



Research Paper

Differences by sex in associations between injection drug risks and drug crime conviction among people who inject drugs in Almaty, Kazakhstan

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ABSTRACT

Background: The criminalization of drug use leads to high rates of drug crime convictions for engaging in injection drug use behaviors, introducing barriers to HIV prevention and drug treatment for PWID. Females (FWID) face unique vulnerabilities to HIV compared to males (MWID) in Kazakhstan. This study examined sex differences in associations between HIV/HCV infection, HIV knowledge, injection drug risk behaviors, and conviction for a drug crime in a sample of people who inject drugs (PWID) in Almaty, Kazakhstan.

Methods: Analyses were performed on baseline data from 510 PWID and stratified by males (MWID) (329) and females (FWID) (181) from Kazakhstan in a couples-focused HIV prevention intervention. Logistic regression analyses using mixed effects (AOR) examined associations between HIV/HCV infection, HIV knowledge, injection drug risk behaviors, drug use severity, drug treatment history and conviction for a drug crime.

Results: About three quarters of PWID reported drug crime conviction (73.92%, n = 377). HCV infection was associated with increased odds of drug crime conviction for FWID (AOR = 4.35, CI₉₅ = 1.83–10.31, p < .01) and MWID (AOR = 3.62, CI₉₅ = 1.09–12.07, p < .01). HIV transmission knowledge was associated with increased odds of conviction for MWID (AOR = 1.19, CI₉₅ = 1.00–1.41, p < .05). Injection drug risk knowledge was associated with lower odds of conviction (AOR = .75, CI₉₅ = .59–.94, p < .05) for FWID. Receptive syringe sharing (AOR = 3.48, CI₉₅ = 1.65–7.31, p < .01), splitting drug solutions (AOR = 4.12, CI₉₅ = 1.86–7.31, p < .05), and injecting with more than two partners (AOR = 1.89, CI₉₅ = 1.06–3.34, p < .05) was associated with increased odds of conviction for FWID. Receptive syringe or equipment sharing with intimate partners was associated with conviction for both MWID (AOR = 1.90, CI₉₅ = 1.03–3.92, p < .05) and FWID (AOR = 1.95, CI₉₅ = 1.02–3.70, p < .05). For FWID, injection drug use in public spaces was associated with conviction (AOR_{ME} = 3.25, CI₉₅ = 1.31–7.39, p < .01). Drug use severity was associated with increased odds of conviction for FWID (AOR = 1.29, CI₉₅ = 1.09–1.53, p < .001) and MWID (AOR = 1.24, CI₉₅ = 1.09–1.41, p < .001). Ever receiving drug treatment was associated with conviction for MWID (AOR = 2.31, CI₉₅ = 1.32–4.12, p < .01).

Conclusion: High-risk behaviors, HCV infection and more severe substance use disorders are associated with drug crime conviction for PWID, particularly FWID. Structural interventions are necessary to increase the engagement of PWID with drug crime convictions in HIV prevention and substance abuse treatment.

Introduction

Kazakhstan is currently experiencing one of the fastest growing epidemics of HIV infection in the world with a growth of 39% in new cases (2200 to 2900) from 2010 to 2016 (UNAIDS, 2016). Injection drug use accounts for more than 60% of all new HIV infections (Degenhardt et al., 2016) and 8.5% of the approximately 122,000 people who inject drugs (PWID) are HIV-positive (UNAIDS, 2016). In

addition to HIV, infection with hepatitis C virus (HCV) is highly concentrated among PWID in Kazakhstan with an estimated prevalence of 61–90% (Walsh & Maher, 2013), substantially higher than estimates of the surrounding Central Asian region of 54.0% (Degenhardt et al., 2017). Co-infection is also extremely high with many PWID with HIV also infected with HCV (Platt et al., 2016). Studies from Central Asia and other parts of the world suggest the criminalization of drug use leads to higher rates of convictions for drug law violations among PWID

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(Jürgens, Nowak, & Day, 2011). Criminalization of drug use fuels the targeting of injection drug behaviors including syringe and equipment sharing, syringe-mediated sharing, using prepared injection solutions by drug law enforcement leading to high rates of drug crime conviction among PWID (Jolley et al., 2012; Otiashvili, Latypov, Kirtadze, Ibragimov, & Zule, 2016; Izenberg et al., 2013; Latypov et al., 2014). In social contexts in which drug use is criminalized, public injection spaces of stairwells, vehicles, alleyways and other injecting spaces attract drug law enforcement activities thus increasing risk of drug crime conviction of PWID (Beletsky et al., 2013; Darke, Kaye, & Ross, 2001; Blankenship & Koester, 2002; Booth et al., 2013; Ti et al., 2015; Wood et al., 2017). Lifetime conviction for drug crimes leads to imprisonment, registration as a drug user, compulsory treatment, future discrimination by the police, exclusion from employment and prevention from participation in voting and other political activities (Azbel et al., 2015; Brewer et al., 2014; DeBeck et al., 2017). Lack of access to harm reduction information in prison systems may be associated with lower knowledge and awareness of HIV prevention, and may be correlated with greater injection drug risk behaviors and HIV/HCV infection (Belenko, Langley, Crimmins, & Chaple, 2004; Dolan et al., 2015).

The criminalization of drug use particularly in public spaces has also resulted in law enforcement targeting drug and HIV treatment locations for arrest and detention of PWID (Bojko, Dvoriak, & Altice, 2013; Werb, 2017; Mimiaga et al., 2010; Wolfe, Carrieri, & Shepard, 2010; Wolfe & Cohen, 2010). Research suggests that PWID who access drug treatment and obtain sterile syringes are far more likely to be targeted by law enforcement officers as well as experience conviction for drug law violations thereby increasing injection drug HIV risk behaviors and HIV/HCV infection (Lunze et al., 2014; Mimiaga et al., 2010; Polonsky et al., 2016; Werb et al., 2015). In Kazakhstan, coverage of drug treatment and harm reduction services is extremely low (Aceijas, Hickman, Donoghoe, Burrows, & Stuijkyte, 2007; Boltaev, Deryabina, Kusainov, & Howard, 2012; DeHovitz, Uuskula, & El-Bassel, 2014) with approximately .5% receiving methadone treatment and an average of 119.70 sterile syringes distributed for every PWID, substantially lower than the recommended coverage of 200 for every PWID (UNAIDS, 2017).

