

# Association of gender-based violence with sexual and drug-related HIV risk among female sex workers who use drugs in Kazakhstan

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## Abstract

**Background:** Little is known about the prevalence of intimate partner violence (IPV) or client violence, and associated HIV risk among women who engage in sex work (WESW) and use drugs in Kazakhstan, despite a growing HIV epidemic.

**Methods:** Women who reported engaging in sex work and using illicit drugs were recruited from Almaty and Temirtau, Kazakhstan between 2015 and 2017. A cross-sectional analysis was conducted to determine prevalence and correlates of physical and sexual violence perpetrated by intimate partners and clients. Associations between each type of violence with sexual and drug-related HIV risk behaviors were assessed with negative-binomial and logistic regression models, respectively.

**Results:** Of the 400 women, 45% and 28% reported recent IPV and client violence, respectively. IPV and client violence was associated with a greater number of sex work clients [IPV: adjusted incidence rate ratio (aIRR)<sub>physical</sub>: 1.86, 1.28–2.71; aIRR<sub>sexual</sub>: 2.28, 1.56–3.35]; [client violence: aIRR<sub>physical</sub>: 2.20, 1.44–3.42; aIRR<sub>sexual</sub>: 2.54, 1.72–3.83], and client violence was associated with greater frequency of condomless sex with clients [aIRR<sub>physical</sub>: 2.33, 1.41–4.03; aIRR<sub>sexual</sub>: 2.16, 1.35–3.56]. Violence was not associated with injection drug use, despite exchanging sex for drugs being associated with higher odds of violence.

**Conclusion:** HIV prevention programs for WESW in Kazakhstan should consider multi-sectoral approaches that address economic hardship and relationship-based components, in addition to violence reduction.

## Keywords

HIV, sex work, PWID, gender-based violence, intimate partner violence

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## Introduction

Women who engage in sex work (WESW) remain a key population at risk for HIV infection. Globally, the risk of acquiring HIV is 30 times greater among WESW compared to adult women in the general population.<sup>1</sup> Gender-based violence (GBV) from a multitude of perpetrators, including intimate partners, sex work clients, pimps, drug dealers, and police, considerably exacerbate HIV risk.<sup>2</sup> Global lifetime prevalence estimates of GBV against WESW range from 45–75%, and 32–55% within the past year.<sup>3,4</sup> The mechanism by which violence contributes to HIV vulnerability is complex and multi-faceted. Violence can directly increase HIV risk through sexual coercion or forced sex, or indirectly through decreased self-efficacy, mental health morbidity,

drug and alcohol use, and difficulties in accessing health or social services, harm reduction, or negotiating condom use.<sup>5–10</sup> Furthermore, perpetrators of violence tend to have

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greater HIV risk behaviors, including multiple sex partners, condomless sex, anal sex, and drug and alcohol use.<sup>11–13</sup>

The risk pathways for HIV and violence among WESW often overlap and are further aggravated by substance use.<sup>14</sup> WESW are often coerced into sex work to procure drugs for themselves or an intimate partner,<sup>14</sup> and it is estimated that WESW who inject drugs face a 7-fold increase in the risk of client violence, compared to WESW who do not.<sup>15</sup> Alcohol and drug use may be used as a coping mechanism within the context of sex work; however, inebriety reduces a woman's ability to recognize and screen for violent clients and negotiate condom use. Furthermore, violence is often the manifestation of stigma and discrimination against WESW, which is further amplified when sex work and/or drug use is criminalized.<sup>16</sup> Criminalization of sex work and/or drug use also makes it more difficult to report violence to law enforcement or other authorities, and pushes women into increasingly isolated areas, which makes it especially challenging to access HIV testing, treatment, and prevention services.<sup>17,18</sup> Prior studies from Cambodia, South Africa, Thailand, and Russia indicate that physical and sexual violence against WESW who use drugs is significantly associated with drug and sexual HIV risk behaviors; including a greater number of sex partners, condomless sex, client condom refusal, injection, and non-injection drug use, sex under the influence of drugs and/or alcohol, sexually transmitted infections (STIs), and avoidance of health services.<sup>8,19–21</sup>

