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CAN HETEROGENEITY IN (POLY)DRUG USE AND HIV RISK INFORM PRECISION IN HARM REDUCTION?

Characteristics of polydrug use and associations with HIV risk behaviours in people who inject drugs in Estonia and Russia

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OUTLINE

Introduction
- What is polydrug use and why does it matter?
- Drug use and HIV in Kohtla-Järve and St Petersburg
- Study objectives

Methods
- Study population; measures; statistical analyses

Findings
- Latent class model and polydrug use class membership
- Correlates of polydrug use

Discussion
- Summary of findings
- Implications
- Limitations and strengths

Acknowledgements

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INTRODUCTION 1: Why is polydrug use a problem?

- Challenges harm reduction efforts, especially drug treatment;

- Evidence of higher HIV incidence among PWID injecting opiate with stimulants [Tavitian-Exley, 2015];

- Evidence links some stimulants with high-risk sexual behaviour and HIV infection;

  - Stimulants found to increase biological susceptibility to HIV;

- Polydrug use has become frequent across settings [50% of all PWID; min-max: 15%-78%] iorcos ([Tavitian-Exley, 2016];

- Increased availability of different substances (e.g. ATS, cocaine).

- ill-defined – diverse practices lumped together…

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INTRODUCTION 2:
Prevalence of polydrug use among PWID, globally

- 61 published reports of studies conducted between 1993 and 2015;

- reported in at least 40 cities in 19 countries;

- 50% of all PWID recently injected and/or used multiple drugs [min-max: 15%-78%]

- Polydrug use ill-defined and drug use profile often not characterised or reported in studies.

- "use of more than one drug or type of drug by an individual, often at the same time or sequentially, and usually with the *intention* of enhancing, potentiating, or counteracting the effects of another drug"
[WHO, 2013; Leri and Bruneau, 2003].
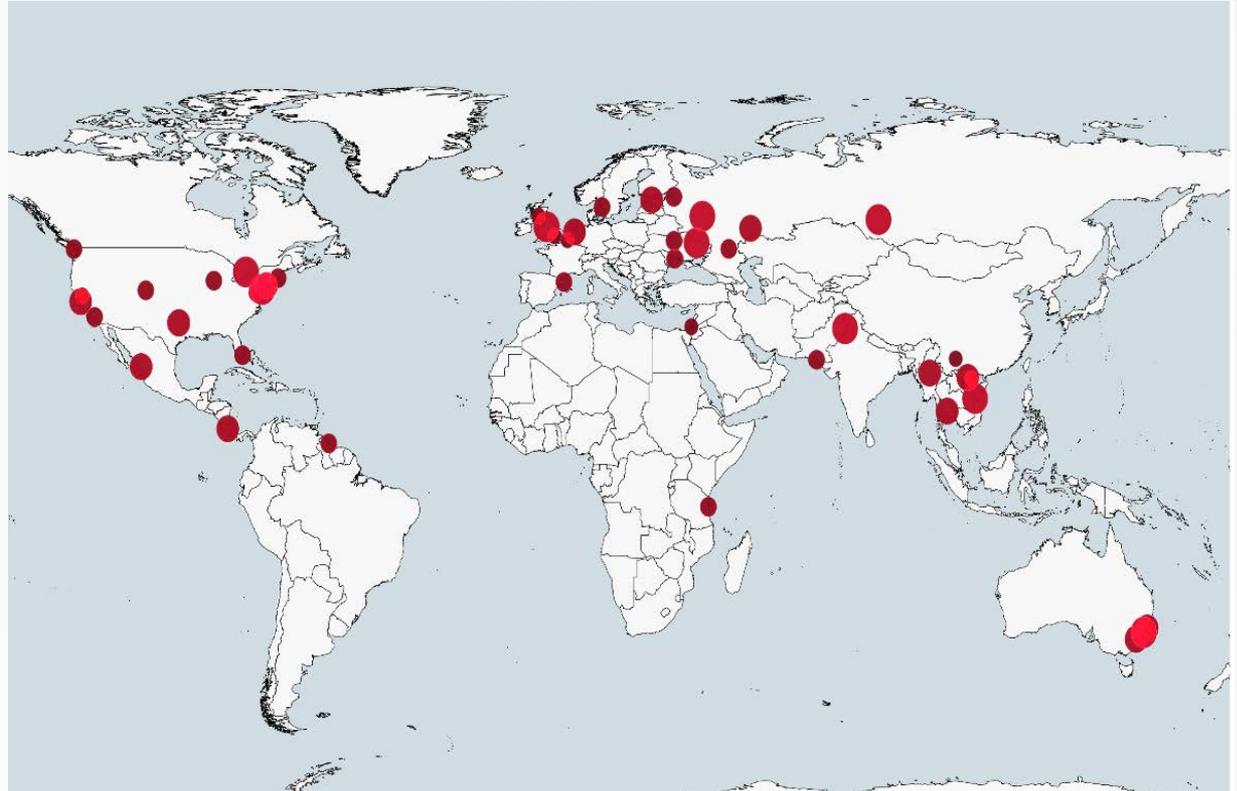
Tavitian-Exley, I. (2016). *The relevance of polydrug use in HIV risk and associated injecting and sexual risk behaviours among people who inject drugs.* Doctoral thesis, Imperial College London, United Kingdom.

