

# Socio-economic marginalization and viral suppression among antiretroviral therapy exposed individuals who use illicit drugs

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## Background

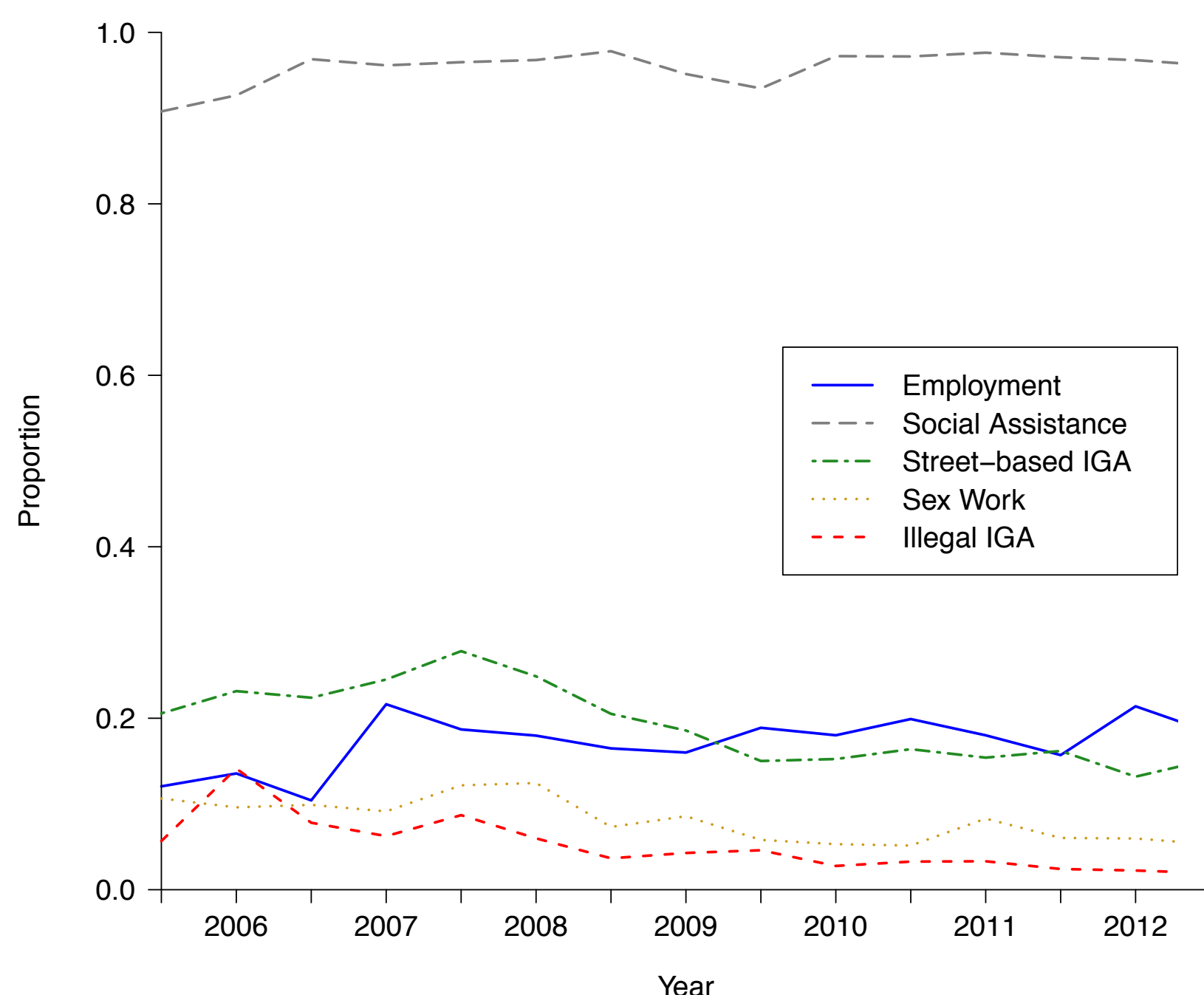
- Among people living with HIV/AIDS (PHA), evidence increasingly points to a critical relationship between social and structural exposures, antiretroviral therapy (ART) adherence and HIV-clinical outcomes.
- The International Labour Organization recently identified employment as playing a significant role in HIV treatment outcomes. Additionally, previous research has identified significant barriers to employment among people living with HIV/AIDS, with significant impacts on individual morbidity and mortality.
- However, little is known about the role that illegal or prohibited income generation plays in ART adherence and plasma HIV RNA suppression.
- We therefore undertook the present study to explore this relationship among a cohort of illicit drug users living with HIV/AIDS in Vancouver, Canada.

## Methods

- The data was derived from the AIDS Care Cohort to evaluate Exposure to Survival Services (ACCESS), a long-running prospective cohort of community-recruited drug users in Vancouver, Canada, a setting of free and universal access to HIV care.
- Longitudinal cohort data were linked to comprehensive HIV clinical monitoring and ART dispensation records provided by the BC Centre for Excellence in HIV/AIDS.
- First, we first examined the income generation profile of cohort participants to determine involvement in different types of income generating activity over time.
- Second, using generalized linear mixed effects modelling, we examined the relationship between prohibited income generation and virologic suppression (plasma viral load  $\leq 50$  copies/mL<sup>3</sup>) among ART-exposed individuals.
- Last, we conducted standard mediation analyses to determine the extent to which ART adherence mediates the relationship between prohibited income generation and virologic suppression.