Significant progress has been made in HIV epidemic control efforts in the last decade, with global HIV incidence decreasing by 32% between 2010 and 2021.<sup>1</sup> Eastern Europe and Central Asia, however, continue to experience a growing HIV epidemic, in which incidence has increased by 48% in the same time period.<sup>1</sup> The epidemic is concentrated among key populations, with the majority of new infections among people who inject drugs, sex workers, and their sex partners.<sup>1</sup> The HIV epidemic in Kazakhstan has outpaced that of the region, with the incidence growing by 73% since 2010.<sup>22</sup> Of the estimated 20,300 WESW, 1.3% are living with HIV,<sup>22</sup> and it is estimated that the prevalence of HIV is 20 times higher among WESW who inject drugs compared to WESW who do not.<sup>23</sup> Furthermore, the overlap between sex work and drug use is common, with an estimated 40% of women who inject drugs engaging in sex work.<sup>24</sup> Despite a growing HIV epidemic among key populations, no studies to date have examined the prevalence of intimate partner or client violence among WESW or women who use drugs, or the relationship between violence and HIV risk behaviors in Central Asia. Furthermore, data availability and data quality amongst key populations in low- and middle-income countries is often inadequate due to stigma, discrimination, and criminalization.<sup>25</sup> Therefore, this paper seeks to examine the prevalence and correlates of physical and sexual violence

from intimate partners and clients, and associations between violence and HIV risk behaviors among WESW who use drugs in Kazakhstan.

## Methods

### Study participants

The current analysis utilizes baseline data from Project Nova, a cluster-randomized control trial that evaluated the efficacy of a combination HIV risk reduction and micro-finance intervention. Women were eligible for the study if they were over the age of 18, reported illicit drug use within the past 12 months, provided sex in exchange for money, goods, or services within the past 90 days, and reported at least one incidence of unprotected sex within the past 90 days. Women were recruited from non-governmental organizations, HIV clinics, drug treatment clinics, hotels, saunas, and sex work venues in Almaty and Temirtau, Kazakhstan. Women were also recruited via snowball recruitment, where eligible women were given referral coupons and a modest financial incentive (5 USD) to refer additional women to the study. Trained research assistants approached potential participants, briefly described the study, and offered to screen them for eligibility. Eligibility screening was conducted using a computer-based tool, and participants received 1 USD for completing the screening. Eligible participants were then invited to enroll in the study. A detailed description of the methods, study procedures and regional differences between recruitment sites are described elsewhere.<sup>26</sup>

Enrollment and baseline data collection was completed between February 2015 and May 2017 using computer-assisted self-interviewing (CASI), and participants were compensated (10 USD) for their time. Informed consent was obtained from each study participant prior to data collection activities. This study was approved by the ethical review boards at Columbia University and the Kazakhstan School of Public Health and is registered with [Clinicaltrials.gov](https://clinicaltrials.gov) (NCT02406482).

### Study measures

Participants completed a standardized CASI interview at enrollment. This questionnaire assessed sociodemographic characteristics, sex work behaviors, substance use, and HIV risk behaviors.

Sociodemographic characteristics included age, ethnicity, marital status, education, homelessness, food insecurity and being detained by law enforcement in the past 90 days. Homelessness, and food insecurity were defined as not having had a regular place to sleep, or not having enough money to buy food in the past 90 days, respectively.

Characteristics related to sex work included the number of years engaged in sex work, sex work as a primary source

of income in the past 90 days, and engaging in street-based sex work in the past 90 days. To determine a woman's primary source of income, women were asked to indicate their top three income-generating activities in the past 90 days. Women who ranked sex work within their top three activities were dichotomized to have sex work as a primary income source. Women were also asked whether they solicited clients on the street in the past 90 days.

**Experiences of violence.** Intimate partner and client violence was measured using a modified Revised Conflict Tactics Scale (CTS2) that assessed various forms of physical and sexual violence.<sup>27</sup> Participants were first asked whether each form of violence ever occurred (yes/no). Women who responded yes to any of the violence questions were then asked whether each form of violence occurred in the past 90 days (yes/no). Those who responded yes, were further asked whether the violence was perpetrated by a current or former intimate partner, paying client, boss, drug dealer, or police. This analysis examines physical and sexual violence perpetrated by current and former intimate partners and sex work clients in the past 90 days.

**HIV risk behaviors.** HIV risk was assessed through sexual and drug use risk behaviors. Sexual risk behaviors were measured as the total number of sexual partners, and unprotected vaginal and anal sex acts in the past 90 days. Women were asked to separately recount the number of intimate partners and sex work clients in the past 90 days. For each type of sexual partner (i.e., intimate versus sex work client), women were asked to recall their most recent sex partner(s) and provide detailed histories of sexual encounters with each partner. This included an estimated number of vaginal and anal sex acts with each type of partner, and the number of times a condom was used during each vaginal and anal sex act. Women who reported more than five partners were asked to provide estimates of the number of partners (*How many other [intimate partners (not paid partners) or paying partners] have you had in the past 90 days?*), the number of times they had vaginal or anal sex (*How many times have you had [vaginal or anal] sex with these [intimate or paying] partners in the past 90 days?*), and the number of times they used a condom (*Of these times, how many times was a condom used?*) in aggregate. The total number of unprotected sex acts were summed up by each sexual partner type and in total.