Although males who inject drugs (MWID) are more likely to experience conviction for a drug crime and resulting incarceration, females (FWID) who are involved in the criminal justice system are at greater risk of injection drug risk behaviors, and HIV and HCV infection (El-Bassel, Strathdee, & El Sadr, 2013; El-Bassel, Gilbert et al., 2013). FWID accounts for approximately 12.1% of PWID in Central Asia (Degenhardt et al., 2017). The intersection of drug-related stigma, gender inequities, and sexual violence place FWID at greater risk of HIV and drug related harms compared to MWID (Iversen, Page, Madden, & Maher, 2015; Lunze et al., 2016; El-Bassel, Strathdee et al., 2013). However, FWID are more likely than MWID to engage in drug and sexual risks due to greater discrimination and cultural stigma surrounding injection drug use, poor mental health and exposure to gender-based violence particularly intimate partner violence (IPV) (Gilbert et al., 2013; Shaw et al., 2016; El-Bassel & Strathdee, 2015; El-Bassel, Shaw, Dasgupta, & Strathdee, 2014; Gilbert et al., 2013; Shannon et al., 2008; Pinkham & Malinowska-Sempruch, 2007). Within the context of intimate partnerships, in Kazakhstan, MWID are more likely to provide syringes and other equipment (receptive sharing), prepare syringes and equipment for their female sex partners, and share injection equipment with a greater number of partners (El-Bassel, Gilbert et al., 2013; El-Bassel, Strathdee et al., 2013; El-Bassel, Gilbert et al., 2014). FWID in intimate partnerships in Kazakhstan and other parts of the world face significant barriers to safe injection practices and HIV testing and counseling because of power differentials in relationships that constrain agency over safe injection practices (El-Bassel, Gilbert, Witte, Wu, & Chang, 2011; El-Bassel, Strathdee et al., 2013; McMahon, Pouget, & Tortu, 2007; Terlikbayeva et al., 2013; Shaw et al., 2017). Understanding differences by sex in associations between

injection drug risk behaviors, HIV/HCV infection and drug crime convictions among MWID and FWID is critical to attenuating co-occurring epidemics of HIV and HCV, developing prevention interventions and identifying sex-specific strategies to scale up drug treatment programs in Kazakhstan. Studies are yet to examine sex differences in relationships between risky injecting spaces, drug use severity, and HIV transmission injection drug risks and drug crime conviction in Kazakhstan and other Central Asian countries for MWID and FWID. Although MWID are more likely to be involved in the criminal justice system than FWID little is known about sex differences between injection drug, HIV infection and knowledge and drug crime conviction in Kazakhstan and other parts of the world.

This study addresses these gaps in the literature using baseline data from a sample of PWID who participated in a clinical trial of a couples-focused HIV prevention intervention in Almaty, Kazakhstan. This paper hypothesizes that 1) Injection drug risk behaviors (syringe/equipment sharing, syringe mediated sharing, using prepared equipment) with others, and number of injecting partners will be associated with drug crime conviction (*Hypotheses 1*). 2) Injecting with intimate partners will be associated with drug crime conviction (*Hypotheses 2*). 3) Injecting in public spaces and shooting galleries will be associated with greater drug crime conviction (*Hypotheses 3*); 4) HCV/HIV infection will be associated with drug crime conviction (*Hypotheses 4*). 5) Lower knowledge of HIV transmission risk behaviors will be associated with greater risk of drug crime conviction (*Hypothesis 5*). 6) Intimate partner violence (IPV) will be associated with a greater risk of drug crime conviction (*Hypothesis 6*) and, 5) PWID with more severe substance use will be more likely to report drug crime conviction (*Hypothesis 7*). We enrich these hypotheses with sex-stratified analyses between injecting drug risk behaviors, HIV/HCV infection and drug crime conviction.

Methods

Data source

Conducted between 2009–2012, Project Renaissance was a randomized control trial that tested the efficacy of a behavioral HIV prevention intervention for heterosexual couples where at least one or both partners engaged in injection drug use (El-Bassel, Gilbert et al., 2014). All research activities received approval from the Columbia University Institutional Review Board and the Kazakhstan School of Public Health Institutional Review Board.

Recruitment of participants

Several recruitment strategies identified potential couples from community-based, governmental and non-governmental centers rendering services to PWID in Almaty, Kazakhstan. Participants were recruited from HIV treatment and prevention clinics, syringe exchange programs, public neighborhood locations where PWID congregated using (1) targeted outreach and (2) word-of-mouth from injecting social network members and peers. A brief screening interview identified eligibility and then intimate partners were invited to participate in a second screening interview. The recruitment criteria first recruited male PWID and their female injecting or non-injecting intimate partners.

Eligibility criteria

Couples were eligible for the study if (1) both partners were greater than 18 years of age, (2) both partners considered each other as a spouse, lover, boy/girlfriend and/or the parent of his or her child, and the main sexual partner of the opposite sex, (3) the length of the relationship was 6 months or greater, (4) both partners reported an intent to remain together for at least a year, (5) one or both partners reported injecting drugs in the past 90 days and (6) one or both partners reported

having had unprotected vaginal or anal intercourse with the other partner in the past 90 days. Providing consent to provide biological samples was not an eligibility criterion for inclusion in the study. Exclusion criteria included (1) indication of psychiatric, physical or neurological impairment that could hinder participation in the study, (2) self-reported severe physical or sexual violence victimization by the other partner identified using the Revised Conflicts Tactics Scale (Straus, 1979), (3) planning a pregnancy in the next 18 months self-reported by either partner, and (4) lack of Russian fluency. Given that the eligibility criteria recruited injecting and non-injecting partners of male PWID, this study restricted the final sample to include only individual participants that reported injecting drugs in the past 90 days. The final sample consists of 510 PWID, with 189 females (FWID) and 321 males (MWID).

Data collection

Eligible participants provided samples for biological assays and completed a self-reported assessment using a 1.5 h Audio Computer Assisted Self-Interview (administered in Russian) in a private location at baseline, 3, 6, and 12 months follow-up. Pre-test counseling on HIV, HCV and other STIs occurred in a gender-specific testing room by the Clinical Research Coordinator (CRC). Post-test counseling occurred for each participant within two weeks of the baseline interview upon notification of HIV, HCV and STI test results. When needed, referrals and navigation to STI/HIV treatment were provided by the CRC and trained research assistants. Compensation for the baseline ACASI assessment and biological testing was the equivalent of 10\$USD.

Measures

Primary outcomes

Drug crime conviction. Drug crime conviction included ever being convicted for a drug-related offense (possession of drugs, selling drugs, possession of a used needle).

Correlates of interest

Biological assays for HIV and HCV. To identify cases of HIV and HCV, a dried blood spot (DBS) technique was collected and analyzed in the reference laboratory at the Republican AIDS Center (RAC) in Almaty, Kazakhstan. Both HIV and HCV testing were based on standards provided by the Centers for Disease Control (CDC) and widely implemented by the RAC and included the standard Enzyme Linked Immunosorbent Assays (ELISAs) conducted at Abbott Murex Biotech (USA) tests. Each Murex Abbott test has a reported sensitivity of > 99.99% and specificity of 99%. Positive HIV ELISA was then confirmed via Western Blot analysis. Dichotomous variables reflect HIV, HCV and coinfection status (1 = infected, 0 = non-infected) based upon results from biological testing.

HIV transmission and injection drug knowledge. A scale devised and piloted for the parent study ($\alpha = .87$) (Project Renaissance) in which participants selected a response of either True, False or Do Not Know assessed knowledge of HIV/AIDS and unsafe injection behaviors (Gilbert et al., 2010). The scale consists of two subscales comprising a single construct of HIV knowledge. Question items were dichotomized and summed to create a subscale measuring HIV transmission and prevention knowledge and a second measuring injection drug risk knowledge.

Injection drug risk behaviors with others. The Risk Behavior Assessment measured participants' unsafe injection behaviors in the past 90 days (National Institute on Drug Abuse, 1991). The Risk Behavior Assessment is widely used with PWID throughout the world with excellent validity and reliability in the former Soviet Union, particularly in Central Asia (El-Bassel, Gilbert et al., 2013; El-Bassel, Strathdee et al., 2013). The dichotomized injection drug risk behaviors with others included 1) syringe and other equipment sharing behaviors; 2) more than 2 injection partners 3) splitting solution using same

container 4) syringe-mediated drug sharing or back loading and 5) using prepared heroin injection. A continuous variable included the number of injections with others in the past 90 days.