INTRODUCTION 3:
Polydrug use in Kohtla-Järve and St Petersburg

HIV epidemics driven by drug use

- 70% in Kohtla-Järve (KJ) in 2007 [Talu, 2010; Vorobjov, 2013; NIHD];
- 59% in St Petersburg (SP) in 2009 [Eritsyan, 2013; UNODC, 2014].
- situated on drug trafficking corridors (Afghanistan-Western Europe [UNODC, 2012, 2015].

Synthetic opioids and amphetamines:

- Most PWID in the region injected synthetic opioids (in KJ: locally-produced fentanyl & in SP: illicit methadone)[Grund 2009; Eritsyan, 2013].

- Estonia: highest prevalence of amphetamine-type stimulant (ATS) use in Europe [EMCDDA 2012, UNODC, 2015].

- ATS: main secondary drug used by PWID in Kohtla-Järve, Talinn and St Petersburg [18, 21–23].

STUDY OBJECTIVE(S)

- to identify subgroups (emergent classes) of polydrug use on the basis of a primary (=main) drug injected, other class(es) and their administration route;

- to determine whether polydrug use sub-groups differed in their socio-demographic characteristics, access to services and to investigate whether injecting and sexual risk behaviours, HIV and HCV are associated with (poly)drug use.

Polydrug use = "past month *injection* of a main illicit drug and injection *or* use of one or more additional illicit substances (cannabis and alcohol excluded).

METHODS SUMMARY

Survey population and measures

- ≥ 18 years old, past month injection;
- Social & demographic variables, access to services, past-year drug substitution (OST in KJ); sexual & injecting behaviours, HIV serostatus, HepC (KJ only).

Latent Class Analysis - divides heterogeneous population into more homogenous subgroups (= latent classes);

- PWID sub-groups with similar patterns in primary drug injected (main) and additional drugs injected or used (ie. polydrug classes).

Multinomial logistic regression

- to compare socio-demographic, programme and HIV risk behavior variables between emergent sub-types of the best fit latent class model;
- models adjusted for demographic and contextual variables.

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FINDINGS-1

- 1402 active PWID, 18 years or older and living in Kohtla-Järve and St Petersburg had injected drugs in the past 4 weeks;

- Polydrug use substantial among PWID - 44% belonged to one of four polydrug classes;

- Best fit model suggest 5 classes:
  - **Polydrug poly-route injection** (Class 1, **9%**)
  - **Opiate-stimulant poly-injection** (Class 2, **7%**)   **44%** of all PWID
  - **Non-injection stimulant co-use** (Class 3, **12%**)
  - **Opiate-opioid poly-injection** (Class 4, **16%**)
  - **Single drug injection** (Class 5, **56%**)   **56%** of all PWID