Drug use risk behaviors were measured by whether WESW exchanged sex for drugs, injected drug use and had unsafe injection drug use in the past 90 days. Exchanging sex for drugs and injection drug use in the past 90 days were measured as binary variables (yes/no). Women were asked a series of nine questions related to their injection drug use behaviors in the past 90 days. These included whether they used an injection solution prepared by someone else, shared drug solution or injection equipment with someone else,

whether they drew blood into the syringe before injecting, whether they mixed a drug solution with either their own or someone else's blood, whether they used needles or syringes after someone else, whether needles were cleaned before use, and whether syringes were given to someone else. Women who responded yes to any one of these behaviors, were dichotomized as having unsafe injection drug use in the past 90 days.

### Data analysis

Descriptive statistics were used to characterize the study sample. Intimate partner and client violence were first dichotomized as ever or never occurring in the past 90 days. Bivariate associations between the independent variables and violence by perpetrator in the past 90 days were assessed using Pearson's chi-square test for categorical variables, a student's t-test for normally distributed continuous variables, or a Mann-Whitney U test for non-parametric continuous variables.

Each form of violence was then classified as physical or sexual violence based on the CTS2 subscales. Participants who responded yes to at least one form of physical IPV were categorized as having experienced physical IPV; those who responded yes to at least one form of sexual IPV were categorized as having experienced sexual IPV. Similarly, participants who responded yes to at least one form of physical client violence were categorized as having experienced physical client violence; those who responded yes to at least one form of sexual client violence were categorized as having experienced sexual client violence.

First, we examined risk factors for physical and sexual violence perpetrated by intimate partners and clients using a multivariable logistic regression model. Separate models were fit for physical and sexual violence given the conceptual differences between each violence subtype. Only factors with an  $p$ -value of  $<0.20$  in bivariate analyses were included in adjusted multivariable models to avoid overfitting the models. Correlates of violence were considered statistically significant if  $p < 0.05$  in the adjusted models.

Next, we examined how each type of violence is associated with sexual and drug-related risk behaviors. Separate bivariate and multivariable negative binomial models were fitted to assess the association between each type of violence and number of unprotected sex acts with all sexual partners, number of unprotected sex acts with paying clients, the total number of sex partners, and the total number of paying clients in the past 90 days. Negative binomial models were used to account for overdispersion of count variables, and coefficients were reported as incidence rate ratios (IRRs) to describe the incidence ratio of new outcomes per person. Separate bivariate and multivariable logistic regression models were also fit to examine the association between each form of violence, exchanging sex for drugs, injection drug use, and unsafe injection drug use in the past 90 days.

All models adjusted for study site, homelessness, food security, detention history in the past 90 days, and other sex work characteristics. All analyses were completed in R using the `tableone`<sup>28</sup> or `MASS`<sup>29</sup> package.

## Results

Of the 400 women enrolled, nearly one-half (45%) and over one-quarter (28%) reported experiencing IPV and client violence in the past 90 days, respectively. Most women (64%) were recruited in Almaty, of Russian ethnicity (67%), were experiencing homelessness (58%) and food insecurity (90%), had a history of incarceration (53%), and reported sex work as a primary source of income (76%) (Table 1). The median number of years women had engaged in sex work was 10 years. Women also reported a median number of 5 [IQR: 2–16] different partners in the 90 days prior. Women recruited from Almaty (compared to those recruited from Temirtau), as well as those experiencing homelessness and those who traded sex for drugs (compared to those who did not), were more likely to experience both IPV and client violence in the past 90 days ( $p < 0.05$ ). Women who were younger, married, engaged in street-based sex work, utilized sex work as a primary source of income, had a greater number of partners, and a greater number of unprotected sex acts, were more likely to experience client violence in the past 90 days ( $p < 0.05$ ).

Correlates of physical and sexual IPV are presented in Table 2. Women experiencing homelessness were nearly three times (aOR: 2.84 (95% CI: 1.81, 4.53)) more likely to experience physical IPV. Correlates of sexual IPV include residing in Almaty (aOR: 1.45 (95% CI: 0.86, 2.49)), a previous marriage (aOR: 0.39 (95% CI: 0.20, 0.75)) homelessness (aOR: 3.36 (95% CI: 1.95, 5.99)), and trading sex for drugs (aOR: 2.36 (95% CI: 1.41, 3.96)).

