10%
Not housed & moved 14x or +	47%	40%	90%	40%	9%

Essential items are often discarded/lost during camp clearances, LA/Denver 2021/22 (n=429)



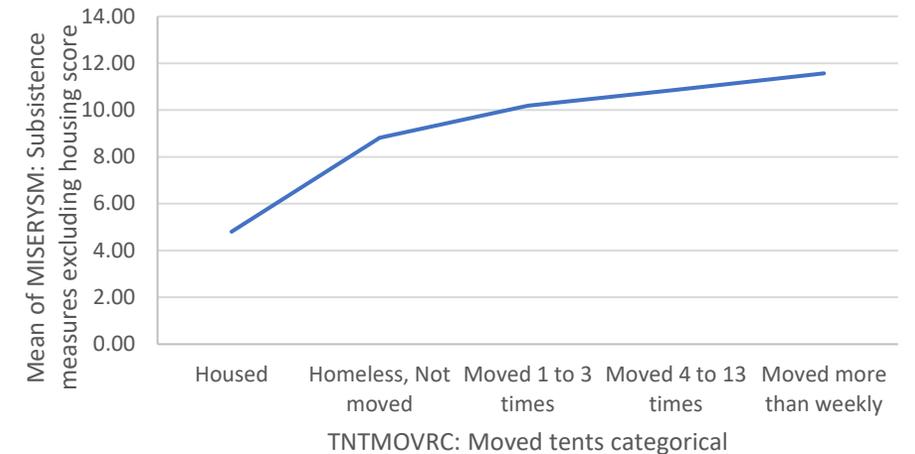
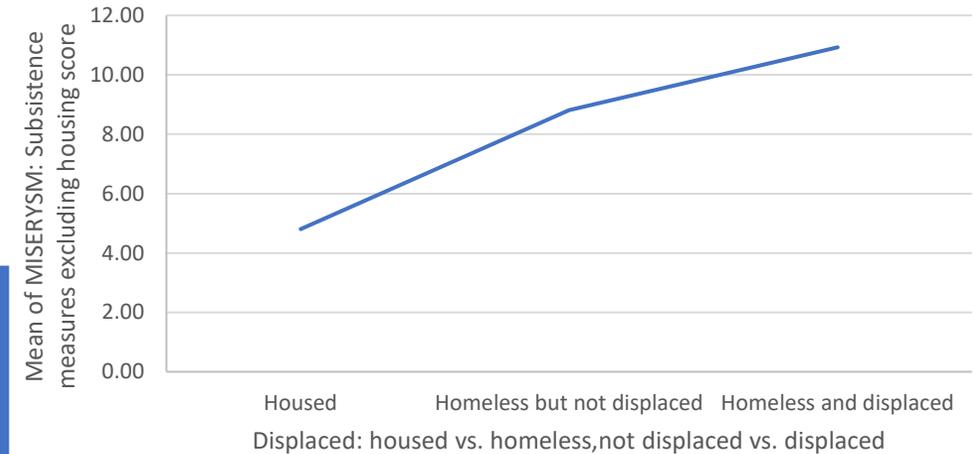
Factors associated with displacement (referent is Housed population)

Factors (in the last 3 months)	Adjusted odds ratio	95% confidence interval
Homeless not displaced		
Age	ns	
Any mental health disorder*	ns	
Any heroin withdrawal symptoms	ns	
Any hospitalization	ns	
Any SUD treatment	0.49	0.25, 0.98
Homeless, displaced		
Age		
<30	4.35	1.59, 11.88
30-39	4.00	1.88, 8.52
40-49	2.23	1.06, 4.65
50 or more	Referent	
Any mental health disorder*	2.04	1.14, 3.66
Any heroin withdrawal symptoms	2.21	1.28, 4.09
Any hospitalization	3.64	1.54, 8.54
Any SUD treatment	0.35	0.19, 0.66

Subsistence scores

- Participants were asked about difficulty obtaining Food, Clothing, Restrooms, and Showers. Response 1= Never to 4=Usually
- Subsistence score sum of 4 measures (excluded shelter item)
- Displacement was significantly associated with poor subsistence using both measures ($p < 0.05$)

Mean subsistence scores (standard deviation)	Food	Clothing	Rest room	Washing	Total
Housed	1.3 (0.8)	1.3 (0.8)	1.1 (0.6)	1.1 (0.6)	4.8 (1.6)
HL, not displaced	2.0 (1.2)	2.0 (1.3)	2.5 (1.3)	2.3 (1.3)	8.8 (3.6)
Displaced	2.5 (1.2)	2.5 (1.3)	3.0 (1.2)	3.0 (1.2)	10.9 (3.7)
Moved 1 to 3	2.4 (1.1)	2.2 (1.2)	2.7 (1.2)	2.9 (1.2)	10.2 (3.6)
Moved 4 to 13	2.4 (1.1)	2.5 (1.3)	3.1 (1.2)	2.9 (1.3)	10.8 (3.6)
Moved 14 or more	2.7 (1.2)	2.7 (1.2)	3.1 (1.2)	3.2 (1.1)	11.6 (3.7)



Displacement associated with health risk among people who inject drugs, 2021/22 (n=429)

Nonfatal overdose* in the last 3 months	Adjusted Odds Ratio (95% Confidence Interval)	Receptive syringe sharing* in the last 3 months	Adjusted Odds Ratio (95% Confidence Interval)
Housed	Referent	Housed	Referent
Not housed & not moved	2.13 (0.72, 6.27)	Not housed & not moved	3.18 (1.01, 9.97)
Not housed & move 1 to 3x	3.70 (1.28, 10.72)	Not housed & move 1 to 3x	4.18 (1.34, 13.07)
Not housed & moved 4 to 13x	4.56 (1.55, 13.79)	Not housed & moved 4 to 13x	4.73 (1.51, 14.80)
Not housed & moved 14x or +	5.17 (1.81, 14.81)	Not housed & moved 14x or +	4.67 (1.52, 14.32)

*while controlling for confounders

Subsistence also contributes to HIV risk & nonfatal overdose risk

Nonfatal Overdose, Past 3 Months

Predictor	aOR	95% CI	p <
IM Tercile 1 (Low)		Referent	
IM Tercile 2 (Middle)	2.25	1.18 - 4.31	0.014
IM Tercile 3 (High)	2.85	1.41 - 5.77	0.004
Latinx Ethnicity	1.89	1.00 - 3.55	0.049

Receptive Syringe Sharing, Past 3 Months

Predictor	aOR	95% CI	p <
IM Tercile 1 (Low)		Referent	
IM Tercile 2 (Middle)	1.42	0.75 - 2.70	0.287
IM Tercile 3 (High)	3.67	1.87 - 7.18	< 0.001
Latinx Ethnicity	2.05	1.09 - 3.87	0.027

Goldshear J, Corsi K, Simpson K, Wilkins P, Dominguez K, Kovalsky E, Bluthenthal RN. Immiseration as a risk factor for health risk and outcomes among people who inject drugs in Los Angeles, CA and Denver, CO in 2021. APHA 2022 Annual Meeting & Expo. Boston, MA, Nov. 6 to 9, 2022.