Injection drug risk behaviors with intimate partners. Injection drug risk behaviors with partners included *receptive syringe or equipment sharing* (i.e using a syringe after being used by your partner) and *distributive syringe sharing* (i.e partner using syringe after being used by you).

Physical injection locations. Two dichotomous variables were created indicating if participants injected 1) at a shooting gallery, or 2) in public (car, stairwell, outside in public place like street or park) in the past 90 days.

Intimate partner violence. A dichotomous variable was created indicating lifetime exposure to physical, emotional or sexual violence by an intimate partner.

Substance use severity and drug treatment. The Texas Christian University (TCU) Drug Screen assessed severity of participants' use of drugs in the past 12 months (Institute of Behavioral Research, 2007). Each question item was summed to create a scale ranging from 0 to 9 measuring participants' drug dependence severity (alpha, 0.82). A score of 3 indicates severe drug dependence in the past 12 months. In addition to the TCU, participants were asked when they first engaged in injection drug use. A continuous variable measured total length of time in years since the participant injected drugs for the first time. A dichotomous variable indicated if PWID received or were currently receiving any treatment because of drug use.

Control variables

Socio-demographic variables. Participants' self-reported information on socio-demographic characteristics included age, unemployment, food insecurity, and education. Food insecurity was defined as not having enough money to buy food in the past 90 days. Unemployment was indicated if the participant reported not working fulltime at the time of the baseline assessment. Education measured the number of years of education in the participant's lifetime.

Statistical analysis

To answer the hypotheses put forth in this study analyses were performed on the total sample as well as stratified by MWID and FWID to elucidate differences in hypotheses by sex. Data for PWID in Table 1 is discussed in the text and stratified descriptive statistics for MWID and FWID are provided in the table. Bivariate analyses in Table 2 included chi-square and t-tests that assessed the data for significant bivariate differences between injection drug HIV risk behaviors, prevalence of HIV/HCV infection, history of criminal justice, drug use severity and socio-demographic characteristics overall and stratified by sex (Katz, 2011). Fischer exact tests were performed instead of chi-squared in situations where expected cell counts were less than 5 (Gregg, 2008). All tests performed in bivariate analyses used a significance criterion p-value of less than 5% (presented in bold in the tables) and 10%. Proportions (%) counts (n) means (M) and standard errors (SE) are presented in descriptive statistics in Table 1 and bivariate analyses in Table 2.

Multivariable analyses require an analytic methodology capable of addressing non-independence of the data in which individuals are nested in couples (Kenny & Cook, 1999; Rabe-Hesketh & Skrondal, 2008). Mixed effects logistic regression with random effects at the couple level permits correlated response patterns within dyads while maintaining independence across dyads (Cook & Kenny, 2005; Kashy & Kenny, 2000). This adjusts for potential bias in estimates where respondents were sampled at the couple level (Cook & Kenny, 2005). Analyses tested study hypotheses by examining associations between HIV/HCV serostatus, drug risk behaviors, injecting in public spaces, drug use severity and drug treatment history and conviction for a drug crime. To avoid problems introduced by multicollinearity, models were run for each variable separately after adjusting for food insecurity,

Table 1
Descriptive statistics of independent variables and drug crime conviction, overall (PWID) and by sex (MWID and FWID).

	PWID ⁶ %(n)	FWID ⁷ %(n)	MWID ⁸ %(n)
Conviction for a drug crime ¹	73.92(377)	71.43(135)	75.39(242)
HIV ²	29.02(148)	29.10(55)	28.97(93)
HCV ²	91.18(495)	91.53(173)	90.97(292)
HIV/HCV co-infection ²	25.88(132)	24.87(47)	26.48(85)
HIV transmission and prevention mean(SE) ³	2.26(.07)	2.23(.11)	2.28(.09)
Injection drug risk knowledge mean (SE) ³	1.62(.07)	1.71(.11)	1.57(.08)
Number of injections with others mean(SE) ³	51.32(2.63)	56.04(4.48)	48.52(3.25)
Syringe or equipment sharing with others ⁴	50.20(256)	52.91(100)	48.60(156)
Split Solution using same container ⁴	71.18(363)	74.07(140)	69.47(223)
Syringe-mediated drug sharing ⁴	33.53(171)	38.62(73)	30.53(98)
Use prepared heroin injection ⁴	28.63(146)	29.63(56)	28.04(90)
More than two injecting partners ⁴	31.96(163)	35.98(68)	29.60(95)
Number of injections with partners mean(SE) ^{3,4}	30.81(2.48)	39.46(4.51)	25.72(2.89)
Receptive syringe or equipment sharing ⁴	36.67(187)	47.09(89)	30.53(98)
Distributive syringe or equipment sharing ⁴	35.10(179)	41.80(79)	31.15(100)
Shooting gallery ⁴	9.41(48)	10.05(19)	9.03(29)
Public location (car, stairwell, outside, street park) ⁴	37.45(191)	32.80(62)	40.19(129)
Intimate partner violence ¹	51.96(265)	65.61(124)	43.95(141)
Drug use severity (TCU) ^{4,5}	7.18(.09)	7.25(.15)	7.14(.11)
Drug treatment ¹	48.43(247)	46.03(87)	49.84(160)
Years of injection drug use mean (SD) ⁴	15.66(.34)	13.86(.52)	16.73(.42)
Age	36.43(.33)	35.79(.51)	36.80(.42)
Food insecurity ⁴	51.57(263)	50.79(96)	52.02(167)

* $p < .05$; † $p < .01$; ¹Lifetime; ²Biologically confirmed cases; ³Standard Error; ⁴Past 90 days; ⁵Past 12 months; ⁶People who inject drugs; ⁷Females who inject drugs; ⁸Males who inject drugs.

injection drug use history and age (Farrar & Glauber, 1967). Diagnostic tests revealed no collinearity between the control variables and any of the primary independent correlates. Parameter estimates include adjusted odds ratios from mixed effects regressions (AOR_{ME}) for all models stratified by sex. Significant results provided in Table 2 and 3 are discussed in the text. Multivariate analyses show p-value thresholds for *** $p < .001$, ** $p < .01$, and $p < .05$. Analyses were conducted using the statistical computing software STATA version 14 (StataCorp, 2013).

Results

Descriptive statistics

Table 1 provides descriptive statistics for the dependent variable of drug crime conviction, primary correlates, and control variables, for the overall sample (PWID) and stratified by sex (MWID and FWID).