Correlates of physical and sexual client violence are presented in Table 3. Completing high school was associated with a decreased likelihood of physical client violence (aOR: 0.47 (95% CI: 0.25, 0.88)), but was not significantly associated with sexual client violence. Additional correlates of physical client violence include being currently (aOR: 8.06 (95% CI: 3.15, 25.22)) or previously (aOR: 6.26 (95% CI: 2.37, 19.89)) married, utilizing sex work as a primary means of income (aOR: 7.33 (95% CI: 2.53, 31.16)), and trading sex for drugs (aOR: 2.04 (95% CI: 1.12, 3.70)). Correlates of sexual client violence include: residing in Almaty (aOR: 2.04 (95% CI: 1.18, 3.66)), younger age (aOR: 0.95 (0.91, 0.99)), being currently (aOR: 6.84 (95% CI: 2.85, 20.33)) or previously married (aOR: 6.73 (95% CI: 2.73, 20.37)), engaging in sex work for over a decade (aOR: 2.66 (95% CI: 1.58, 4.44)), utilizing sex work as a primary means of income (aOR: 3.97 (95% CI: 1.70, 10.95)), and trading sex for drugs (aOR: 2.05 (95% CI: 1.15, 3.65)).

Associations between each form of violence and sexual HIV risk are presented in Table 4. Both forms of violence

from intimate partners (aIRR<sub>physical</sub>: 1.66 (95% CI: 1.21, 2.27); aIRR<sub>sexual</sub>: 1.76 (95% CI: 1.29, 2.44)) and clients (aIRR<sub>physical</sub>: 2.20 (95% CI: 1.58, 3.12); aIRR<sub>sexual</sub>: 2.07 (95% CI: 1.48, 2.93)) were associated with an increased rate of total sex partners, including sex work clients. Physical violence from intimate partners or clients, and sexual violence from intimate partners was associated with a more than 50% increased rate of condomless sex acts with all partners. When examining condomless sex acts with sex work clients specifically, physical (aIRR: 2.30 (95% CI: 1.39, 3.96)) and sexual (aIRR: 2.16 (95% CI: 1.36, 3.56)) client violence was associated with nearly a two-fold increase in the rate of condomless sex. Exchanging sex for drugs was associated with nearly a two-fold increase in sexual IPV (aOR: 2.14 (95% CI: 1.29, 3.53)), sexual client violence (aOR: 2.13 (95% CI: 1.24, 3.65)), and physical client violence (aOR: 1.98 (95% CI: 1.13, 3.48); Table 5). Violence was not significantly associated with injection drug use behaviors in this population.

## Discussion

Results from this study show a high prevalence of violence from clients, and an even higher prevalence of violence from intimate partners among women who engage in sex work and use drugs in Kazakhstan. Marital status, sex work as a primary source of income, and trading sex for drugs was associated with increased odds of physical and sexual violence from clients. The higher odds of client violence among married women may have been prompted by jealousy and insecurity due to multiple partners, condom use negotiation, and additional client solicitation.<sup>30</sup> Economic hardship and a reliance on sex work, as demonstrated by homelessness, utilizing sex work as a primary source of income, and trading sex for drugs, was found to be associated with increased odds of physical and sexual violence. Among WESW with intimate partners, IPV often results from partner infidelity, jealousy, sexual control, mental health, substance use, psychological distress, and lower sexual decision-making power.<sup>2,31,32</sup> We also found a high prevalence of poverty, as indicated by a high prevalence of homelessness, food insecurity, and exchanging sex for drugs. Studies also show that WESW who are unhoused, younger, experience economic hardship, food insecurity, and use drugs are more vulnerable to violence.<sup>18,33,34</sup> consistent with findings from this study. This emphasizes the need for structural interventions to support stable housing, food security and substance use treatment, in parallel with HIV and violence prevention interventions.

When examining the relationship between violence and HIV risk behaviors, results from this study suggest that intimate partner and client violence is primarily associated with sex work behaviors. This was demonstrated by increased rate of sex partners, and higher rate of condomless sex among women experiencing physical and sexual

**Table 1.** Sociodemographic, sex work and drug use characteristics of women who use drugs and experience gender-based violence in Kazakhstan.