Social immiseration increases health risk among PWID

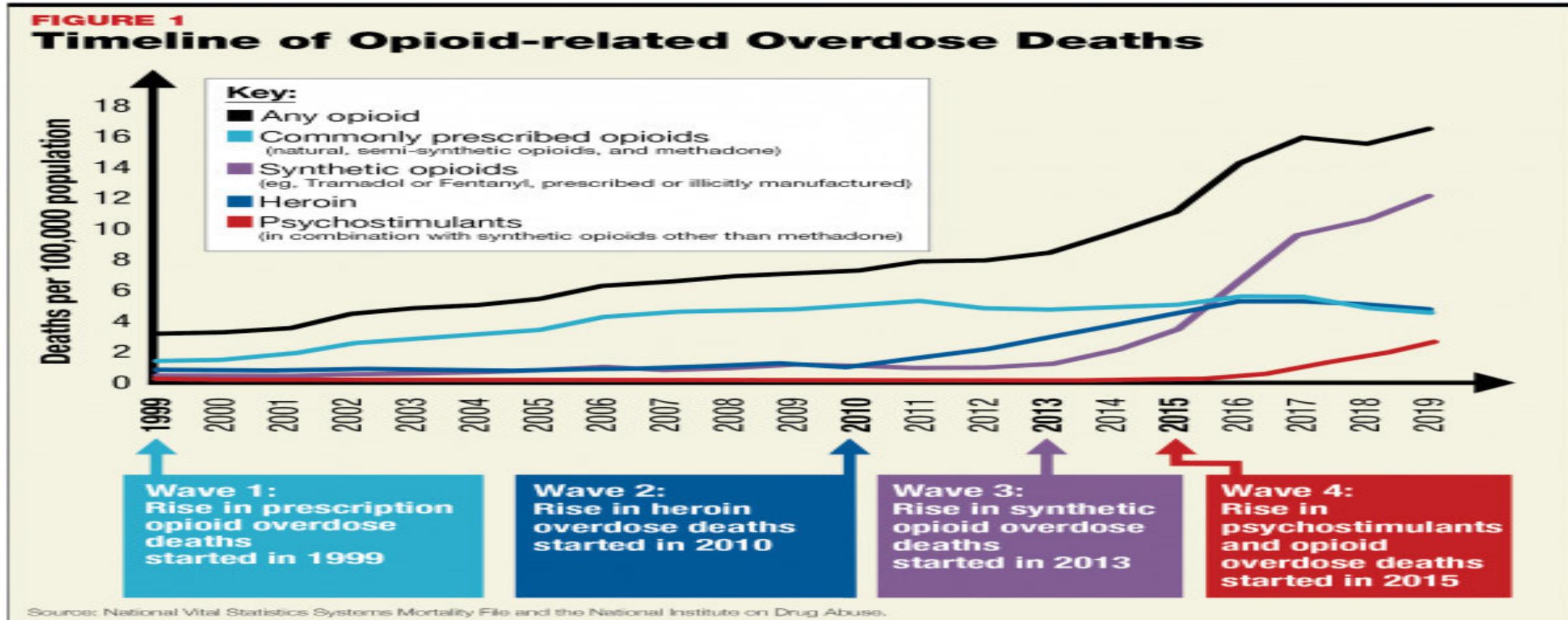
- Displacement & poor subsistence lowers the capacity of PWID to do self-care
- Important health outcomes and risk are associated with experiences of displacement and poor subsistence
- Politically popular responses to homelessness make the problem worse

Drug use changes and HIV risk

Goal

- To describe local changes in drug use patterns in Los Angeles and San Francisco, CA between 2011 and 2018
- To describe recent changes in drug use patterns in Los Angeles, CA and Denver, Colorado in 2021/22
- To explore HIV implications of recent changes

Changing drug use patterns are common

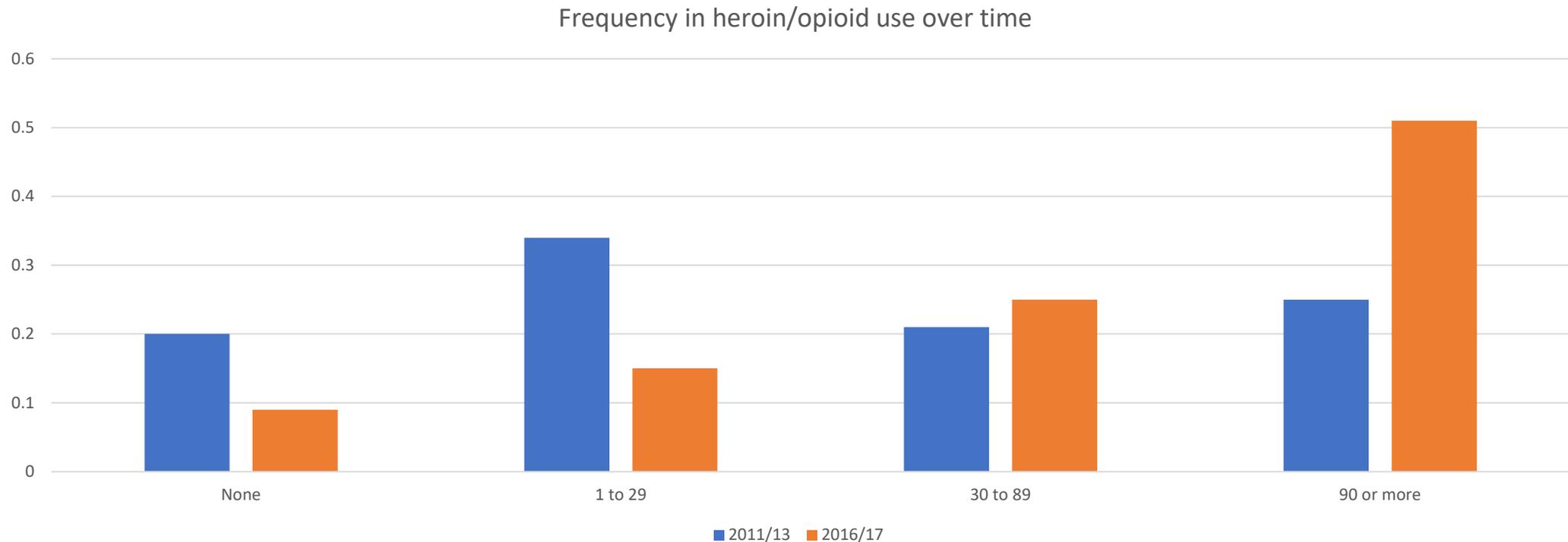


Sample Demographics Comparison: 2011/13 vs. 2016/17

	2011/13	2016/17
Female	25%	23%
GLB	18%	19%
White	37%	42%
Latinx	26%	23%
Black	25%	20%
Native	3%	7%
API	1%	1%
Mixed	8%	6%

