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Prevalence and Correlates of Female Condom Use and Interest Among Injection Drug-Using Female Sex Workers in Two Mexico–US Border Cities

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Abstract Little is known about female condom use among female sex workers who inject drugs (FSW-IDUs) in Northern Mexico, where HIV/STI prevalence is high. We examined the prevalence and correlates of female condom use and interest in female condom use among FSW-IDUs aged $\geq$18 years in Tijuana and Ciudad Juárez, Mexico enrolled in a behavioral intervention designed to reduce high-risk sexual and injection behaviors. Of 621 FSW-IDUs, 8 % reported ever using female condoms, and 67.2 % expressed interest in trying female condoms. Factors independently associated with female condom use were having had a client become angry at the suggestion of using condoms and having engaged in unprotected vaginal sex with non-regular clients. Factors independently associated with interest in using female condoms were lifetime physical abuse and lifetime sexual abuse. Increasing the availability of female condoms and providing education on their use in the context of drug use and violence is recommended.

Resumen Se sabe poco acerca del uso del condón femenino por parte de sexoservidoras usuarias de drogas inyectables (SS-UDIs) en el norte de México, donde la prevalencia del VIH/ITS es elevada. Analizamos la prevalencia y los factores relacionados con el interés en y el uso del condón femenino en SS-UDIs de $\geq$18 años en Tijuana y Ciudad Juárez, México inscritas en una intervención conductual diseñada para disminuir los comportamientos sexuales y del uso de jeringas de alto riesgo. De 621 SS-UDIs, el 8 % reportó alguna vez haber usado condones femeninos y el 67.2 % mostró interés en usarlos. El que el cliente se enoje al sugerir el uso de condones y el sexo vaginal sin protección con clientes no regulares fueron factores independientemente relacionados con el uso del condón femenino. El abuso físico y el abuso sexual a lo largo de su vida fueron factores independientemente relacionados con el interés en el uso de los condones femeninos. Se recomienda aumentar la disponibilidad del condón femenino y brindar educación sobre su uso en el contexto del uso de drogas y la violencia.

Keywords Female condom · Female sex workers · Injection drug use · HIV · Mexico

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Introduction

The female condom provides an alternative HIV prevention method ideal for women who are unable to negotiate

male condom use with their partners [1], often as a result of relationship power imbalances and physical and/or sexual violence [1–5]. In vulnerable populations at high risk for HIV such as drug-using women and female sex workers (who may overlap in their risk for HIV), results have been mixed in the acceptability of the female condom as a barrier method to prevent sexually transmitted infections (STIs). For example, facilitators of female condom use include prior use of male condoms, the perception that it is more physically resistant and thus safer than the male condom, and the fact that it can be inserted several hours prior to sexual intercourse [2, 6–8]. Other facilitators of use that have been identified include a perceived increase in negotiating power and in control over safer sex and the fact that, unlike male condoms, female condoms will not tear or be removed by a sex partner midway through sex [2, 6–11]. A history of childhood abuse has also been associated with female condom use [9, 12]. Conversely, factors identified as barriers or as negatively associated with female condom use include the risk of violent reactions from male sex partners, clients' refusal or distrust of unfamiliar methods, difficulties during application and use, and high cost [6, 7, 11, 13–15]. Despite these mixed results, the female condom has been shown to increase the number of protected sex acts and reduce STI incidence among drug-using women and female sex workers [16–21].

Female sex workers in Tijuana and Ciudad (Cd.) Juárez who inject drugs (FSW-IDUs) have been identified as a high-risk population for HIV acquisition [22]. In 2006, HIV prevalence among FSW-IDUs in these cities was 12 %, which was twice as high as that of non-injecting female sex workers (6 %) [23]. More recent data from these cities (2009) showed that the prevalence among FSW-IDUs of any STI was 72 % [24]. Both cities have "zones of tolerance" where sex work is quasi-legal. Clients come from both sides of the Mexico–US border and from other countries to solicit sex, which is often unprotected [25]. Both cities also lie on major trafficking routes for cocaine, heroin, and methamphetamine, which has led many female sex workers to engage in drug use [26].