Characteristic	Overall (N = 400)	IPV in past 90 days (N = 180)	No IPV in past 90 days (N = 220)	p-value	Client violence in past 90 days (N = 113)	No client violence in past 90 days (N = 287)	p-value
Site, n (%)	—	—	—	0.008	—	—	<0.001
Almaty	255 (63.7)	128 (71.1)	127 (57.7)	—	88 (77.9)	167 (58.2)	—
Temirtau	145 (36.3)	52 (28.9)	93 (42.3)	—	25 (22.1)	120 (41.8)	—
Age (mean (SD))	34.1 (8.4)	34.2 (8.3)	34.1 (8.5)	0.930	32.7 (8.3)	34.7 (8.6)	0.039
Ethnicity, n (%)	—	—	—	0.963	—	—	0.103
Kazakh	38 (9.5)	17 (9.4)	21 (9.5)	—	13 (11.5)	25 (8.7)	—
Russian	269 (67.2)	120 (66.7)	21 (9.5)	—	67 (59.3)	202 (70.4)	—
Other	93 (23.2)	43 (23.9)	50 (22.7)	—	70 (61.9)	60 (20.9)	—
Completed high school, n (%)	273 (68.3)	122 (67.8)	151 (68.6)	0.940	70 (61.9)	203 (70.7)	0.114
Marital status, n (%)	—	—	—	0.234	—	—	<0.001
Single, never married	106 (26.5)	50 (27.8)	56 (25.5)	—	11 (9.7)	95 (33.1)	—
Married	170 (42.5)	82 (45.6)	88 (40.0)	—	59 (52.2)	111 (38.7)	—
Previously married (divorced, separated, widowed)	124 (31.0)	48 (26.7)	76 (34.5)	—	43 (38.1)	81 (28.2)	—
Homeless <sup>**</sup> , n(%)	232 (58.0)	132 (73.3)	100 (45.5)	<0.001	79 (69.9)	153 (53.3)	0.004
Food insecure <sup>**</sup> , n(%)	358 (89.5)	166 (92.2)	192 (87.3)	0.149	106 (93.8)	252 (87.8)	0.114
Detained <sup>**</sup> , n(%)	116 (29.0)	60 (33.3)	56 (25.5)	0.106	41 (36.3)	75 (26.1)	0.059
Years engaged in sex work (median [IQR])	10.0 [4.0, 15.0]	10.0 [5.0, 15.0]	9.0 [3.8, 15.0]	0.265	10.0 [5.0, 15.0]	8.0 [3.0, 15.0]	0.018
Sex work as primary source of income <sup>**</sup> , n(%)	304 (76.0)	137 (76.1)	167 (75.9)	1.000	107 (94.7)	197 (68.6)	<0.001
Street-based sex work <sup>**</sup> , n (%)	118 (30.0)	60 (33.7)	58 (27.0)	0.181	44 (38.9)	74 (26.4)	0.020
Total number of sex partners <sup>**</sup> (median [IQR])	5.0 [2.0, 16.0]	5.0 [2.0, 20.0]	5.0 [3.0, 14.0]	0.674	11.0 [2.0, 35.0]	5.0 [2.0, 11.0]	0.004
Total number of paying partners <sup>**</sup> (median [IQR])	3.0 [1.0, 10.0]	3.0 [1.0, 12.3]	3.0 [1.0, 8.0]	0.639	5.0 [1.0, 22.0]	2.0 [0.0, 7.0]	<0.001
Total unprotected sex acts with all partners <sup>**</sup> (median [IQR])	16.0 [2.0, 49.0]	20.5 [4.0, 50.0]	13.5 [1.0, 45.0]	0.059	21.0 [3.5, 58.0]	15.0 [2.0, 40.5]	0.107
Total unprotected sex acts with paying partners <sup>**</sup> (median [IQR])	5.0 [0.0, 20.0]	5.0 [0.0, 22.0]	5.0 [0.0, 17.5]	0.901	11.0 [0.0, 32.0]	3.0 [0.0, 15.0]	<0.001
Traded sex for drugs <sup>**</sup> , n (%)	109 (27.3)	64 (35.6)	45 (20.5)	0.001	50 (44.2)	59 (20.6)	<0.001
Injection drug use <sup>**</sup> , n (%)	136 (34.0)	63 (35.0)	73 (33.2)	0.783	39 (34.5)	97 (33.8)	0.985
Unsafe injection <sup>**</sup> , n (%)	131 (32.8)	60 (33.3)	71 (32.3)	0.906	38 (33.6)	93 (32.4)	0.907

\* Abbreviations: intimate partner violence (IPV); sex work (SW); standard deviation (SD); interquartile range (IQR).

<sup>\*\*</sup> Measured in past 90 days.