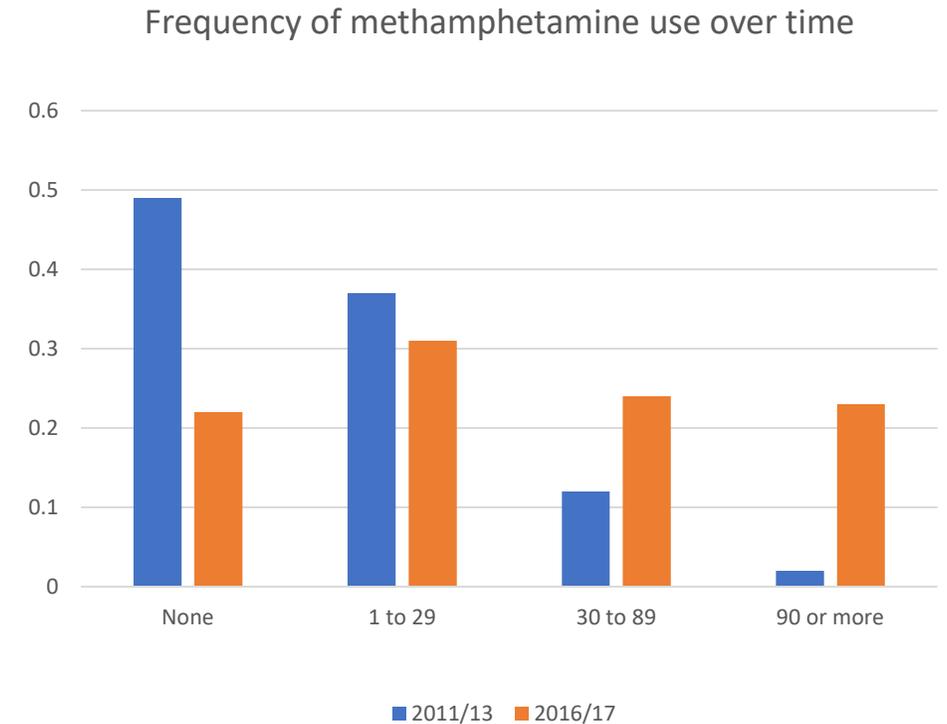
	2011/13	2016/17
Age		
<30	10%	20%
30-39	13%	23%
40-49	31%	25%
50 or more	46%	32%
Year of injection		
<10	16%	31%
10-19	17%	21%
20 or more	67%	48%

Opioid (including heroin) drug use characteristics, 2011/13 vs. 2016/17



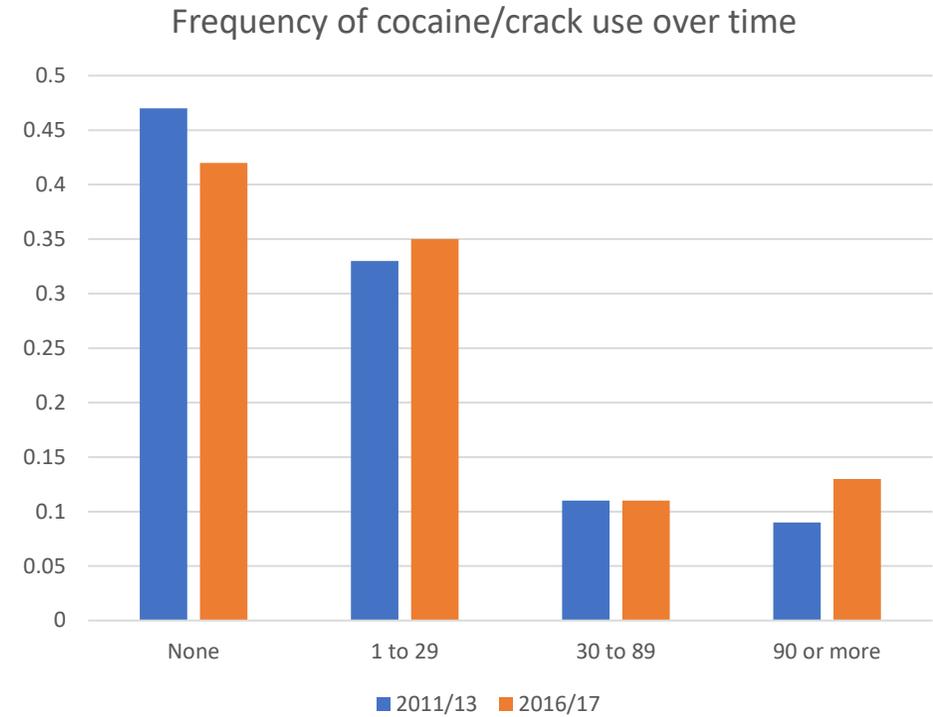
Methamphetamine drug use characteristics 2011/13 vs. 2016/17

	2011/13	2016/17
Non-injection meth – Any use	28%	48%
-- % of all meth use	30%	27%
Injection meth – Any use	45%	61%
-- % of all meth use	62%	39%
Non-injection goofball – Any use	2%	7%
-- % of all meth use	2%	2%
Injection goofball – Any use	14%	54%
-- % of all meth use	7%	32%



Cocaine/Crack drug use characteristics, 2011/13 versus 2016/17

Cocaine use characteristics	2011/13	2016/17
Non-injection crack – Any use	45%	40%
-- % of all cocaine use	82%	56%
Injection crack – Any use	11%	13%
-- % of all cocaine use	3%	11%
Non-injection cocaine – Any use	8%	13%
-- % of all cocaine use	2%	3%
Injection cocaine – Any use	10%	16%
-- % of all cocaine use	4%	5%
Non-injection speedball – Any use	2%	5%
-- % of all cocaine use	< 1%	2%
Injection speedball – Any use	16%	32%
-- % of all cocaine use	9%	23%



Transitions into fentanyl use may increase injection-related risk

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Research Paper

Associations between perceived illicit fentanyl use and infectious disease risks among people who inject drugs

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ARTICLE INFO

Keywords:

Illicit fentanyl use
Injection frequency
Syringe sharing
HIV
HCV

ABSTRACT

Background: Over the last several years, fentanyl has been introduced into the illicit drug supply in the United States. While the impact of fentanyl on overdose fatalities is clear, the increase in fentanyl use may also be affecting drug use practices with implications for infectious disease transmission. We conducted a cross-sectional survey to explore associations of perceived illicit fentanyl use with opioid use frequency, injection frequency and syringe sharing among people who inject drugs in two California cities.