Compared to non-IDU female sex workers in this region, FSW-IDUs are more likely to be younger, be married or in a common-law relationship, have worked longer in the sex trade, speak English, earn less for sex without condoms, and use drugs before sex [25]. FSW-IDUs face a number of vulnerabilities including entrenched poverty, mental illness, violence from clients or intimate partners, and conflict with sex partners surrounding drug use. These factors may directly or indirectly impair FSWs' ability to negotiate male condom use and thus increase their risk of STIs [27–29]. Furthermore, compared to non-IDU female sex workers, FSW-IDUs may also be more likely to acquiesce to clients' demands for unprotected sex if they are suffering from drug-related withdrawal [24]. Therefore, the female condom may be a useful HIV prevention method.

To date, no study has documented patterns of female condom use or factors associated with such use among any group of FSW-IDUs in Mexico. Our study aimed to determine the prevalence and correlates among FSW-IDUs in Tijuana and Cd. Juárez of both female condom use and interest in trying female condoms. We hypothesized that FSW-IDUs with a history of female condom use or who were interested in trying the female condom would be more likely to report male condom use and more likely to have experienced physical or sexual abuse. Identification of such correlates is important for increasing knowledge about female condoms and their accessibility.

Methods

Study Population

Between 2008 and 2009, FSW-IDUs in Tijuana ($n = 311$) and Cd. Juárez, Mexico ($n = 311$) were recruited to participate in *Mujer Más Segura*, a randomized controlled trial of a behavioral intervention designed to reduce high-risk sexual and injection behaviors [24]. In each city, three neighborhoods with high densities of sex workers and three with medium densities were randomly assigned to one of three intervention conditions. Fifty women from each neighborhood were recruited into each condition, for a total of 100 per condition per city. Approximately 600 FSW-IDUs were screened in each city to achieve a sample size of at least 300. To be eligible, participants had to be female; aged 18 years or older; report exchanging sex for money, drugs, or material benefit in the past month; report injecting drugs and sharing injecting equipment within the past month; and report having unprotected vaginal or anal sex with a client within the past month. Eligible women provided written informed consent. The study protocol was reviewed and approved by Institutional Review Boards in the United States and Mexico.

Data Collection

Data were collected through interviewer-administered, computer-based surveys and through testing of biological samples for HIV/STIs at baseline and at 4-, 8- and 12-month follow-up visits. The present study used data from the baseline assessment. Interviews were conducted in Spanish or English, and participants received $25 US upon completion of their visit. The baseline interview included questions on sociodemographics; physical and sexual abuse experiences; and sexual and drug-related risk

behaviors with the following partners: spouse or steady partner, regular clients (i.e., clients who return repeatedly or those with whom the FSW has an ongoing relationship), and non-regular clients (i.e., clients whom FSWs entertained at most twice). Female condom use was assessed by a dichotomous self-report variable ("ever" vs. "never"). Participants who had never used a female condom were asked if they were interested in trying one.