**Table 2.** Correlates of intimate partner violence in the past 90 days.

Characteristic	Physical violence				Sexual violence			
	OR (95% CI)	p-value	aOR (95% CI)	p-value	OR (95% CI)	p-value	aOR (95% CI)	p-value
Site								
Temirtau	Ref		Ref		Ref		Ref	
Almaty	1.61 (1.05, 2.49)	0.031	1.43 (0.90, 2.28)	0.133	1.71 (1.07, 2.79)	0.027	1.45 (0.86, 2.49)	<0.001
Age	0.90 (0.97, 1.01)	0.399	—	—	1.01 (0.98, 1.04)	0.454	—	—
Ethnicity								
Kazakh	Ref		—	—	0.76 (0.37, 1.64)	0.470	—	—
Russian	0.88 (0.44, 1.79)	0.716	—	—	1.03 (0.46, 2.37)	0.940	—	—
Other	1.11 (0.52, 2.42)	0.795	—	—	0.98 (0.61, 1.57)	0.916	—	—
Completed high school	0.88 (0.57, 1.35)	0.544	—	—	1.01 (0.98, 1.04)	0.454	—	—
Marital status								
Single, never married	Ref		—	—	Ref		Ref	
Married	1.13 (0.69, 1.86)	0.637	—	—	1.11 (0.66, 1.88)	0.707	0.91 (0.51, 1.60)	0.732
Previously married (divorced, separated, widowed)	0.88 (0.51, 1.50)	0.630	—	—	0.58 (0.32, 1.07)	0.081	0.39 (0.20, 0.75)	0.005
Homeless**	2.99 (1.94, 4.67)	<0.001	2.84 (1.81, 4.53)	<0.001	3.43 (2.11, 5.76)	<0.001	3.36 (1.95, 5.99)	<0.001
Food insecure**	1.42 (0.73, 2.90)	0.322	—	—	1.74 (0.82, 4.16)	0.176	0.72 (0.30, 1.85)	0.465
Detained**	1.50 (0.96, 2.32)	0.073	1.10 (0.68, 1.78)	0.695	1.46 (0.91, 2.33)	0.111	0.87 (0.50, 1.48)	0.603
Engaged in sex work >10 years	1.22 (0.80, 1.85)	0.351	—	—	1.71 (1.09, 2.66)	0.019	1.37 (0.83, 2.26)	0.218
Sex work as primary source of income**	1.16 (0.72, 1.88)	0.550	—	—	1.14 (0.68, 1.94)	0.624	—	—
Street-based sex work**	1.35 (0.87, 2.10)	0.177	1.08 (0.67, 1.73)	0.748	1.39 (0.87, 2.22)	0.166	1.13 (0.66, 1.90)	0.654
Traded sex for drugs**	1.74 (1.11, 2.73)	0.015	1.32 (0.82, 2.12)	0.245	2.79 (1.75, 4.47)	<0.001	2.36 (1.41, 3.96)	0.001

\*Abbreviations: Odds ratio (OR); adjusted OR (aOR).

\*\*Measured in past 90 days.

\*\*\*aOR adjusted for correlates significant at  $p < 0.20$  in the bivariate models.

violence from clients and intimate partners. Consistent with prior studies, client violence was associated with higher rate of condomless sex with clients. This may be due to difficulties with condom negotiation or being offered more money for condomless sex. We also found that trading sex for drugs was associated with higher odds of sexual violence from intimate partners and clients. Prior research suggests that women who use drugs may be pressured to exchange sex to procure drugs for themselves or their intimate partners which may partially explain which may partially explain the increased odds of client violence when trading sex for drugs. This study did not examine partner's illicit drug use, and further research is needed to better understand how drug use is intertwined in relationship dynamics in Kazakhstan, and how partner's drug use behaviors may contribute to a women's economic vulnerability and HIV

risk. Finally, we found that neither violence from intimate partners nor clients were associated with injection drug use or unsafe injection behaviors in this population. This contrasts with prior studies from other settings, which found violence to be associated with injection drug use among WESW.<sup>3,15,35,36</sup>

## Limitations

Results from this study are not without limitations. First, women were recruited via non-random sampling and thus, results may have limited generalizability. Secondly, we used cross-sectional data, and cannot refer causality in the relationship between violence and HIV risk behaviors. Moreover, the relationship between violence and HIV risk behaviors is bi-directional,<sup>37</sup> and although results from this