Methods: People who inject drugs (PWID) were recruited from community settings in Los Angeles and San Francisco, CA from June 2017 to September 2018. Multivariable logistic regression was used to explore adjusted associations between perceived illicit fentanyl use and high frequency opioid use, high frequency injection and syringe sharing.

Results: Among the 395 study participants, the median age of participants was 44 years; 74% of participants were cisgender male; 73% reported to be homeless; 61% lived in San Francisco and 39% in Los Angeles. The prevalence of perceived illicit fentanyl use in the past six months was 50.4% (95% confidence interval (CI): 45.4%–55.3%) among PWID. Findings from our adjusted logistic regression models suggested that people reporting perceived illicit fentanyl use had a greater odds of high frequency opioid use (adjusted odds ratio (aOR) = 2.36; 95% CI: 1.43–3.91; $p = 0.001$), high frequency injection (aOR = 1.84; 95% CI: 1.08–3.13; $p = 0.03$) and receptive syringe sharing (aOR = 2.16; 95% CI: 1.06–4.36; $p = 0.03$), as compared to people using heroin and other street drugs but not fentanyl.

Conclusion: People reporting perceived illicit fentanyl use were at increased risk for injection-related infectious disease risks. Actions must be taken to reduce these risks, including improved access to syringe service programs and opioid treatment and consideration of innovative approaches, such as supervised consumption services.

Table 3

Perceived illicit fentanyl use and drug use practices among people who inject drugs (N = 395).

Illicit fentanyl use	High frequency opioid use (>90 times per month) [*]				High frequency injection (>90 injections per month) ^{**}				Receptive syringe sharing ^{***}			
	No n (%)	Yes n (%)	aOR (95% CI)	p-value	No n (%)	Yes n (%)	aOR (95% CI)	p-value	No n (%)	Yes n (%)	aOR (95% CI)	p-value
No	158 (81)	38 (19)	-		149 (76)	47 (24)	-		175 (89)	21 (11)	-	
Yes	114 (58)	84 (42)	2.36 (1.43–3.91)	0.001	107 (54)	92 (46)	1.84 (1.08–3.13)	0.026	168 (85)	30 (15)	2.16 (1.06–4.36)	0.033

aOR = adjusted odds ratio; 95% CI = 95% confidence interval.

^{*} past 30 days; final covariates included in the model: income, sexual orientation, homelessness, alcohol use and recent substance use treatment.

^{**} Past 30 days; final covariates included in the model: income, race/ethnicity, gender orientation, sexual orientation, recent jail experience, recent substance use treatment, and any opioid use.

^{***} past 6 months; final covariates included in the model: city of residence, race/ethnicity, gender orientation and recent jail experience.

Fentanyl smoking appears to be increasing

Drug and Alcohol Dependence 227 (2021) 109003



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Drug and Alcohol Dependence

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Transition from injecting opioids to smoking fentanyl in San Francisco, California

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ARTICLE INFO

Keywords:
 Fentanyl
 Epidemiology
 Qualitative
 Drugs
 Smoke
 Inject

ABSTRACT

Background: The introduction of illicitly made fentanyl in the United States has slowly replaced heroin. New illicit drugs are often associated with changes in frequency and modes of administration. We assessed changes in injection frequency and smoking fentanyl in the new era of fentanyl availability in San Francisco.

Methods: We used targeted sampling to recruit 395 people who inject drugs (PWID) into an observational cohort study in San Francisco 2018–2020. We assessed changes in injection frequency, opioid injection frequency and fentanyl smoking frequency in four six-month periods. We also conducted qualitative interviews with PWID asking about motivations for injecting and smoking opioids.

Results: The median number of past-month injections steadily decreased by semi-annual calendar year from 92 injections in July to December 2018 to 17 injections in January to June 2020. The rate of opioid injections reduced by half (Adjusted Incidence Rate Ratio = 0.41; 95 % Confidence Interval = 0.25, 0.70; $p < 0.01$). The number of days smoking fentanyl was associated with fewer number of injections ($X^2(2) = 11.0$; $p < 0.01$). Qualitative interviews revealed that PWID's motivation for switching from injecting tar heroin to smoking fentanyl was related to difficulties accessing veins. After switching to smoking fentanyl, they noticed many benefits including how the drug felt, improved health, fewer financial constraints, and reduced stigma.

Conclusion: Between 2018 and 2020, there was a shift from injecting tar heroin to smoking fentanyl in San Francisco. Reductions in injection of illicit drugs may offer public health benefit if it reduces risk of blood-borne viruses, abscesses and soft-tissue infections, and infective endocarditis.

Table 2

Number of times people injected drugs in last 30 days in San Francisco 2018-2020.

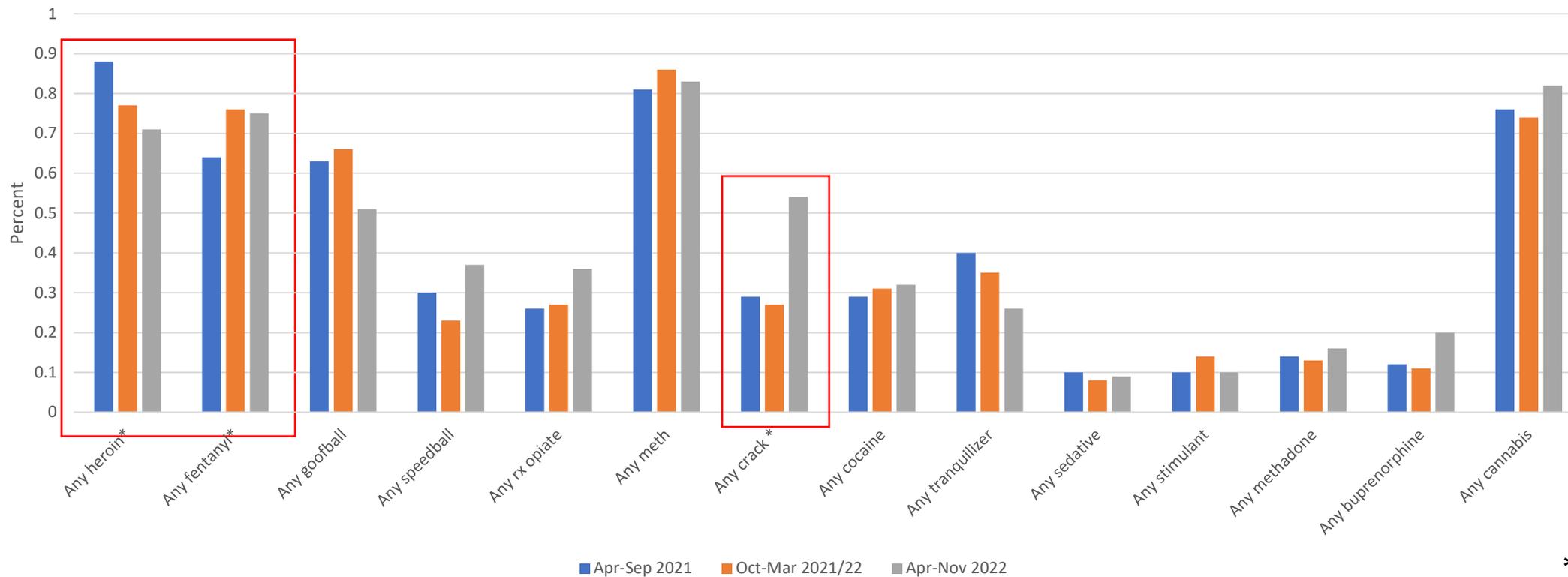
Period	Obs [*]	Median	Interquartile Range	Mean	SD	Adj IRR ¹	95 % CI	p-value
July-December 2018	190	90	(45-120)	95.6	74.7	Ref	-	-
January-June 2019	353	60	(18-100)	71.5	69.8	0.74	(0.62, 0.87)	<0.01
July-December 2019	297	25	(4-90)	49.4	63.3	0.53	(0.39, 0.72)	<0.01
January-June 2020	178	12.5	(0-90)	46.0	67.2	0.46	(0.30, 0.72)	0.01