Nearly three quarters of PWID reported ever being convicted of a drug crime (73.9%, $n = 377$). About 30 percent of PWID were infected with HIV (29.02%, $n = 148$) and more than 90% were infected with HCV (91.18%, $n = 495$). More than a quarter of PWID were co-infected with HIV/HCV (25.88%, $n = 132$). Mean scores on HIV transmission knowledge were 2.26 out of 6 possible points (SE = .07) and injection drug risk knowledge were 1.62 out of 4 possible points (SE = .07). On average, PWID engaged in approximately 51.32 injections. More than half of PWID (50.20%, $n = 256$) reported engaging in syringe or equipment sharing with others and nearly three quarters split solutions using the same container (71.18%, $n = 363$) and injected from a common container (72.16%, $n = 368$). More than a quarter of PWID used prepared heroin injection solution (28.63%, $n = 146$) and about a

third engaged in syringe mediated drug sharing (33.53%, $n = 171$). Nearly, a third reported injecting with more than two injection partners in the past 90 days (31.81%, $n = 163$). On average PWID engaged in more than 30 injections with their intimate partners in the past 90 days (M = 30.81, SE = 2.48). Over a third of PWID engaged in receptive (36.67%, $n = 187$) and distributive syringe sharing (35.10%, $n = 179$). More than a third injected at a public location (37.45%, $n = 191$) and nearly 10 percent injected in shooting galleries (9.41%, $n = 48$). PWID injected for an average of 15.6 years. Scores on the Texas Christian University Screen indicated severe drug dependency for PWID (Mean = 7.2, SD = .09). Overall, 54% of PWID reported lifetime exposure to IPV. The mean age of participants was 36.4 years (SD = .3) and about half of PWID experienced food insecurity in the past year (51.57%, $n = 263$).

Bivariate relationships between independent variables and criminal justice variables

HIV/HCV infection

Significantly more PWID with a prior drug crime conviction were HCV positive compared to PWID without a prior conviction (95.76%, $n = 361$ vs. 78.20%, $n = 104$, $p < .05$). When stratified by sex, the proportion of participants with HCV was significantly greater among those with a prior drug crime conviction compared to those without for FWID (96.30%, $n = 130$ vs. 79.63%, $p < .05$) and MWID (95.45%, $n = 231$ vs. 77.22%, $n = 61$, $p < .05$).

HIV transmission and injection drug risk knowledge

When stratified by sex, mean scores on knowledge of HIV transmission and prevention were significantly lower among FWID who were convicted of a drug crime compared to FWID who were not convicted (M = 2.10, SE = .12 vs. M = 2.56, SE = .23, $p < .05$). Conversely, mean scores on the knowledge of HIV transmission and prevention scale was significantly higher among MWID who were convicted of a drug crime compared to MWID who were not convicted (M = 2.38, SE = .11 vs. M = 1.97, SE = .16, $p < .05$). Mean scores on the knowledge of injection drug risk scale was significantly lower for FWID with a prior drug crime conviction compared to FWID without (M = 1.52, SE = .13, $p < .05$ vs. M = 2.20, SE = .20, $p < .05$).

Injection drug risk behaviors with others

The mean number of injections with others were significantly greater among PWID who were convicted of a drug crime compared to PWID who were not convicted (M = 55.46, SE = 3.19 vs. M = 39.56, SE = 5.61, $p < .05$). When stratified by sex, the mean number of injections were greater among participants with prior drug crime convictions among FWID (M = 62.53, SE = 5.61 vs. M = 39.85, SE = 6.55, $p < .05$) and MWID (M = 51.52, SE = 3.84, vs. M = 39.35, SE 5.85 $p < .05$) compared to FWID and MWID who were not convicted. Significantly more PWID who were convicted of a drug crime engaged in receptive syringe sharing (52.52%, $n = 198$ vs. 43.61%, $n = 58$, $p < .05$), splitting solutions using same container (74.01%, $n = 279$, vs. 63.16%, $n = 84$, $p < .05$), using prepared heroin injections (30.77%, $n = 116$ vs. 22.56%, $n = 30$, $p < .05$), common containers (74.27%, $n = 280$ vs. 66.17%, $n = 88$, $p < .05$) and more than two injecting partners (35.28%, $n = 133$ vs. 22.56%, $n = 30$, $p < .05$). When stratified by sex, significantly more FWID with prior drug crime convictions reported engaging in receptive syringe or equipment sharing (59.26%, $n = 80$ vs. 37.04%, $n = 20$, $p < .05$), splitting solutions using the same container (80.74%, $n = 109$, 57.41% $n = 31$, $p < .05$), syringe mediated sharing (43.70%, $n = 59$ vs. 23.93%, $n = 14$), using prepared heroin injections (34.07%, $n = 46$ vs. 18.52%, $n = 10$, $p < .05$), using a common container (82.22%, $n = 111$ vs. 64.81%, $n = 35$, $p < .05$) and having more than two injecting partners (41.48%, $n = 56$ vs. 22.22%, $n = 12$, $p < .05$).

Table 2

Tests of differences between independent variables and conviction for a drug crime overall (PWID) and by sex (MWID vs. PWID).

	PWID ⁶		FWID ⁷		MWID ⁸	
	Yes n(%)	No n(%)	Yes n(%)	No n(%)	Yes n(%)	No n(%)
Infection¹						
HIV	29.71(112)	27.07 (36)	28.89 (39)	29.63(16)	30.17(73)	25.32(20)
HCV	95.76 (361)*	78.20(104)*	96.30 (130)*	79.63(43)*	95.45(231)*	77.22(61)*
HIV/HCV co-infection	27.56(104)	21.05 (28)	25.93 (35)	22.22(12)	28.51 (69) ⁺	20.25(16) ⁺
HIV Knowledge						
HIV transmission and prevention mean(SE) ²	2.28(.08)	2.21(.13)	2.10(.12)*	2.56(.23)*	2.38(.11)*	1.97(.16)*
Injection drug risk knowledge mean(SE) ²	1.57(.08)	1.76(.13)	1.52(.13)*	2.20(.20)*	1.60 (.09)	1.47(.16)
Injection drug risk others³						
Number of injections with others mean(SE) ²	55.46(3.19)*	39.56(4.36)*	62.53(5.61)*	39.85(6.55)*	51.52(3.84)*	39.35(5.85)*
Receptive Syringe or equipment sharing	52.52(198)*	43.61(58)*	59.26(80)*	37.04(20)*	48.76(118)	48.10(38)
Split Solution using same container	74.01(279)*	63.16(84)*	80.74(109)*	57.41(31)*	70.25(170)	67.09(53)
Syringe-mediated drug sharing	35.28(133) ⁺	28.57(38) ⁺	43.70(59)*	25.93(14) ⁺	30.58(74)	30.38(24)
Use prepared heroin injection	30.77 (116)*	22.56(30)*	34.07(46)*	18.52(10)*	28.93(70)	25.32(20)
More than two injecting partners	35.28(133)*	22.56(30)*	41.48(56)*	22.22(12)*	31.82(77) ⁺	22.78(18) ⁺
Injection drug risk partners³						
Number of injections mean(SE) ²	34.30(3.06)*	21.19(3.80)*	43.29(5.65)*	29.85(6.92)*	29.12(3.55)*	15.27(4.22)*
Receptive syringe or equipment sharing	39.52(149)*	28.57(38)*	50.37(68) ⁺	38.89 (21) ⁺	33.47 (81)*	21.52 (17)*
Distributive syringe or equipment sharing	38.99(147)*	24.06(32)*	45.93(62)*	31.48 (17)*	35.12(85)*	18.99(15)*
Injection location³						
Shooting gallery	9.55(36)	9.02(12)	11.90(16)	5.56(3)	8.26(20)	11.39(9)
Public location	39.79(150)*	30.83(41)*	37.78(51)*	20.37(11)*	40.91(99)	37.97(30)
Drug use severity⁴	7.48(.09)*	6.36(.21)*	7.61(.15)*	6.35(.33)*	7.40(.12)*	6.37(.27)*
Drug treatment⁵	53.58(202)*	33.83(45)*	49.63(67)	37.04(20)	55.79(135)*	31.65(25)*
Intimate partner violence⁵	54.11(204)	45.86(61)	71.11(96)*	51.85(28)*	44.63(108)	41.77(33)
Control Variables						
Years of injection drug use mean(SE) ²	17.18(.38)*	11.37(.57)*	15.54(9.62)*	9.63(.74)*	18.09(.47)*	12.56(.77)*
Age	37.18(.37)*	34.29(.63)*	36.70(.58)*	33.52(.95)*	37.45(.48)*	34.82(.85)*
Food insecurity ³	54.11(204) ⁺	44.36(59) ⁺	51.85(70)	48.15(26)	55.37(134)*	41.77(33)*

*p < .05; ⁺p < .01; ¹Biologically confirmed cases; ²Standard Error; ³Past 90 days; ⁴Past 12 months; ⁵Lifetime; ⁶People who inject drugs; ⁷Females who inject drugs; ⁸Males who inject drugs.