The "Determine"® rapid HIV antibody test (Abbott Pharmaceuticals, Boston, MA, USA) was used to detect HIV antibodies in blood samples. All reactive samples were confirmed by Western Blot and HIV-1 enzyme immunoassay. Women who tested HIV-positive were referred to local municipal health clinics for monitoring and care. The rapid plasma reagin test (Determine™ Syphilis TP; Abbott Pharmaceuticals, Boston, MA, USA) was used to detect syphilis antibodies in blood samples. All reactive samples were confirmed by the *Treponema pallidum* particle agglutination assay (TPPA) (Fujirebio, Wilmington, DE, USA). Women who obtained a positive result on the syphilis rapid test were treated presumptively with benzicillin injections (once per week for 3 weeks). Vaginal swabs were collected to test for chlamydia and gonorrhea. Chlamydia was detected using the BioStar® OIA® chlamydia rapid test kit. Positive rapid tests were confirmed with urine specimens using the Genprobe transcription-mediated amplification assay (TMA; San Diego, CA, USA). During the first half of the recruitment period, gonorrhea was detected using BioStar® OIA® GC. Following guidelines from the Centers for Disease Control and Prevention, in the second half of the recruitment period, gonorrhea was detected through urine samples using the TMA (Genprobe, San Diego, CA). Women who had positive rapid tests for either chlamydia or gonorrhea or who had symptoms were treated presumptively. Confirmatory tests for STIs were conducted at the San Diego County Health Department.

Statistical Analysis

The current study was a secondary analysis of baseline data from the *Mujer Más Segura* study to examine preliminary correlates of female condom use and, among women who reported never having used a female condom, interest in trying one. We explored sexual and drug-related risk behaviors, abuse history, HIV/STI status, and male condom use as correlates given their possible associations with female condom use and interest among this sample of women. First, we conducted descriptive analyses of prevalence and patterns of female condom use among women who reported ever using a female condom. We then examined factors possibly related to female condom use by comparing women who reported ever using a female condom to those who reported that they had never used one. In a second analysis among the women who reported never having used a female condom, we compared those who expressed interest in trying one to those without such an interest. Pearson's Chi-square or Fisher's exact test was used for dichotomous variables. T-tests and Wilcoxon's Rank Sum tests were used for continuous normally and non-normally distributed variables, respectively.

Logistic regression modeling was used to identify factors associated with female condom use and interest in trying a female condom. All variables attaining significance levels of $p < 0.10$ in bivariate models were assessed for inclusion in multivariate regression models. Both models were reduced manually using a backward stepwise regression technique. The likelihood ratio test was used to assess model fit.

Results

Characteristics of Participants

Of 622 FSW-IDUs enrolled at baseline, 621 had complete data on female condom use and were included in the first analysis that identified factors associated with female condom use. To assess factors associated with interest in trying female condoms, we analyzed data from 561 FSW-IDUs who reported never having used female condoms and responded to the question on interest. Among 621 FSW-IDUs, the median age was 33 years (interquartile range [IQR], 27–40), and median years of education was 6 (IQR, 5–9). The median duration of sex work was 11 years (IQR, 6–17). Approximately 50 % of FSW-IDUs were single or never married; one-third had children under the age of 18 years. The majority were street-based workers (88 %).

Patterns of Female Condom Use

Among 621 FSW-IDUs, approximately 8 % ($n = 48$) reported ever using female condoms. Of those 48 women, 51 % used a female condom at least sometimes with regular non-commercial partners, 47 % used them at least sometimes with regular clients, and 54 % used them at least sometimes with non-regular clients. Seven women (15 %) used the same female condom more than once; of those, five (71 %) had used the same condom three or more times in the past month. One reported using the same female condom with more than one client or partner. One woman used two female condoms at the same time on four different occasions.

Among non-users of female condoms ($n = 573$), 14 % were absolutely certain they would use one if the condoms were provided free of charge, 12 % were somewhat certain, and 33 % were unsure; the median amount that they

reported being willing to pay for a female condom was 8 pesos (approximately $0.58 US) (IQR: $0.36–$0.73). The remaining 41 % of FSW-IDUs said they would not use female condoms even if they were provided free of charge.