^{*} Obs = number of observations; Includes baseline, 6-month, and 12-month observations. Data were missing for two observations (participant didn't know).

¹ Adj IRR = adjusted incident rate ratio; estimated using negative binomial GEE with unstructured correlation, adjusting for visit type (baseline, 6-month, 12-month), participant's age, and currently enrolled in substance use treatment program. Ref = referent.

Secular trends in drug use during COVID-19 – 2021/22

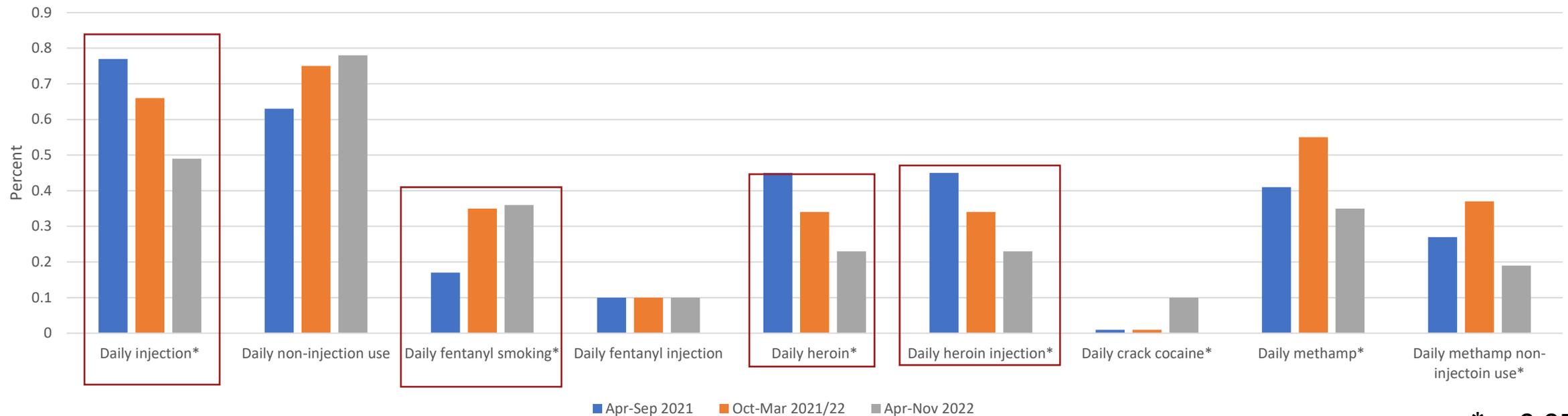
Self-report drug use in the last 3 months by baseline interview teim period, Los Angeles & Denver, 2021-22



*p<0.05

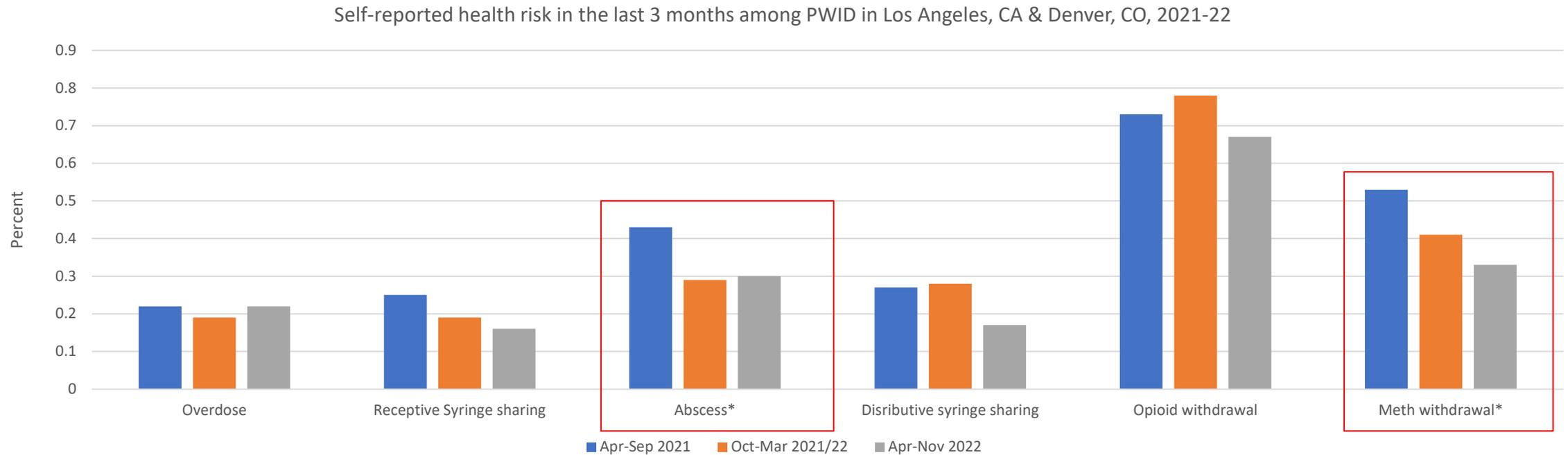
Secular trends in daily drug use and route of use