Table 3

Logistic regressions of associations between independent covariates and conviction for a drug crime (n = 510).

	PWID ⁵	FWID ⁶	MWID ⁷
	AOR _{me} (95% CI)	AOR(95% CI)	AOR (95% CI)
HIV/HCV infection¹			
HIV	1.03(.60, 1.75)	.88(.42, 1.86)	1.09(.59, 2.01)
HCV	5.42(2.06, 14.27)**	3.62(1.09, 12.07)**	4.35(1.83, 10.31)**
HIV/HCV co-infection	1.26(.71, 2.26)	1.03(.46, 2.31)	1.31(.68, 2.51)
HIV knowledge			
HIV transmission	1.04(.89, 1.21)	.82(.66, 1.02) ⁺	1.19(1.00, 1.41)*
Injection drug risk knowledge	.92(.77, 1.08)	.75(.59, .94)*	1.08(.89, 1.31)
Injection drug use others²			
Number of injections	1.01(1.00, 1.01)*	1.01(1.00, 1.02)*	1.00(.99, 1.01)
Receptive syringe or equipment sharing	1.75(1.05, 2.91)*	3.48(1.65, 7.31)**	1.01(.57, 1.78)
Split Solution using same container	1.91(1.14, 3.18)*	4.12(1.86, 9.11)*	1.16(.64, 2.13)
Syringe-mediated drug sharing	1.52(.89, 2.59)	2.74(1.27, 5.90)**	.93(.50, 1.71)
Use prepared heroin injection	1.32(.75, 2.33)	2.43(1.04, 5.66)*	.82(.43, 1.58)
More than two injecting partners	1.89(1.06, 3.34)*	2.85(1.27, 6.42)*	1.31(.69, 2.46)
Injection drug use with partners²			
Number of injections	1.01(1.00, 1.01)*	1.00(.99, 1.01)	1.01(1.00, 1.02)*
Receptive syringe or equipment	1.97(1.16, 3.35)*	1.90(1.03, 3.92)⁺	1.95(1.02, 3.70)*
Distributive syringe or equipment	2.34(1.33, 4.09)**	2.12(1.02, 4.22)*	2.31(1.20, 4.45)*
Injection location²			
Public location	1.75(1.05, 2.93)*	3.25(1.41, 7.39)**	1.18(.66, 2.10)
Drug use severity (TCU)³	1.27(1.13, 1.42)***	1.29(1.09, 1.53)**	1.24(1.09, 1.41)**
Drug treatment⁴	2.01(1.22, 3.39)**	1.50(.74, 3.06)	2.32(1.32, 4.12)**

***p < .001; **p < .01; *p < .05; ⁺p < .01; Models adjusted for age, food insecurity and injection drug use history (years); AOR is Adjusted Odds Ratio and AOR_{me} Adjusted Odds Ratio mixed effects; TCU is Texas Christian University scale; bold indicates statistical significance p < .05; ¹Biologically confirmed cases; ²Past 90 days; ³Past 12 months; ⁴Lifetime; ⁵People who inject drugs; ⁶Females who inject drugs; ⁷Males who inject drugs.

Injection drug risk behaviors with study partners

The mean number of injections with intimate partners among PWID with a prior conviction for a drug crime was greater than the mean number of injections among PWID with no prior conviction (M = 34.30, SE = 3.06 vs. M = 21.19, SE = 3.80, p < .05). When stratified by sex the mean number of injections with intimate partners

was greater for FWID (M = 43.29, SE = 5.65 vs. M = 29.85, SE = 6.92, p < .05) and MWID (M = 29.12, SE = 3.55, M = 15.27, SE = 4.22, p < .05) who were convicted of a drug crime. The proportion of PWID with a prior drug crime conviction who engaged in receptive syringe sharing (39.52%, n = 149 vs. 28.57%, n = 38, p < .05) and distributive sharing (38.99%, n = 147 vs. 24.06%, n = 32, p < .05) with

intimate partners was significantly greater than the proportion of syringe sharing among PWID with no prior drug crime conviction. When stratified by sex, the proportion of participants who engaged in distributive syringe and equipment sharing with intimate partners was significantly greater among those with a drug crime conviction for both FWID (45.93%, $n = 62$ vs. 31.48%, $n = 17$, $p < .05$) and MWID (35.12%, $n = 85$ vs. 18.99%, $n = 15$, $p < .05$). The proportion of MWID with a prior drug crime conviction who engaged in receptive syringe sharing with intimate partners (33.47%, $n = 81$ vs. 21.52%, $n = 17$, $p < .05$) was greater than the proportion of MWID with no prior conviction.

Injection locations

The proportion of PWID with a drug crime conviction who reported injecting in public locations of car, stairwells, outside, streets and parks were greater than the proportion of PWID without a drug crime conviction (39.79% $n = 150$, vs. 30.83% $n = 41$, $p < .05$). For FWID with a prior drug crime conviction a greater proportion reported injecting in public spaces compared to FWID who did not have a prior conviction (37.78%, $n = 51$ vs. 20.37%, $n = 11$, $p < .05$).

Substance use severity and drug treatment

The substance use severity of participants with prior drug crime conviction was greater for PWID ($M = 7.48$, $SE = .09$, vs. $M = 6.36$, $SE = .21$, $p < .05$), FWID ($M = 7.61$, $SE = .15$ vs. $M = 6.35$, $SE = .33$, $p < .05$) and MWID ($M = 7.40$, $SE = .12$, $M = 6.37$, $SE = .27$, $p < .05$) than PWID, FWID and MWID without prior conviction. A greater proportion of participants with prior drug crime conviction reported receiving drug treatment for PWID (53.38%, $n = 202$ vs. 33.83%, $n = 45$, $p < .05$) and MWID (55.79%, $n = 135$ vs. 31.65% $n = 25$, $p < .05$) compared to PWID and MWID without a prior conviction.

Intimate partner violence (IPV)

Significantly more FWID with prior drug crime conviction reported IPV compared to FWID without a drug crime conviction (71.11% $n = 96$ vs. 51.85%, $n = 28$, $p < .05$).

Multivariate analyses

Table 3 presents logistic regressions and 95% confidence intervals (CI_{95}) testing study hypotheses of relationships between HIV/HCV infection, drug risk behaviors with others and study partners, injection location, drug use severity drug treatment and drug crime conviction for the whole sample of PWID and stratified FWID and MWID.