Factors Associated with Female Condom Use

Compared to women who never used female condoms, women who ever used them reported fewer unprotected vaginal sex acts in the past month with both non-regular clients (mean: 34, standard deviation [SD]: 33 vs. mean: 61, SD: 36; t = 5.29, $p < 0.0001$) and regular clients (mean: 51, SD: 38 vs. mean: 68, SD: 37; t = 2.93, $p = 0.005$) (Table 1). Compared to women who never used female condoms, those who ever used female condoms were more likely to have been forced or coerced into sex during their lifetime (65 vs. 49 %; $\chi^2 = 4.09$, $p = 0.043$) and were more likely to have ever experienced physical abuse by a client (31 vs. 19 %; $\chi^2 = 4.17$, $p = 0.041$). Women who ever used a female condom were more likely to have had a client use or threaten to use violence when she proposed any condom use during sex (25 vs. 13 %; $\chi^2 = 5.02$, $p = 0.025$) and to report having had a client who was angered by the suggestion that he use a condom during sex (57 vs. 44 %; $\chi^2 = 3.08$, $p = 0.079$).

Women who ever used female condoms were significantly more likely to have had an HIV test (73 vs. 51 %; $\chi^2 = 8.89$, $p = 0.003$) and were more likely to have syphilis titers $\geq$1:8 at the time of interview (17 vs. 10 %; $\chi^2 = 3.38$, $p = 0.066$). The two groups did not differ significantly in type of sex work, substance use behaviors, lifetime history of physical abuse, or prevalence of HIV, chlamydia, or gonorrhea.

After we adjusted for age, number of years as a sex worker, and study site, two factors were associated with ever using female condoms (Table 1). Women who used female condoms were less likely to report unprotected vaginal sex with non-regular clients (adjusted odds ratio [AOR]: 0.98, 95 % confidence interval [95 % CI]: 0.97–0.99) and were more likely to report having had a client who became angry at the suggestion that he use a male condom (AOR: 1.71, 95 % CI: 1.17–2.52).

Factors Associated with Interest in Trying Female Condoms

Among 561 women who reported never having used a female condom, 67 % expressed interest in trying one (Table 2). Compared to those who were not interested, women who were interested in trying female condoms were younger, had been a sex worker for fewer years, and were less likely to be from Tijuana (vs. Cd. Juárez). Women who were interested in trying female condoms also had fewer unprotected vaginal sex acts with non-regular clients (mean: 59, SD: 35 vs. mean: 66, SD: 39; t = 2.10, $p = 0.037$) and were less likely to inject drugs with clients around the time of sex (68 vs. 82 %; $\chi^2 = 11.19$, $p < 0.0001$). Women who were interested in trying female condoms were more likely ever to have been physically abused (56 vs. 33 %; $\chi^2 = 26.43$, $p < 0.0001$), ever to have been forced or coerced into sex (56 vs. 39 %; $\chi^2 = 13.30$, $p = 0.0003$), and ever to have experienced physical abuse from a client (23 vs. 12 %; $\chi^2 = 9.47$, $p = 0.002$). No significant differences were detected between the interested vs. the non-interested groups with respect to sex work type, sex work earnings, number of IDU partners, number of IDU clients, abuse in the context of condom negotiation, HIV testing, or STI prevalence.

After we adjusted for age and study site, we found that interest in trying female condoms was independently associated with having engaged in sex work for fewer years (AOR: 0.96 per year, 95 % CI: 0.93–0.99) and with lower odds of having injected drugs with clients around the time of sex in the past month (AOR: 0.59, 95 % CI: 0.36–0.97). Women who were interested in trying female condoms were also approximately two times more likely ever to have been physically abused (AOR: 1.98, 95 % CI: 1.26–3.10) or forced or coerced into sex (AOR: 1.73, 95 % CI: 1.12–2.66) (Table 2).

Discussion

In our sample of high-risk FSW-IDUs, only 8 % had ever used a female condom, possibly due to the condoms' cost and poor availability. These barriers have been documented in prior studies [6, 13, 14]. In Northern Mexico, female condoms are currently available in few health clinics, and their high cost (approximately 35 pesos, equivalent to approximately $3 US) limits purchases. In Tijuana, female condoms are available from the state HIV agency for free when the agency is able to purchase them at a discount (which limits their availability), whereas male condoms are widely and consistently available for free at community health centers [30].