Self-reported daily drug use patterns last 3 months by baseline time period, PWID in Los Angeles, CA & Denver, CO, 2020-22



*p<0.05

Secular trends in health risk



Are trends in less injection associated with a health outcome - Abscesses

- Examined factors found to be associated with abscesses in the last 3 months
 - Included when participant was interviewed to capture trend
- Conducted bivariate and multivariate analysis to identify factors independently associated with health outcome

Abscess in the last 3 months	Adjusted odds ratio	95% Confidence interval
Interviewed		
Apr-Sep '21	Referent	
Oct-Mar '21/22	0.58	0.36, 0.95
Apr-Nov '22	0.70	0.38, 1.27
Injected by another person*	2.21	1.44, 3.29
Opioid withdrawal symptoms*	2.00	1.21, 3.29
Daily heroin injection*	1.88	1.23, 2.89

In the last 3 months

Polysubstance use and HIV risk

Polysubstance use background

- Historically, most participants in my studies have used multiple substances particularly if alcohol and nicotine are counted
- Combined, concurrent and sequential use of substances can be difficult to measure
- My data permits consideration of combined use of opioids and cocaine (speedballs), opioids and methamphetamine (goofballs), & concurrent daily use of substances

Polysubstance use and health & sex risk

- Goofball use in the last 3 months was associated with receptive syringe sharing and non-fatal overdose
- Daily polysubstance injection was associated with having a paying sex partner
- Results are preliminary and consideration of condom use by partner is the next step

Bivariate analysis of polysubstance variables in the last 3 months

	Receptive sharing	Nonfatal OD	Multiple sex partners	Paying sex partners
Any Speedball	20%	20%	33%	9%
Any Goofball	28%	25%	30%	9%
Non-injection drug use				
No daily drug use	23%	21%	29%	8%
1 daily drug use	18%	20%	25%	5%
Poly daily use	27%	22%	32%	12%
Injection drug use				
No daily injection	21%	21%	33%	10%
1 daily injection	22%	22%	24%	3%
Poly daily injection	25%	25%	27%	14%

Drug changes and HIV risk summary

- Prior to COVID-19, increases in stimulant use were consistently observed
- Fentanyl smoking is increasing at the expense of heroin use and injection based on latest data
- If trends in route of administration persist it could reduce HIV risk
- Polysubstance use appears to increase some HIV risk, but better measures are needed

Harm reduction and structural changes needed to achieve HIV prevention goals

Health outcomes are worsening people who use drugs

Clinical Infectious Diseases

MAJOR ARTICLE



Bacterial Infections Associated With Substance Use Disorders, Large Cohort of United States Hospitals, 2012–2017

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Background. Rises in the incidence of bacterial infections, such as infective endocarditis (IE), have been reported in conjunction with the opioid crisis. However, recent trends for IE and other serious infections among persons with substance use disorders (SUDs) are unknown.

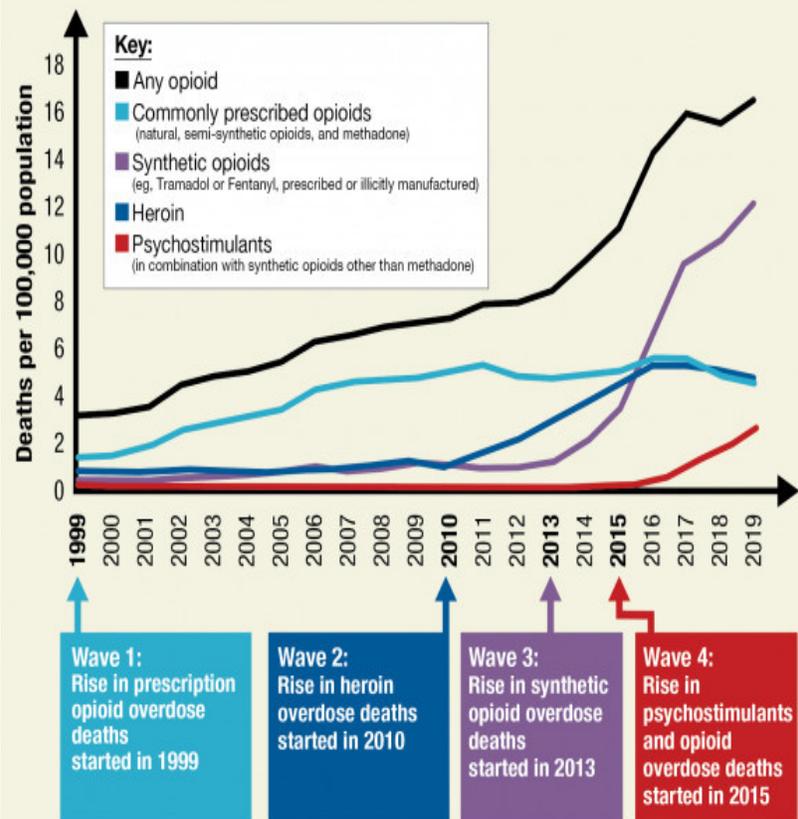
Methods. Using the Premier Healthcare Database, we identified hospitalizations from 2012 through 2017 among adults with primary discharge diagnoses of bacterial infections and secondary SUD diagnoses, using *International Classification of Diseases, Clinical Modification Ninth and Tenth Revision* codes. We calculated annual rates of infections with SUD diagnoses and evaluated temporal trends. Blood and cardiac tissue specimens were identified from IE hospitalizations to describe the microbiology distribution and temporal trends among hospitalizations with and without SUDs.

Results. Among 72 481 weighted IE admissions recorded, SUD diagnoses increased from 19.9% in 2012 to 39.4% in 2017 ($P < .0001$). Hospitalizations with SUDs increased from 1.1 to 2.1 per 100 000 persons for IE, 1.4 to 2.4 per 100 000 persons for osteomyelitis, 0.5 to 0.9 per 100 000 persons for central nervous system abscesses, and 24.4 to 32.9 per 100 000 persons for skin and soft tissue infections. For adults aged 18–44 years, IE-SUD hospitalizations more than doubled, from 1.6 in 2012 to 3.6 in 2017 per 100 000 persons. Among all IE-SUD hospitalizations, 50.3% had a *Staphylococcus aureus* infection, compared with 19.4% of IE hospitalizations without SUDs.

Conclusions. Rates of hospitalization for serious infections among persons with SUDs are increasing, driven primarily by younger age groups. The differences in the microbiology of IE hospitalizations suggest that SUDs are changing the epidemiology of these infections.