HIV/HCV infection

After adjusting for potential confounders, the odds of drug crime conviction among PWID with HCV was more than 5 times the odds of drug crime conviction among PWID without HCV ($AOR_{ME} = 5.42$, $CI_{95} = 2.06$ – 14.27 , $p < .01$). When stratified by sex, the odds of drug crime conviction were higher among MWID ($AOR = 3.62$, $CI_{95} = 1.09$ – 12.07 , $p < .01$) and FWID ($AOR = 4.35$, $CI_{95} = 1.83$ – 10.31 , $p < .01$) with HCV compared to MWID and FWID without HCV.

HIV transmission and injection drug risk knowledge

Greater HIV transmission and prevention knowledge ($AOR = 1.19$, $CI_{95} = 1.00$ – 1.41 , $p < .05$) was associated with greater odds of drug crime conviction for MWID. Greater injection drug risk knowledge was associated with lower odds of drug crime conviction for FWID ($AOR = .75$, $CI_{95} = .59$ – $.94$, $p < .05$).

Injection drug risk behaviors with other

For PWID the number of injections with others were associated with increased odds of drug crime conviction after adjusting for confounders

($AOR_{ME} = 1.01$, $CI_{95} = 1.00$ – 1.01 , $p < .05$). When stratified by sex, the number of injections with others was associated with increased odds of drug crime conviction ($AOR = 1.01$, $CI_{95} = 1.00$ – 1.02 , $p < .05$) for FWID. The odds of drug crime conviction (AOR_{ME}) among PWID who engaged in receptive syringe or equipment sharing was 1.75 times the odds drug crime conviction among PWID who did not engage in receptive syringe or equipment sharing ($CI_{95} = 1.05$ – 2.9 , $p < .05$). For FWID who engaged in receptive syringe and equipment sharing the odds of drug crime conviction was nearly three and a half times the odds of conviction for FWID who did not engage in receptive syringe and equipment sharing ($AOR = 3.48$, $CI_{95} = 1.65$ – 7.31 , $p < .01$). The odds of drug crime conviction for PWID who split solutions using the same container was nearly twice the odds of drug crime conviction for PWID who did not split solutions ($AOR_{ME} = 1.91$, $CI_{95} = 1.14$ – 3.18 , $p < .05$). Among FWID who split solutions using the same container the odds of drug crime conviction was more than four times the odds of drug crime conviction for FWID who did not split solutions ($AOR = 4.12$, $CI_{95} = 1.86$ – 7.31 , $p < .05$). The odds of drug crime conviction among PWID who injected with more than two partners was nearly twice the odds of drug crime conviction compared to PWID who did not inject with more than two partners ($AOR_{ME} = 1.89$, $CI_{95} = 1.06$ – 3.34 , $p < .05$). Among FWID who injected with more than 2 partners, the odds of drug crime conviction was nearly three times the odds of drug crime conviction for FWID who did not inject with more than 2 partners ($AOR = 2.85$, $CI_{95} = 1.27$ – 6.42 , $p < .05$). In the sex stratified models, the odds of drug crime conviction was greater among FWID who engaged in syringe-mediated sharing ($AOR = 2.74$, $CI_{95} = 1.27$ – 5.90 , $p < .01$) and using prepared heroin injections ($AOR = 2.43$, $CI_{95} = 1.04$ – 5.66 , $p < .05$) compared to FWID who did not engage in these behaviors.

Injection drug risk behaviors with intimate partners

Mixed effects logistic regression models identified significant relationships between the number of injections with intimate partners and drug crime conviction among PWID ($AOR_{ME} = 1.01$, $CI_{95} = 1.00$ – 1.01 , $p < .05$), MWID ($AOR = 1.01$, $CI_{95} = 1.00$ – 1.02 , $p < .05$). The odds of drug crime conviction for PWID who engaged in receptive syringe or equipment sharing with intimate partners was nearly twice as high as the odds of drug crime conviction for PWID who did not engage in receptive syringe or equipment sharing ($AOR_{ME} = 1.97$, $CI_{95} = 1.16$ – 3.35 , $p < .05$). When stratified by sex, the odds of drug crime conviction for MWID ($AOR = 1.90$, $CI_{95} = 1.03$ – 3.92 , $p < .05$) and FWID ($AOR = 1.95$, $CI_{95} = 1.02$ – 3.70 , $p < .05$) who engaged in receptive syringe or equipment sharing with others was nearly twice as high as the odds of drug crime conviction for MWID and FWID who did not engage in receptive syringe or equipment sharing. The odds of drug crime conviction was more than twice as high for PWID ($AOR_{ME} = 2.34$, $CI_{95} = 1.33$ – 4.09 , $p < .01$) as well as MWID ($AOR = 2.12$, $CI_{95} = 1.02$ – 4.22 , $p < .05$) and FWID ($AOR = 2.31$, $CI_{95} = 1.20$, 4.45 , $p < .05$) who engaged in distributive syringe or equipment sharing compared to their counterparts.

Injection locations

The odds of drug crime conviction for PWID (AOR_{ME}) who injected in public locations was 1.75 times the odds of drug crime conviction for PWID who did not inject in public locations ($CI_{95} = 1.05$ – 2.93 , $p < .05$). The odds of drug crime conviction for FWID who injected in public was more than 3 times the odds of drug crime conviction for FWID who did not inject in public ($AOR_{ME} = 3.25$, $CI_{95} = 1.31$ – 7.39 , $p < .01$).

Substance use severity and drug treatment

Greater drug use severity was associated with increased odds of drug crime conviction for PWID ($AOR_{ME} = 1.27$, $CI_{95} = 1.13$ – 1.42 , $p < .001$), FWID ($AOR = 1.29$, $CI_{95} = 1.09$ – 1.53 , $p < .001$) and MWID ($AOR = 1.24$, $CI_{95} = 1.09$ – 1.41 , $p < .001$). The odds of drug

crime conviction were about twice as high for PWID who received drug treatment compared to PWID who did not receive treatment ($AOR_{ME} = 2.01$, $CI_{95} = 1.22\text{--}3.39$, $p < .01$). The odds of drug crime conviction were more than twice as high for MWID who received drug treatment compared to MWID who did not receive treatment ($AOR = 2.31$, $CI_{95} = 1.32\text{--}4.12$, $p < .01$).

Discussion

Findings from this study support a growing body of literature pointing to the collateral effects of criminalizing drug use by PWID on increasing injection drug risk behaviors and HIV/HCV infection (Altice et al., 2016; DeBeck et al., 2017; Dolan et al., 2016; Rubenstein et al., 2016). Several implications for HIV prevention and drug policy with FWID and MWID arise from this study. HIV prevention and drug treatment policies for PWID must pay more attention to associations between HCV infection, injection drug risk behaviors, substance use severity and drug crime conviction amongst PWID and differences between FWID and MWID in these relationships. Women who use drugs particularly through injection drug use are a subpopulation that is neglected from HIV prevention and substance abuse treatment interventions for PWID in Kazakhstan and globally (El-Bassel, Terlikbaeva, & Pinkham, 2010). The criminal justice system in Kazakhstan may play an integral role in removing barriers to accessing treatment and HIV prevention interventions in populations of PWID as well as addressing social inequities facing FWID.