FINDINGS-2 **Latent class model of polydrug use** (5-class solution)
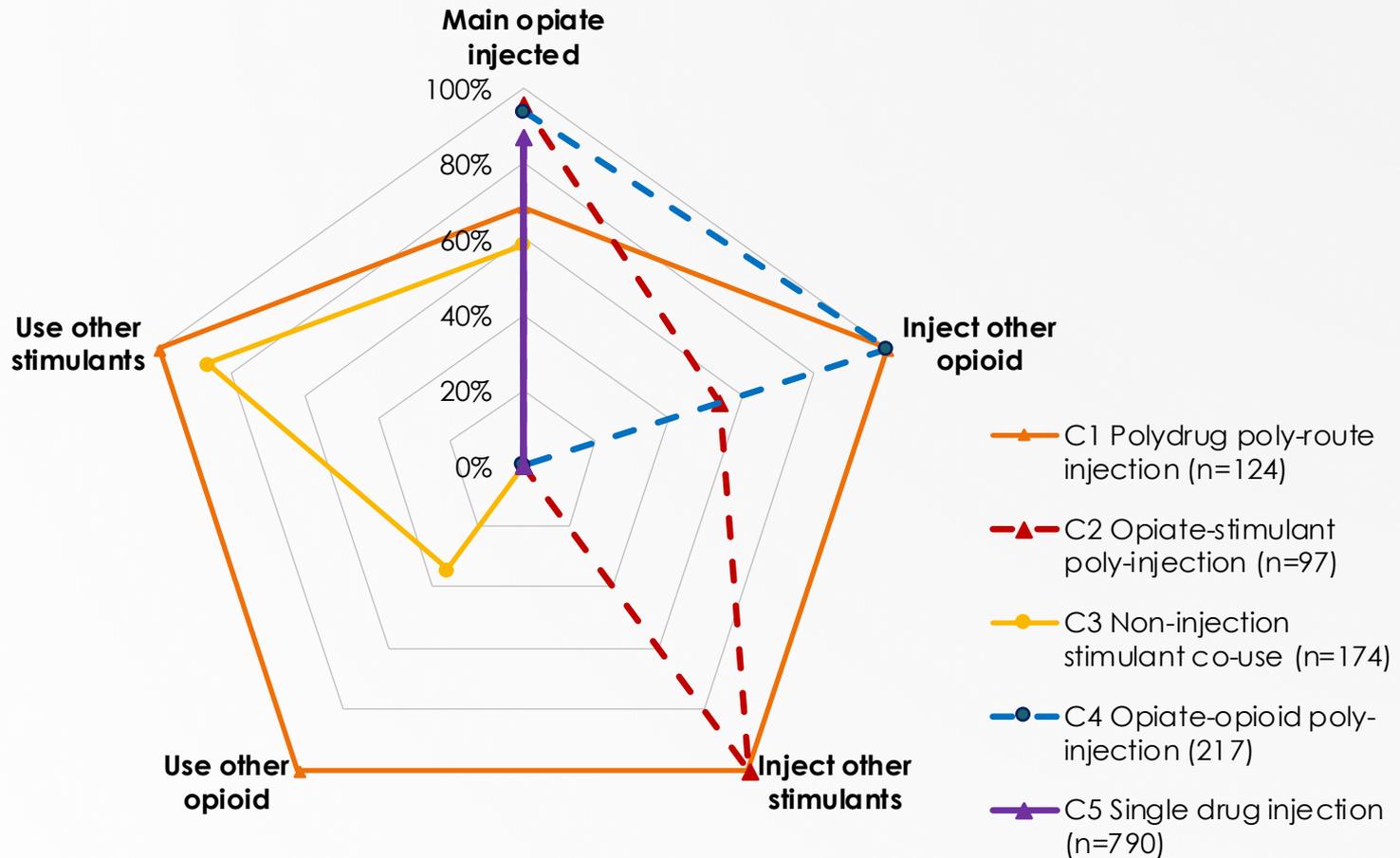
Note: The axes of the diagram show the proportion of PWID who responded "yes" to each of the five observed drug use variables in the five latent (polydrug)classes (=conditional probabilities).

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FINDINGS – models adjusted for socio-demographic and contextual variables

Adjusted Odds Ratios (95% CI)