Approximately 25 % of women who had never used a female condom were at least somewhat certain they would use female condoms if they were provided free of charge. An additional 33 % were unsure they would use them under that condition, and 41 % would not use them at all, which may reflect a lack of knowledge on how to use them or the fear that they would interfere with sex work transactions. In other studies, women have reported various barriers to female condom use, such as difficulties surrounding application and discomfort during use [7, 13, 14], while in our study, the fact that 15 % of those who had

Table 1 HIV risk factors associated with female condom use among FSW-IDUs in Tijuana and Ciudad Juárez, Mexico ($N = 621$)

Characteristic	Ever used female condoms[a] ($n = 48$)	Never used female condoms[a] ($n = 573$)	Test statistic	p value	Unadjusted OR (95 % CI)	Adjusted OR (95 % CI)
Sociodemographics						
Median age (IQR)	31 (27, 37)	33 (27, 40)	$Z = 1.34$	0.179	0.98 (0.94–1.01)	0.97 (0.91–1.03)
Median years education (IQR)	7 (5, 10)	6 (5, 9)	$Z = 0.85$	0.398	1.05 (0.95–1.16)	–
Median years sex worker (IQR)	11 (5, 16)	12 (6, 17)	$Z = 0.76$	0.438	0.98 (0.95–1.02)	1.01 (0.95–1.07)
Has children <18 years	18 (37.50)	199 (34.73)	$\chi^2 = 0.16$	0.921	0.90 (0.75–1.09)	–
Marital status						
Single	18 (37.50)	287 (50.09)	$\chi^2 = 2.92$	0.232	–	–
Married/common-law	23 (47.92)	212 (37.00)			1.73 (0.91–3.29)	–
Divorced/separated/widowed	7 (14.58)	74 (12.91)			1.51 (0.61–3.75)	–
City of residence						
Tijuana	15 (31.25)	295 (51.48)	$\chi^2 = 7.25$	0.007	**0.43 (0.23–0.81)**	0.51 (0.25–1.05)
Ciudad Juárez	33 (68.75)	278 (48.52)			–	–
Sex worker type						
Street worker	42 (87.50)	502 (87.76)	NA	0.322	–	–
Dance hostess	1 (2.08)	2 (0.35)			5.99 (0.53–67.41)	–
Barmaid	1 (2.08)	24 (4.20)			0.50 (0.07–3.78)	–
Other	4 (8.33)	44 (7.69)			1.09 (0.37–3.18)	–
Male condom use						
% unprotected vaginal sex w/spouse/steady partners[b], mean (SD)	95 (20)	96 (20)	$t = 0.25$	0.801	0.99 (0.98–1.02)	–
% unprotected vaginal sex w/non-regular clients[b], mean (SD)	34 (33)	61 (36)	$t = 5.29$	<0.0001	**0.98 (0.97–0.99)**	**0.98 (0.97–0.99)**
% unprotected vaginal sex w/regular clients[b], mean (SD)	51 (38)	68 (37)	$t = 2.93$	0.005	**0.99 (0.98–0.99)**	–
Median USD[c] earned for sex with a condom, median (IQR)	25 (10, 40)	20 (15, 30)	$Z = 0.15$	0.878	1.00 (0.98–1.01)	–
Median USD[c] earned for sex without a condom, median (IQR)	35 (18, 45)	30 (20, 50)	$Z = 0.28$	0.755	0.99 (0.97–1.01)	–
Substance use						
Used alcohol or drugs before or during sex with a client[b]	44 (91.67)	530 (92.66)	$\chi^2 = 0.063$	0.801	0.87 (0.30–2.54)	–
Injected drugs with client around time of sex[b]	28 (66.67)	377 (73.06)	$\chi^2 = 0.79$	0.372	0.74 (0.38–1.44)	–
Number of IDU[d] male clients[b], median (IQR)	2 (0, 3)	2 (0, 5)	$Z = 1.17$	0.240	0.90 (0.81–1.00)	–
Number of IDU non-client sex partners[b], median (IQR)	1 (0, 1)	0 (0, 1)	$Z = 0.65$	0.516	0.96 (0.81–1.14)	–
Abuse history						
Ever physically abused	26 (56.52)	275 (48.50)	$\chi^2 = 1.09$	0.295	1.38 (0.75–2.53)	–
Ever forced/coerced into sex	31 (64.58)	280 (49.38)	$\chi^2 = 4.09$	0.043	**1.87 (1.01–3.45)**	–
Ever physically abused by client	15 (31.25)	108 (18.98)	$\chi^2 = 4.17$	0.041	**1.94 (1.02–3.70)**	–
Client ever used/threatened violence when proposing condom use	12 (25.00)	76 (13.26)	$\chi^2 = 5.02$	0.025	**2.18 (1.09–4.37)**	–
Client angry due to suggestion of condom use[b]	27 (57.45)	217 (44.11)	$\chi^2 = 3.08$	0.079	**1.66 (1.18–2.33)**	**1.71 (1.17–2.52)**
Client violent due to suggestion of condom use[b]	12 (26.09)	106 (21.54)	$\chi^2 = 0.507$	0.477	1.29 (0.64–2.57)	–