Implications for HIV/HCV infection

This study found PWID who were HCV positive were more likely to have a history of incarceration compared to PWID without HCV. Findings from this study support prior literature pointing to high rates of HCV infection for PWID in Central Asia and other parts of the world (Platt et al., 2016; Mohd Hanafiah, Groeger, Flaxman, & Wiersma, 2013; Walsh & Maher, 2013). Although, prior literature emphasizes the importance of responding to hepatitis C through the criminal justice system (Hochstatter et al., 2017; Rich, Allen, & Williams, 2014) few studies call attention to the criminal justice system in Central Asia (Altice et al., 2016; Azbel et al., 2016). Rates of HCV for PWID in Kazakhstan are among the highest in the world and are highly concentrated in criminal justice settings (Degenhardt et al., 2017; Platt et al., 2016). One potential explanation for the significant association between HCV and drug crime conviction is that PWID who are involved in the criminal justice system are offered testing at higher rates than their counterparts in the community (Lambdin, Kral, Comfort, Lopez, & Lorvick, 2017; Morris, Brown, & Allen, 2017). However, substantial gaps and barriers to treatment for HCV exist for PWID in Kazakhstan with many PWID who test positive for HCV receiving no or inadequate treatment (Lelebicioglu et al., 2018). The criminal justice system may be an opportune venue to redress the public health crisis of HCV with PWID by expanding treatment for PWID who test positive for HCV (Altice et al., 2016; Kinner et al., 2018; Rich et al., 2014). Treatment for HCV must bridge settings in the criminal justice system and the community to close gaps in access to treatment for PWID. Another potential explanation is that PWID with HCV and drug crime conviction have higher risks of more severe substance use disorders which provide more exposures to risks factors of HCV particularly syringe and equipment sharing (Azbel et al., 2015; Degenhardt & Hall, 2012; Loftis, Matthews, & Hauser, 2006; Nelson et al., 2011). Given intertwined relationships between HIV and HCV, HIV prevention and drug treatment policies must incorporate HCV treatment into community-based HIV and drug treatment programs for PWID in Kazakhstan.

Implications for HIV transmission and injection drug risk knowledge

When stratified by sex, greater HIV knowledge, specifically injection

drug risk knowledge was significantly associated with reduced likelihood of drug crime conviction for FWID. FWID with lower knowledge about injection drug risks may be more likely to engage in injection drug behaviors including injecting in public that increase their exposure to potential contact and apprehension by law enforcement officers (Lunze et al., 2016; Scambler & Paoli, 2008). Additionally, criminal justice settings are male-dominated spaces where HIV prevention interventions to increase knowledge often are designed and researched primarily for men (i.e. Grinstead, Zack, Faigles, Grossman, & Blea, 1999). There is very little research elucidating relationships between HIV transmission and injection drug risk knowledge amongst PWID (Belenko et al., 2004). Further research is critical examining interventions that raise knowledge about HIV and injection drug risks specifically for FWID in criminal justice settings in Kazakhstan. For MWID greater scores on HIV transmission knowledge was associated with increased odds of conviction for a drug crime. MWID with convictions for drug crimes may be afforded more opportunities to learn about HIV transmission and injection drug risks by virtue of social networks as well as greater access to HIV prevention interventions within criminal justice settings compared to FWID. The greater knowledge of HIV transmission and injection risks among MWID with prior drug crime conviction may in part explain insignificant associations between injection drug risks, HIV infection and drug crime conviction.

Implications for injection drug risk with others

When stratified by sex, receptive sharing with others, syringe-mediated sharing, using prepared syringes and injection with more than one partner significantly predicted conviction for a drug crime for FWID and not MWID. This study suggests that FWID with prior drug crime convictions engage in risky injection drug practices with others. Injection drug use behaviors of FWID may be more heavily policed than MWID due to the intersection of drug-related stigma and gender norms and thus injecting with others could increase risk of drug crime conviction compared to MWID (Blankenship & Koester, 2002; El-Bassel & Strathdee, 2015; Pinkham & Malinowska-Sempruch, 2007; Sabri et al., 2017; Livingston, Milne, Fang, & Amari, 2012). The association between using preloaded syringes and drug crime conviction as significant for FWID and not MWID which may be due to unequal power differentials between FWID and MWID that endorse dominance of MWID through injection practices (El-Bassel & Strathdee, 2015; Iverson et al., 2015; Sabri et al., 2017). However, studies are yet to explore how unequal power differentials between FWID and MWID shape differences by sex in the relationship between using preloaded syringes and drug crime conviction in Kazakhstan.

Additionally, prior conviction for a drug crime may be a more accurate indicator of injection drug vulnerabilities to HIV for FWID compared to MWID. This may be due to the fact that conviction for a drug crime is a more common experience for MWID in Kazakhstan and may not differentiate risk with the same precision as FWID (El-Bassel, Strathdee et al., 2013; El-Bassel, Gilbert et al., 2013). Future research that examines a broader, more nuanced measure of criminal justice involvement including number of contacts, arrest, length of incarceration episodes and other factors could improve the differentiation of risks among MWID compared to FWID. Interventions to reduce syringe and equipment sharing behaviors with others must focus more closely on FWID in Kazakhstan through improving access to syringe distribution to FWID and educating FWID in safe injection practices.

Implications for injection drug risk behaviors with intimate partners

The odds of drug crime conviction were higher for both FWID and MWID who used syringes previously used by their intimate partners (receptive) as well as provided syringes used by themselves to their partners for use (distributive). Due to relationship power inequities

between men and women, MWID may have more control over injection drug practices within intimate partnerships and thus dominate their partners' injection behaviors (El-Bassel & Wechsberg, 2012; El-Bassel, Shaw et al., 2014; Jiwatram-Negrón & El-Bassel, 2014; Simmons & Singer, 2006). These findings lend support for expanding couples-focused interventions for PWID in Kazakhstan into the criminal justice system that address the interdependent nature of injection drug use within intimate partnerships. Additionally, societal norms that subjugate women and create unequal power relationships further reinforce syringe sharing and drug-related norms in intimate partnerships (El-Bassel & Wechsberg, 2012; El-Bassel, Shaw et al., 2014; Sabri et al., 2017). Structural policies and interventions must collaborate with the criminal justice system to address systemic inequities and inequalities between men and women as a critical component of effective HIV prevention and drug treatment with PWID in Kazakhstan.

Implications for public injection locations

This study found increased odds of drug crime conviction for FWID who injected in public spaces compared to FWID who did not inject in public locations. Findings from this study suggest that FWID may disproportionately experience criminal justice involvement as a result of injecting in public locations compared to MWID. Women experience significant drug-related stigma, which intersects with harsh gender norms to amplify negative views of FWID (Ford, Wirawan, Sumantera, Sawitri, & Stahre, 2004). Injecting in public may lead to drug crime conviction for FWID due to greater attention paid by law enforcement to drug user status for FWID and less social acceptance of injection drug use for FWID compared to MWID. Injecting in public locations is strongly associated with rushed injections due to fear of police contact and harassment, which drives PWID to forego sanitary and safe injection practices (Beletsky et al., 2013; Booth et al., 2013; Ti et al., 2015). Specific interventions are necessary with FWID who inject in public locations that incorporates peer outreach and diversion from criminal justice involvement. Diversion from criminal justice involvement must focus on replacing conviction for drug crimes with linkage to harm reduction services in the community that includes syringe distribution, evidence-based drug treatment and HIV/HCV testing and treatment.