Reference group: class 5 (= single drug injection)	Class 1 **Polydrug poly-route injection**	Class 2 **Opiate-stimulant poly-injection**	Class 3 **Non-injection stimulant co-use**	Class 4 **Opiate-opioid poly-injection**
Injecting risk behaviours (last month)				
Less than 5 years' injecting	1.1 (0.7-1.9)	1.6 (0.4-6.3)	0.7 (0.4-1.3)	1.8 (0.5-5.9)
Injected daily or more	**2.5 (1.1-5.7)***	**3.0 (1.5-5.8)***	0.9 (0.5-1.5)	1.3 (1.0-1.8)
Injected ≥ twice a day	**2.7 (1.3-5.9)***	**4.0 (2.3-6.9)***	1.1 (0.8-1.6)	**1.6 (1.1-2.4)***
Shared needles/syringes	**2.5 (1.3-4.8)***	**2.3 (1.7-3.2)***	1.6 (0.7-4.0)	**1.6 (1.1-2.4)***
Lent needles/syringes	1.0 (0.5-1.9)	**2.4 (1.4-3.9)***	0.9 (0.5-1.7)	1.4 (0.9-1.9)
Shared paraphernalia	**2.7 (1.4-4.9)***	**1.8 (1.2-2.7)***	2.4 (0.9-6.9)	1.2 (0.9-1.7)
Filled from working syringe	**3.6 (2.3-5.8)***	**1.8 (1.1-3.1)***	**3.2 (1.4-7.2)***	0.7 (0.5-1.1)
Sexual risk behaviours (last 6 months)				
Any sex in last 6 months	1.1 (0.6-2.2)	**1.9 (1.1-3.5)***	**1.5 (1.1-2.2)***	0.9 (0.6-1.1)
≥ 2 sex partners	1.2 (0.8-1.8)	**1.7 (1.2-2.4)***	1.1 (0.8-1.5)	**1.6 (1.2-2.1)***
Regular sex partner injects	1.5 (0.8-3.2)	1.9 (0.8-4.4)	1.2 (0.9-1.6)	**3.2 (2.1-4.9)***
Casual sex partner injects	1.7 (1.0-2.9)	1.3 (0.5-3.5)	1.1 (0.5-2.6)	**2.1 (1.1-3.9)***
Ever paid for sex	1.0 (0.4-2.4)	0.6 (0.2-1.7)	0.5 (0.2-1.2)	0.5 (0.1-1.9)
Serological markers [**]				
HIV test positive	0.7 (0.4-1.3)	1.1 (0.7-1.8)	0.9 (0.7-1.3)	1.3 (0.9-1.8)
HCV reactive	0.7 (0.2-2.3)	0.6 (0.1-2.9)	0.8 (0.5-1.3)	0.8 (0.2-4.2)
HSV positive	0.6 (0.3-1.1)	1.1 (0.5-2.8)	0.6 (0.4-1.0)	2.0 (0.6-6.6)

Note: Multivariable multinomial regression models adjusted for age, sex, education, income, ethnicity, contact with needle and syringe programme and city (drug/substitution treatment did not differ significantly across classes). CI = confidence intervals, NSP=needle and syringe programme. * Regression coefficient p value ≤0.05. ‡Drug/substitution treatment in past 12 months refers to drug substitution in Kohtla-Järve and any treatment in St Petersburg. ** Serological markers for hepatitis C (HCV) and herpes simplex virus (HSV) were available for Kohtla-Järve only.

FINDINGS-3: Associations between demographic variables, behavioural risk, HIV status <u>and</u> latent poly(drug) class *(compared to "single drug injectors")*

Polydrug poly-route injection *(Class 1)*	Opiate-stimulant poly-injection *(Class 2)*	Non-injection stimulant co-use *(Cl. 3)*	Opiate-opioid poly-injection *(Class 4)*
- ↑ non- Russian ethnicity - - - ↑↑ Kohtla-Järve	↑ < 30 years old - - - - -	↑ < 30 years old - ↓ secondary education ↑ non-regular income ↑↑ Kohtla-Järve	↑ < 30 years old ↑ non- Russian ethnicity - - - ↑ St Petersburg
↑ Injected daily or more ↑↑ Injected ≥ twice a day ↑ shared needles/syringes ↑↑ sharing paraphernalia ↑↑ back-loaded	↑↑ Injected daily or more ↑↑ Injected ≥ twice a day ↑ shared needles/syringes ↑ sharing paraphernalia ↑ back-loaded	- - - - ↑ back-loaded	= Injected daily or more ↑ Injected ≥ twice a day ↑ shared needles/syringes - -
- - - -	↑ any Sex last 6 months ↑ multiple sex partners - -	↑ any Sex last 6 months - - -	- ↑ multiple sex partners ↑↑ regular sex partner injects ↑ casual sex partner injects
- - -	= HIV positive - = HSV positive	= HIV positive - -	= HIV positive = HCV reactive = HSV positive

Note: "↑" and "↓" indicate positive and negative associations, respectively.
"↑↑" indicates a strong positive association (aOR≥2). Associations that were positive but not significant are marked "=".