## Results

- Between December 2005 and May 2013, of our 687 study participants, 234 (34.1%) self-identified as women and 384 (55.9%) as Caucasian, with 391 (56.9%) reporting prohibited income generation activity at any point during the study period.
- We found a strong negative association between prohibited income generation and virologic suppression in bivariate (odds ratio: 0.56; 95% CI: 0.44-0.73) and multivariate analyses (adjusted odds ratio: 0.68, 95% CI: 0.52-0.88) which were adjusted for hypothesized confounders, including age, homelessness and ART adherence.
- Mediation analyses indicate that ART adherence partially mediates the relationship between prohibited income generation and virologic suppression (Sobel test statistic = 5.59,  $p < 0.001$ )



**FIGURE 1.** Income generating activity (IGA) of ART-exposed individuals living with HIV who use illicit drugs in Vancouver, 2005-2013 (n=687)

**TABLE 1. Generalized linear mixed effects analyses of factors associated with plasma HIV-1 RNA viral load  $< 50$  copies/mm<sup>3</sup> among 687 ART – exposed, HIV-positive people who use illicit drugs**

Characteristic	Unadjusted Odds Ratio (95% CI) <sup>1</sup>	p-value	Adjusted Odds Ratio (95% CI)	p-value
Prohibited income generation <sup>a,b</sup> (yes vs. no)	0.56 (0.44-0.73)	<0.001	0.72 (0.55-0.94)	0.015
Age (per additional year)	1.25 (1.21-1.29)	<0.001	1.13 (1.10-1.15)	<0.001
Gender (male vs. female)	2.74 (1.59-4.73)	<0.001		
Ethnicity (white vs. other)	1.35 (0.80-2.27)	0.267		
Homelessness <sup>a</sup> (yes vs. no)	0.26 (0.19-0.34)	<0.001	0.35 (0.26-0.48)	<0.001
High-intensity drug use (yes vs. no)	0.44 (0.34-0.56)	0.622	0.63 (0.49-0.81)	<0.001
Recent incarceration <sup>a</sup> (yes vs. no)	0.39 (0.26-0.58)	0.006		
Addiction treatment enrolment <sup>a</sup> (yes vs. no)	2.04 (1.54-2.69)	<0.001		
HAART adherence <sup>a</sup> ( $\geq 95\%$ vs. $< 95\%$ )	12.10 (9.65 – 15.18)	<0.001	9.87 (7.87-12.37)	<0.001
Baseline CD4 <sup>+</sup> T-cell count (per 100 cells)	1.00 (1.00-1.00)	0.671		

ART, antiretroviral therapy; CI, confidence interval

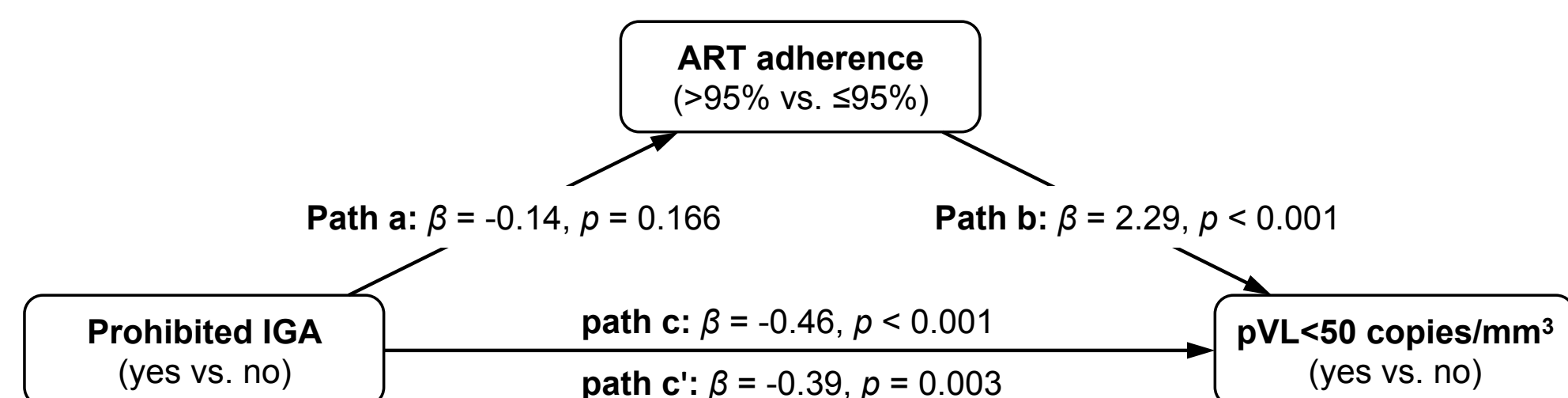
<sup>a</sup>refers to the six month period preceding the follow-up interview

<sup>b</sup>includes sex work, drug dealing, theft, street-based and other illegal or prohibited sources of income

<sup>c</sup>includes daily or greater heroin injection, cocaine injection or crack-cocaine smoking

## Discussion

- The current study findings demonstrate that involvement in prohibited income generation decreases the likelihood of virologic suppression both directly and indirectly through its negative association with ART adherence.
- Readers should be cautious when reviewing our results as the current study may include the potential for unmeasured confounding from factors not considered here; the limited generalizability common to all observational studies; and the potential for social desirability or recall bias due to the self-reported nature of the non-clinical indicators.
- The ongoing socio-economic marginalization of PHA who use illicit drugs is entrenched through the criminalization of illicit drug use as well as a lack of viable licit employment opportunities that can accommodate health service utilization and episodic absences from the labour market.
- These findings therefore call for programmatic and policy interventions to decrease socio-economic vulnerability and subsequent HIV-related morbidity and mortality among marginalized PHA.



**FIGURE 2.** Mediation effects for ART adherence on the relationship between prohibited IGA and pVL suppression among 687 ART-exposed, HIV infected people who use illicit drugs. Estimates adjusted for age and homelessness. Sobel statistic = 5.59,  $p < 0.001$ .