**Table 3.** Correlates of client violence in the past 90 days.

Characteristic	Physical violence			Sexual violence				
	Or (95% CI)	p-value	aOR (95% CI)	p-value	Or (95% CI)	p-value	aOR (95% CI)	p-value
Site								
Temirtau	Ref	—	Ref	—	Ref	—	Ref	—
Almaty	2.04 (1.18, 3.66)	0.013	1.90 (0.99, 3.76)	0.059	4.20 (2.34, 8.03)	<0.001	4.62 (2.38, 9.48)	<0.001
Age	0.97 (0.94, 1.00)	0.057	0.97 (0.93, 1.01)	0.101	0.99 (0.96, 1.02)	0.422	0.95 (0.91, 0.99)	0.001
Ethnicity								
Kazakh	Ref	—	—	—	Ref	—	—	—
Russian	0.66 (0.30, 1.57)	0.324	—	—	0.65 (0.31, 1.43)	0.259	—	—
Other	1.12 (0.48, 2.81)	0.799	—	—	0.95 (0.42, 2.25)	0.909	—	—
Completed high school	0.66 (0.40, 1.11)	0.112	0.47 (0.25, 0.88)	0.018	0.71 (0.44, 1.16)	0.165	—	—
Marital status								
Single, never married	Ref	—	—	—	Ref	—	—	—
Married	6.84 (2.85, 20.33)	<0.001	8.06 (3.15, 25.22)	<0.001	5.89 (2.72, 14.76)	<0.001	6.52 (2.84, 17.12)	<0.001
Previously married (divorced, separated, widowed)	6.73 (2.73, 20.37)	<0.001	6.26 (2.37, 19.89)	<0.001	5.79 (2.59, 14.78)	<0.001	1.68 (1.96, 12.60)	0.001
Homeless**	2.16 (1.28, 3.77)	0.005	1.41 (0.76, 2.68)	0.286	2.08 (1.27, 3.47)	0.004	1.37 (0.75, 2.50)	0.308
Food insecure**	1.93 (0.80, 5.75)	0.184	1.42 (0.51, 4.70)	0.531	3.14 (1.22, 10.70)	0.034	1.96 (0.67, 7.26)	0.256
Detained**	2.70 (1.62, 4.50)	<0.001	1.82 (0.99, 3.33)	0.051	1.48 (0.90, 2.42)	0.117	0.66 (0.35, 1.21)	0.187
Engaged in sex work >10 years	1.35 (0.82, 2.23)	0.236	—	—	2.05 (1.28, 3.29)	0.003	2.14 (1.14, 4.08)	0.020
Sex work as primary source of income**	10.33 (3.73, 42.89)	<0.001	7.33 (2.53, 31.16)	0.001	6.01 (2.74, 15.87)	<0.001	3.97 (1.70, 10.95)	0.003
Street-based sex work**	2.07 (1.24, 3.44)	0.005	1.50 (0.83, 2.70)	0.178	2.15 (1.32, 3.49)	0.002	1.58 (0.88, 2.79)	0.119
Traded sex for drugs**	2.66 (1.58, 4.44)	<0.001	2.04 (1.12, 3.70)	0.019	2.95 (1.81, 4.82)	<0.001	2.05 (1.15, 3.65)	0.014

\* Abbreviations: Odds ratio (OR); adjusted OR (aOR).

\*\* Measured in past 90 days.

\*\*\* aOR adjusted for correlates significant at  $p < 0.20$  in the bivariate models.

study describe how violence is associated with greater sexual risk behaviors, it can be inferred that sexual risk is also associated with increased risk of violence. Furthermore, all data was self-reported, and may be subject to social desirability or recall bias. Finally, this study did not include measures on psychological or economic violence, which has been found to increase HIV risk through inconsistent condom use during sex work, and further research is needed to understand the cumulative impact of physical, sexual, psychological, and economic abuse on HIV risk behaviors among WESW.<sup>38,39</sup> Nonetheless, there is a crucial lack of data on violence among WESW and

women who use drugs in Central Asia. This study adds to the limited body of evidence in a region with the fastest growing HIV epidemic, and findings are expected to be applicable to women who use drugs and engage in sex work in Central Asia, including Kazakhstan.

Simulation and modeling studies have found that reducing physical and sexual violence has the potential to avert up to 25% of incident HIV infections among WESWs, and up to 6% in the general population by decreasing condomless sex acts during sex work.<sup>40</sup> Multisectoral interventions that integrate community mobilization, empowerment, peer support, rapid crisis response, and relationship-based and