Summary findings

- Substantial polydrug use among PWID (44%);

- Considerably greater injecting & sexual risk in classes of polydrug users than among single-drug injectors;

- Overlap between injection and sexual risk behaviours = potential for transmission of BBI & STI;

- <u>Opiate-stimulant poly-injection</u> associated with frequent and intense injecting, sharing needle/syringes and paraphernalia, back-loading and multiple sex partners –

- <u>Opiate-opioid poly-injection</u> associated with frequent injecting, sharing needle/syringe, multiple sex partners and having a sexual partner who injects.

IMPLICATIONS – why monitor polydrug use?

- As potential marker for risk behaviours and HIV/HCV risk [Degenhardt, 2012].

- To tailor HIV interventions to risk profiles and drug combinations injected by PWID;

- To ensure sufficient supplies are available (e.g. do **opiate-stimulant** and **polydrug polyroute injectors** require more clean injection equipment?);

- To target risk reduction messages (injecting and sexual) and promote safe sexual behaviours _with all sex partners_;

- to ensure entry points for PWID with different drug/risk profiles (e.g. primary health care services/pharmacies for _stimulant co-users_).

IMPLICATIONS –

➢ expand substitution treatment following evidence-based dosage at the public health scale for <u>all</u> PWID (or legalize in Russia);

➢ provide drug treatment alternatives including behavioural and pharmacological approaches for PWID who **inject opiates and stimulants** if opiate substitution not effective [Williamson, 2006; Roy, 2013; Colfax, 2010; Colfax, 2005].

➢ Increase retention, adherence to therapy and improve treatment outcomes for all PWID [EMCDDA, 2009; Nosyk, 2015;McArthur, 2012, Malta, 2010].

Strengths and limitations

- samples may not represent all PWID (chain referral sampling);

- short-term drug use patterns (ie. four-weeks) may not be a good predictor of HIV and HCV prevalence (ie. polydrug class membership may not be consistent longitudinally);

- Important structural differences in the two locations (unmeasured);

- RDS effective in recruiting hard-to-reach sub-groups, within key populations at risk of HIV infection, not reached by programmes;

- Consistent recall period (4 weeks) for all injecting risk including polydrug use;

- possible under-reporting of stigmatised behaviours in PWID self-reports and bias towards socially desirable answers - minimized through confidential face-to-face interviews;

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Selected references

- Vorobjov S, Des Jarlais DC, Abel-Ollo K, Talu A, Ru¨Tavitian-Exley, I., Vickerman, P; Bastos, Francisco I.; Boily, MC. Influence of different drugs on HIV risk in people who inject: systematic review and meta-analysis. Addiction, 2015. 110(4): p. 572-584.

- Leri, F., J. Bruneau, and J. Stewart, Understanding polydrug use: Review of heroin and cocaine co-use. Addiction, 2003. 98(1): p. 7-22.

- World Health Organization, *WHO terminology on substance abuse*. 2013, World Health Organisation,: Geneva.

- Talu A, Rajaleid K, Abel-Ollo K, Ruutel K, Rahu M, Rhodes T, et al. HIV infection and risk behaviour of primary fentanyl and amphetamine injectors in Tallinn, Estonia: implications for intervention. Int J Drug Policy. 2010;21(1):56–63.

- Vorobjov S, Des Jarlais DC, Abel-Ollo K, Talu A, Ru¨u¨tel K, Uusku¨la A. Socio-demographic factors, health risks and harms associated with early initiation of injection among people who inject drugs in Tallinn, Estonia: evidence from cross-sectional surveys. Int J Drug Policy. 2013;24(2):150–5.

- National Institute for Health Development. HIV in Estonia: situation, prevention, treatment, and care. Tallinn: National Institute for Health Development, Development NIfH; 2016.

- Eritsyan K, Heimer R, Barbour R, Odinokova V, White E, Rusakova MM, et al. Individual-level, network-level and city level factors associated with HIV prevalence among people who inject drugs in eight Russian cities: a cross-sectional study. BMJ Open. 2013;3(6):e002645.

- United Nations Office on Drugs and Crime. World drug report 2014. Vienna: UNODC, Research and Trend Analysis Branch; 2014.