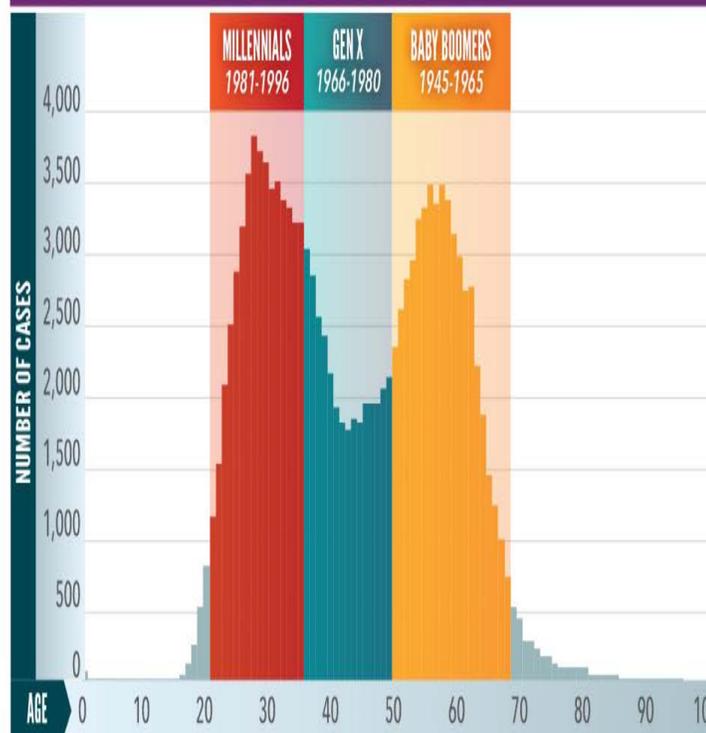
Keywords. substance use; bacterial infection; injection drug use; opioid; endocarditis.

FIGURE 1
Timeline of Opioid-related Overdose Deaths



Source: National Vital Statistics Systems Mortality File and the National Institute on Drug Abuse.

New Reports of Chronic Hepatitis C High in Multiple Generations



SOURCE: National Notifiable Diseases Surveillance System, 2018

Ending the HIV Epidemic Among Persons Who Inject Drugs: A Cost-Effectiveness Analysis in Six US Cities

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Background. Persons who inject drugs (PWID) are at a disproportionately high risk of HIV infection. We aimed to determine the highest-valued combination implementation strategies to reduce the burden of HIV among PWID in 6 US cities.

Methods. Using a dynamic HIV transmission model calibrated for Atlanta, Baltimore, Los Angeles, Miami, New York City, and Seattle, we assessed the value of implementing combinations of evidence-based interventions at optimistic (drawn from best available evidence) or ideal (90% coverage) scale-up. We estimated reduction in HIV incidence among PWID, quality-adjusted life-years (QALYs), and incremental cost-effectiveness ratios (ICERs) for each city (10-year implementation; 20-year horizon; 2018 \$ US).

Results. Combinations that maximized health benefits contained between 6 (Atlanta and Seattle) and 12 (Miami) interventions with ICER values ranging from \$94 069/QALY in Los Angeles to \$146 256/QALY in Miami. These strategies reduced HIV incidence by 8.1% (credible interval [CI], 2.8%–13.2%) in Seattle and 54.4% (CI, 37.6%–73.9%) in Miami. Incidence reduction reached 16.1%–75.5% at ideal scale.

Conclusions. Evidence-based interventions targeted to PWID can deliver considerable value; however, ending the HIV epidemic among PWID will require innovative implementation strategies and supporting programs to reduce social and structural barriers to care.

Keywords. HIV; localized HIV microepidemics; interventions; cost-effectiveness; injection drug use; dynamic HIV transmission model.

Gap between what is provided and what is needed is substantial

Table 1. HIV Among Persons Who Inject Drugs in 2017 and Selected HIV Treatment and Prevention Service Levels in 2015 in 6 Cities

Treatments and Services	Atlanta, GA	Baltimore, MD	Los Angeles, CA	Miami, FL	New York City, NY	Seattle, WA
Persons who inject drugs who are living with HIV, No. (% among all living with HIV) ^a						
Prevalence	3612 (11.3)	4759 (21.3)	5575 (10.8)	2425 (9.3)	13 037 (10.5)	884 (12.9)
New diagnoses ^b	67 (4.1)	50 (11.4)	146 (7.5)	27 (2.3)	64 (3.0)	17 (10.8)
HIV prevention program service levels						
Estimated annual number of syringes distributed per PWID	2	20	19	6	24	196
Coverage of medication for opioid use disorder among PWID, % ^c	3.0	9.4	15.7	7.1	19.9	11.9
HIV testing levels among PWID/MSMWID ^d						
Percent receiving an HIV test in the past year	30/15	11/ 12	40/25	16/15	9/41	43/51
HIV treatment engagement among PWID/MSMWID ^d						
Percent of diagnosed initiating ART ^e	44/38	55/47	51/44	48/41	39/42	51/46
Percent discontinuing ART ^e	28/25	11/8	14/13	24/21	11/8	5/4
Percent reinitiating ART ^e	42/44	28/29	23/20	43/46	31/32	49/50

Counties included in city boundaries for Atlanta, Baltimore, Los Angeles, and Miami match those included in the definition of Ryan White EMA or TGA. New York City and Seattle boundaries are restricted to a subset of counties. Counties included in cities are: Atlanta (Barrow, Bartow, Carroll, Cherokee, Clayton, Cobb, Coweta, DeKalb, Douglas, Fayette, Forsyth, Fulton, Gwinnett, Henry, Newton, Paulding, Pickens, Rockdale, Spalding, Walton); Baltimore (Anne Arundel, Baltimore City, Baltimore County, Carroll, Harford, Howard, Queen Anne's); Los Angeles (Los Angeles county); Miami (Miami-Dade county); New York City (county and borough: New York [Manhattan], Kings [Brooklyn], Queens [Queens], Bronx [Bronx], Richmond [Staten Island]); Seattle (King county). Excluded counties for New York City compared to the Ryan White EMA definition included Westchester, Rockland, and Putnam, and excluded counties for Seattle compared to Ryan White TGA definition included Snohomish and Island.

Abbreviations: ART, antiretroviral therapy; EMA, Eligible Metropolitan Area; HIVRN, HIV Research Network; MSMWID, men who have sex with men who inject drugs; PWID, persons who inject drugs; TGA, Transitional Grant Area.

^aPersons who inject drugs include men who have sex with men who inject drugs.

^bNew diagnoses are from 2017 in city surveillance reports, except for Los Angeles were new diagnoses are for 2016, or from the Centers for Disease Control and Prevention's Surveillance HIV Surveillance Supplemental Report.

^cCoverage is among the 72.7% of PWID estimated to have an opioid use disorder [23].

^dWhile the model runs in monthly cycles, we have converted these figures to yearly probabilities for ease of interpretation.