**Table 4.** Associations between violence and sexual HIV risk.

Type of violence	Number of total sex partners			Number of sex work clients			Number of condomless vaginal and anal sex acts with all partners			Number of condomless vaginal and anal sex acts with clients				
	IRR (95% CI)	p	aIRR (95% CI)	IRR (95% CI)	p	aIRR (95% CI)	IRR (95% CI)	p	aIRR (95% CI)	IRR (95% CI)	p	aIRR (95% CI)		
<b>Intimate partner violence</b>														
Physical	1.65 (1.24, 2.23)	<0.001	1.66 (1.21, 2.27)	1.68 (1.19, 2.39)	0.004	2.01 (1.40, 2.90)	<0.001	1.86 (1.33, 2.61)	<0.001	1.65 (1.16, 2.35)	0.004	1.77 (1.16, 2.75)	0.009	1.38 (0.86, 2.23)
Sexual	1.79 (1.31, 2.48)	<0.001	1.76 (1.29, 2.44)	1.93 (1.34, 2.84)	<0.001	2.39 (1.65, 3.50)	<0.001	1.71 (1.20, 2.48)	0.004	1.54 (1.07, 2.26)	0.020	1.41 (0.89, 2.29)	0.151	1.28 (0.81, 2.09)
<b>Client violence</b>														
Physical	2.31 (1.64, 3.34)	<0.001	2.20 (1.58, 3.12)	2.46 (1.65, 3.81)	<0.001	2.12 (1.38, 3.32)	<0.001	1.84 (1.25, 2.82)	0.003	1.73 (1.09, 2.50)	0.021	2.49 (1.52, 4.31)	<0.001	2.30 (1.39, 3.96)
Sexual	1.84 (1.32, 2.60)	<0.001	2.07 (1.48, 2.93)	2.28 (1.56, 3.44)	<0.001	2.70 (1.85, 4.02)	<0.001	1.45 (0.99, 2.17)	0.063	1.45 (0.99, 2.16)	0.070	1.90 (1.18, 3.19)	0.011	2.16 (1.36, 3.56)

\* Abbreviations: Incidence Rate ratio (IRR); adjusted IRR (aIRR)

\*\* aIRR adjusted for study site, homelessness, food security, detained in past 90 days, and sex work characteristics (years engaging in sex work, sex work as a main source of income, street-based sex work).



**Table 5.** Associations between violence and drug-related HIV risk.

Type of violence	Exchanging sex for drugs			Injection drug use			Unsafe injection drug use					
	OR (95% CI)	p	aOR (95% CI)	OR (95% CI)	p	aOR (95% CI)	OR (95% CI)	p	aOR (95% CI)	p		
Intimate partner violence												
Physical	1.74 (1.11, 2.77)	0.015	1.33 (0.82, 2.15)	0.253	1.23 (0.80, 1.87)	0.348	1.14 (0.71, 1.84)	0.586	1.17 (0.76, 1.79)	0.480	1.11 (0.68, 1.78)	0.682
Sexual	2.79 (1.75, 4.47)	<0.001	2.14 (1.29, 3.53)	0.003	1.00 (0.62, 1.57)	0.985	0.81 (0.48, 1.35)	0.422	1.02 (0.64, 1.62)	0.939	0.86 (0.51, 1.43)	0.561
Client violence												
Physical	2.66 (1.58, 4.44)	<0.001	1.98 (1.13, 3.48)	0.017	1.16 (0.69, 1.93)	0.571	0.95 (0.53, 1.70)	0.870	1.16 (0.68, 1.94)	0.569	0.96 (0.53, 1.72)	0.891
Sexual	2.95 (1.81, 4.82)	<0.001	2.13 (1.24, 3.65)	0.006	1.09 (0.66, 1.76)	0.730	0.76 (0.43, 1.32)	0.339	1.10 (0.67, 1.79)	0.697	0.77 (0.44, 1.35)	0.368

\* Abbreviations: Odds ratio (OR); adjusted OR (aOR)

\*\* aOR adjusted for study site, homelessness, food security, detained in past 90 days, and sex work characteristics (years engaging in sex work, sex work as a main source of income, street-based sex work).

individual-level HIV/STI risks factors such as alcohol use, harm reduction, and conflict de-escalation provide strong evidence of violence prevention in the context of HIV risk reduction<sup>41</sup> Among WESW in India, multi-level, combination approaches that integrate community mobilization, peer outreach, health and social services, social norms change, and individual as well as group counseling with intimate partners to improve trust, communication and self-efficacy have demonstrated efficacy<sup>14</sup> Improving economic conditions may also have the potential to reduce client violence in this population, and combination microfinance and HIV risk reduction interventions have been found to reduce violence and improve HIV risk behaviors in Kazakhstan and Mongolia.<sup>42–45</sup>

## Conclusion

Our results indicate a high prevalence of both intimate partner violence and client violence among women who engage in sex work and use drugs in Kazakhstan, which is associated with economic hardship and poverty as demonstrated by the high rates of homelessness, and trading sex for drugs. Furthermore, our results show that physical and sexual violence from intimate partners and clients is associated with greater sexual HIV risk, including a greater number of sex work clients and condomless sex, but not injection drug use. Given a rapidly growing HIV epidemic that is concentrated among key populations, HIV prevention interventions for WESW and women who use drugs in Kazakhstan should consider addressing economic vulnerability and integrating multi-sectoral interventions that include relationship-based violence prevention activities.

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## Ethics approval

This study was approved by the ethical review boards at Columbia University and the Kazakhstan School of Public Health and is registered with [Clinicaltrials.gov](https://clinicaltrials.gov) (NCT02406482).

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