- Grund J-P, Zabransky T, Irwin K, Heimer R. Stimulant use in central and Eastern Europe. In: Pates R, Diane Riley, editors. Interventions for amphetamine misuse. Blackwell: Wiley; 2009.

- EMCDDA 2012, UNODC, 2015].

- United Nations Office on Drugs and Crime. World Drug Report 2015. Vienna: UNODC, Research and Trend Analysis Branch; 2015. Contract No.: E.12.XI.1.

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THANK YOU

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ORIGINAL PAPER

Polydrug Use and Heterogeneity in HIV Risk Among People Who Inject Drugs in Estonia and Russia: A Latent Class Analysis

Isabel Tavitian-Exley[1] · Marie-Claude Boily[1] · Robert Heimer[2] · Anneli Uusküla[3] ·
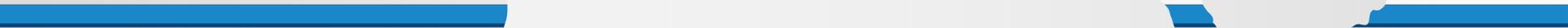Olga Levina[4] · Mathieu Maheu-Giroux[5]

Abstract Non-medical drug injection is a major risk factor for HIV infection in Russia and Estonia. Multiple drug use (polydrug) has further been associated with increased harms. We compared HIV, injecting and sexual risk associated with polydrug use among people who injected drugs (PWID) in 2012–2013 in Kohtla-Järve (Estonia, n = 591) and St Petersburg (Russia, n = 811). Using latent class analysis, we identified five (poly)drug classes, the largest consisting of single-drug injectors among whom an opioid was the sole drug injected (56% of PWID). The four remaining polydrug classes included *polydrug-polyroute injectors* who injected and used opiates and stimulants (9%), *opiate-stimulant poly-injectors* who injected amphetamine-type-stimulants with a primary opiate (7%) and *opiate-opioid poly-injectors* who injected opioids and opiates (16%). *Non-injection stimulant co-users* were injectors who also used non-injection stimulants (12%). In multivariable multinomial regressions, all four polydrug classes were associated with greater injection risks than single-drug injection, while *opiate-stimulant* and *opiate-opioid poly-injection* were also associated with having multiple sex partners. Riskier behaviours among polydrug-injectors suggest increased potential for transmission of blood-borne and sexually-transmitted infections. In addition to needles/syringes provision, services tailored to PWID drug and risk profiles, could consider drug-appropriate treatment and sexual risk reduction strategies to curb HIV transmission.

Resumen La inyección de drogas no médicas es un factor principal de riesgo para la infección por el VIH en Rusia y Estonia. Además, el uso de múltiple drogas (poli-drogas) se ha asociado con un aumento de daños. Comparamos el estado de infección de VIH, y los comportamientos del riesgo de inyección y sexual asociado con el uso de poli-drogas entre las personas que inyectan drogas (PID) en 2012–2013 en Kohtla-Järve (Estonia, n = 591) y San Petersburgo (Rusia,

SURVEY METHODS - add slide

	Kohtla-Järve	St Petersburg
Seeds	6	16
Waves	11	12
HIV serostatus assessment	HIV antigen/ antibody combo-assay(ADVIA-Centaur, Siemens healthcare diagnostics) and HIV-I/II Score line immunoassay confirmatory test (INNOLIA, Fujirebio Europe)	Rapid oral HIVI/II antibody tests (OraQuick Advance, OraSure Technologies Inc.) and confirmed at the City AIDS Centre [10]

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METHODS – add. slide

Variables examined for association with polydrug classes:

- past month injecting risk: **Injecting frequency** (≥daily vs.<daily), **injecting intensity** (≥ 2 day vs.<2 day on last day injected), sharing needles and syringes, sharing drug paraphernalia, back-loading (filling a syringe from another working syringe),

- past 6 months sexual risk behaviour: multiple sex partners, having a sex partner who injected drugs and having been paid for sex [50]. Variable ''any sex in the last 6 months'' used to exclude non-sexually active PWID when examining associations.

- Serological markers for HIV, HCV and Herpes Simplex Virus-2 (HSV-2) infection

- Social and demographic variables (age, sex, ethnicity (non-Russian/ethnic Russian), living arrangements (unstable/ stable), source of income (nonregular/salaried), contact with needle and syringe programme (NSP), past year drug substitution treatment (OST) and city