^eART initiation rates were estimated from the HIVRN data, and ART discontinuation and reinitiation rates were estimated by a continuous-time multistate Markov model based on the same HIVRN data [18].

Table 2. Description, Effectiveness, and Scale-up Implementation Scenarios for the Evidence-Based HIV Prevention Programs and Care Interventions Included in Analysis

Intervention	Source, Evidence Level ^a	Supporting Evidence	Study Design	Study Setting	Description and Effectiveness ^b	Scale-up Implementation Scenarios ^e	
						Optimistic, %	Ideal, % ^c
HIV prevention programs							
SSP	Aspinall et al 2014 [11], 2a	Meta-analysis		SSP	Clean injection equipment reduces the risk of parenteral HIV transmission by 58%	200 syringes/PWID/year ^f	90
MOUD with buprenorphine	MacArthur et al 2012 [37], 2a	Meta-analysis		Primary care and OTP	Office-based MOUD reduces the number of shared injections by 54% for PWID with OUD ^d	29 ^g	90 ^h
MOUD with methadone	MacArthur et al 2012 [37], 2a	Meta-analysis		Primary care and OTP	Opioid treatment program-based MOUD reduces the number of shared injections by 54% for PWID with OUD ^d	Additional scale-up of 17	90 ^h
Full-time PrEP	Liu et al 2016 [27], 1b	RCT substudy and cohort study		Primary care	Protective level adherence to PrEP (≥4 doses/week) reduces the risk of HIV infection by 60% ⁱ	50	90

- Only Seattle close to reaching consensus on syringes per year
- No city is close to reaching MOUD threshold

PWID interest in PrEP is high but use is low

SUBSTANCE USE & MISUSE
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<https://doi.org/10.1080/10826084.2020.1823419>

ORIGINAL ARTICLE

HIV Pre-Exposure Prophylaxis Prevention Awareness, Willingness, and Perceived Barriers among People Who Inject Drugs in Los Angeles and San Francisco, CA, 2016–2018

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ABSTRACT

Background: Pre-exposure prophylaxis (PrEP) for HIV prevention is indicated for people who inject drugs (PWID), yet most studies do not focus on PWID. This study examines factors associated with PrEP awareness and willingness, and identifies perceived barriers to PrEP among PWID. **Methods:** PWID were interviewed in Los Angeles and San Francisco, CA from 2016 to 2018. We analyzed data from self-reported HIV-negative participants who had injected drugs within the past 6 months ($n = 469$). Questions on PrEP included awareness, willingness, barriers, and uptake. Multiple logistic regression models of factors associated with awareness of, and willingness to, take PrEP were developed. Descriptive statistics on perceived PrEP barriers are reported. **Results:** Among HIV-negative PWID, 40% were aware of PrEP, 59% reported willingness to take PrEP, and 2% were currently taking PrEP. In multivariable analysis, PrEP awareness was associated with study site and sexual minority status, higher educational attainment, and HIV testing in the last 6 months. Willingness to take PrEP was associated with self-reported risk (paying sex partner in the last 6 months, sharing drug paraphernalia, and being injected by another PWID) and perceived HIV risk. The most common perceived barriers to PrEP were copays, concerns about increased HIV or sexually transmitted risk with PrEP, and concerns about reduction of medication efficacy without daily use. **Conclusion:** PrEP awareness among PWID remains inadequate. Willingness to take PrEP was moderate and was most desired by PWID who engaged in high-risk behaviors. Interventions to increase PrEP awareness and willingness, and to facilitate PrEP uptake among PWID are needed.

KEYWORDS

Pre-exposure prophylaxis; persons who inject drugs



AIDS and Behavior
<https://doi.org/10.1007/s10461-021-03304-x>

ORIGINAL PAPER



Living at the Confluence of Stigmas: PrEP Awareness and Feasibility Among People Who Inject Drugs in Two Predominantly Rural States

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Abstract

We explored knowledge, beliefs, and acceptability of pre-exposure prophylaxis (PrEP) for HIV prevention with reference to stigma among people who inject drugs (PWID) in two predominately rural U.S. states. We conducted interviews with 65 current or former PWID aged 18 years or older and living in Arizona or Indiana. Most (63%) of the interviewees were not aware of PrEP. They often confused PrEP with HIV treatment, and many believed that PrEP was only for sexual risk or gay sexual risk. Once they understood that PrEP was recommended for PWID, the participants held a positive view of PrEP and felt that a once-daily pill was feasible. Experiences of stigma about drug use remained a crucial barrier to accessing healthcare and PrEP. This was often linked with anticipated or expressed homophobia. PrEP interventions among PWID must focus on education and the confluence of stigmas in which PWID find themselves when considering PrEP.

AIDS and Behavior (2021) 25:1490–1506
<https://doi.org/10.1007/s10461-020-02988-x>



ORIGINAL PAPER

The Pre-exposure Prophylaxis (PrEP) Care Cascade in People Who Inject Drugs: A Systematic Review

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Abstract

Injection drug use is a key risk factor for the transmission of HIV. Prevention strategies, such as the use of pre-exposure prophylaxis (PrEP), are effective at reducing the risk of HIV transmission in people who inject drugs (PWID). Following PRISMA guidelines, a literature search was conducted to identify the current state of the PrEP care cascade in PWID. Twenty-three articles were evaluated in this systematic review. A decline in engagement throughout the stages of the PrEP care cascade was found. High awareness and willingness to use PrEP was found, yet PrEP uptake was relatively low (0–3%). There is a lack of research on interventions to increase engagement of PrEP across all levels of the care cascade in PWID. Implications from the interventions that have been published provide insight into practice and public policy on efficacious strategies to reduce HIV incidence in PWID. Our findings suggest that more efforts are needed to identify and screen PWID for PrEP eligibility and to link and maintain them with appropriate PrEP care.



The need for new HIV prevention interventions

- Fully fund syringe service programs
- Pipe distribution to facilitate transitions to smoking fentanyl
- Safe consumption sites
- Safe supply interventions (including for stimulant users)

Examples of policy approaches

- Resist popular policy approaches that undermine well-being among people who inject drugs like sweeps of homeless encampments
- Decriminalization of currently illicit drugs
 - Cannabis is now legal for most people in the US
 - Personal use decriminalization has occurred in Oregon
- Investment in communities
 - Measure J – Care, not Jails – 10% of county general fund to support alternative to incarceration (~\$300 million) Measure J in Los Angeles County
 - Oregon Measure 110

Research options

- We need to focus on political and social determinants of health that are an existential threat to people who use drugs
- We need to listen, uplift and empower people who use drugs to identify solutions.
 - Act in solidarity with people who use drugs
 - Support drug user unions and other organizing efforts
 - Hire people with lived experience and active use when ever possible

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Thanks for your attention

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