Implications for substance use severity and drug treatment

People with imprisonment and drug crime convictions had significantly higher drug use severity compared to PWID without CJ, that included engaging in injection drug use at younger ages, and scoring higher on the TCU. These findings emphasize the need to expand evidence-based drug treatment in Kazakhstan that includes medication-assisted therapies (MAT) and behavioral treatments both in criminal justice and community-based settings. In order to attain the Fast-Track coverage goal of 40% of all PWID in MAT by 2030, it is critical that public health and criminal justice partnerships remove structural barriers to engagement and retention in substance abuse treatment programs in Kazakhstan (Stover et al., 2016). MWID who received drug treatment were more likely to have a drug crime conviction. Prior literature from other parts of the world has found law enforcement officers are more likely to target PWID for questioning, searching, harassment, and other forms of discrimination at drug treatment locations (Wolfe et al., 2010). Studies are yet to examine if law enforcement targeting drug treatment locations could explain the relationship between drug treatment and conviction for a drug crime in Kazakhstan. Future research must explore if police contact in proximity of drug treatment providers is associated with greater criminal justice involvement among PWID in Kazakhstan. This study did not find a significant relationship between drug treatment and criminal justice involvement for FWID. Women may face more barriers to accessing drug treatment and as a result insufficient women sought treatment for drug use to detect a significant relationship. Research specifically with FWID

is critical to elucidate relationships between accessing drug treatment and criminal justice involvement in this population. Moreover, interventions with FWID are needed to increase engagement, linkage and retention in evidence-based drug treatment interventions in Kazakhstan.

Implications for intimate partner violence

This study did not identify a significant association between IPV and drug crime conviction for FWID or MWID. Prior literature suggests that IPV increases risk of injection drug behaviors and HIV infection due to trauma and the unequal distribution of relationship power between men and women (El-Bassel, Witte, Wada, Gilbert, & Wallace, 2001). The social networks and behaviors of FWID who experience IPV may be more controlled by their partners which results in less engagement in injection drug risk behaviors that could lead to drug crime conviction including injecting with others or injecting in public (Campbell et al., 2008; Shannon et al., 2008). Future research must examine these pathways more closely among FWID to further elucidate how IPV could be related to criminal justice involvement and increased HIV risk for FWID.

Implications for sex differences for public health policy and research in Kazakhstan

Findings from this study must be integrated into existing research examining sex differences between MWID and FWID in Kazakhstan and globally. Findings from this study are consistent with prior literature suggesting, MWID are more likely to experience criminal justice involvement including drug crime conviction compared to FWID in Kazakhstan (El-Bassel, Gilbert et al., 2014). Overall many of the relationships between injection drug risks (i.e. number of injections, splitting solutions, syringe mediated sharing, using prepared heroin injection, more than two injection partners) and drug crime conviction were significant for FWID and insignificant for MWID suggesting important differences by sex. These findings support existing literature globally suggesting FWID face additional stigma and scrutiny of injection drug use leading to greater rates of surveillance and policing which results in greater rates of drug crime convictions (El-Bassel, Gilbert et al., 2014).

FWID face multiple intersecting HIV risk factors including sex work, injection drug risk factors, intimate partner violence and mental health problems (El-Bassel, Gilbert et al., 2013). FWID face numerous relationship power inequities including constraints on communication about the need to adopt safe injection practices, and HIV injection drug risk reduction communication. MWID may control their intimate partners' access to harm reduction and HIV prevention services that could reduce HIV knowledge. Future research is necessary to elucidate a deeper understanding into explanatory factors of sex differences. In addition to important differences, this study identified that for some of the relationships where parameter estimates were significant for both FWID and PWID (i.e. syringe/equipment sharing with partners), the magnitudes were similar in effect size suggesting some similarities in associations between risk behaviors and drug crime conviction. Additionally, associations between independent variables except for HIV knowledge operated in the same direction for both MWID and FWID. Engaging in drug use behaviors that are criminalized may result in heightened risk of conviction for both MWID and FWID. These findings lend strong support for expanding couples-focused interventions for PWID to include the criminal justice system. This study addressed a critical gap in research on sex differences by examining relationships between injection drug risks, HIV/HCV infection, HIV knowledge, and conviction for a drug crime among PWID in Kazakhstan.

Limitations

This paper has several limitations worth noting. It is possible that some bias was introduced to the study from the sampling design. Women who were brought by their intimate partners to this study may be more high risk than women who did not accept or if women would have brought their partner in. The following study excluded female partners who did not engage in injection drug use and thus restricted generalizability of this study to other high-risk female partners who inject. A fruitful avenue of future research is to conduct research that identifies FWID through more representative sampling techniques including Respondent Driven Sampling and other methods. Variables measuring CJI are for lifetime exposure rather than within a more distal window of time. Insufficient numbers of positive responses were recorded on drug crime conviction in the past 90 days to examine recent CJI. Future research with larger sample sizes are required to examine if these relationships change or stay the same when measured in the past 90 days compared to lifetime exposure. This study in no way implies directionality of findings but rather aims to identify the most vulnerable groups within PWID who would benefit from HIV prevention interventions in the criminal justice system. The self-reported nature of the data might introduce some social desirability bias thus underreporting criminal justice and injection drug risk behaviors. The cross-sectional nature of the data precludes causal inference and restricts generalizability of findings from the study. The analytic sample of PWID is not generalizable to all PWID in Kazakhstan because participants were recruited for participation in a clinical trial of a behavioral intervention using a non-random sampling technique. The eligibility criteria requiring one or both partners to have unprotected vaginal or anal intercourse with the other partner in the past 90 days could result in a more risky study sample. The intention of this inclusion criterion was to identify a sample that would benefit from a behavioral HIV prevention intervention for PWID and their injecting and non-injecting intimate partners. Future empirical inquiry is necessary to examine these associations in a more representative sample of PWID. This study only looked at injection drug use but future research must examine the impact of CJI on sexual risk behaviors of MWID and FWID that includes non-injecting partners to generate a deeper picture of pathways of risk between HIV risks and CJI.

Conclusion

Limitations notwithstanding, PWID are a high risk population needing specialized comprehensive and accessible services that take into account the role of the criminal justice system as well as co-occurring morbidities of substance use disorders, HIV, HCV and other infections. Women are a population of PWID who have traditionally been neglected from substance use and HIV prevention interventions. Fear of violence or other forms of victimization from the police particularly in populations of FWID may discourage carrying syringes and necessary materials for effective harm reduction practices. Building partnerships to reduce incarceration and arrest of PWID particularly FWID in Kazakhstan could remove social and structural barriers to accessing interventions and reducing the stigma inflicted on PWID. Partnerships with criminal justice agencies including law enforcement and corrections in Kazakhstan must include protections against discrimination, abuse of PWID, arrest, detention, registration as a person with an addiction, and incarceration. Collaboration is critical between the criminal justice and public health sectors to enhance the delivery of confidential testing free from stigma, pre/post test counseling, access to sterile needles and opioid substitution treatment. The criminal justice system is a promising setting to deliver prevention and treatment services for PWID.

Conflict of interest

The authors have no conflicts of interest to report financial or otherwise.

Declarations of interest

None.

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