Table 1 continued

Characteristic	Ever used female condoms[a] ($n = 48$)	Never used female condoms[a] ($n = 573$)	Test statistic	p value	Unadjusted OR (95 % CI)	Adjusted OR (95 % CI)
HIV/STI status						
Ever tested for HIV	35 (72.92)	289 (50.52)	$\chi^2 = 8.89$	0.003	**2.64 (1.37–5.09)**	–
HIV	4 (8.33)	29 (5.06)	$\chi^2 = 0.31$	0.855	1.70 (0.57–5.06)	–
Chlamydia	5 (10.42)	75 (13.09)	$\chi^2 = 0.82$	0.845	0.76 (0.29–1.99)	–
Gonorrhea	1 (2.33)	13 (2.52)	$\chi^2 = 0.51$	0.916	0.92 (0.12–7.16)	–
Syphilis titers $\geq$1:8	8 (16.67)	55 (9.60)	$\chi^2 = 3.38$	0.066	2.16 (0.95–4.93)	–

OR (CI) values that are significant are shown in **bold**. Adjusted odds ratios reflect associations after controlling for all other variables that were included in the model

OR odds ratio, *CI* confidence interval, *IQR* interquartile range, *SD* standard deviation

[a] Data are in the format *n (%)* unless otherwise indicated. Some percentages may reflect denominators smaller than the *n* value given in the column head due to missing data

[b] In the past month

[c] US dollar

[d] Injection drug user

used female condoms reported re-use suggests that these women may benefit from more education on how to use them appropriately.

Although our study was cross-sectional, we were able to provide informative preliminary data on factors associated with female condom use among FSW-IDUs and with FSW-IDUs' interest in trying the female condom. We found that women who reported using female condoms were less likely to have unprotected vaginal sex with non-regular clients. Prospective studies have suggested that providing women with female condoms can decrease their number of unprotected sex acts, whether through increased male condom use, increased female condom use, or more commonly, a combination of the two [17].

The low proportion of women who reported female condom use may have limited our power to detect potentially significant associations with other sexual and drug-related risk variables in multivariate analyses. However, in bivariate analyses, additional violence-related variables—namely, lifetime physical and sexual abuse, and violence in the context of condom use negotiation—were significantly associated with female condom use. This lends support to the idea that women with histories of violence may feel empowered to protect themselves through their own prevention methods rather than relying on their sex partner to implement safe sex strategies. Additionally, women who had a history of getting tested for HIV were more likely to report lifetime female condom use, which may reflect counseling they received on HIV prevention methods, including the female condom, in connection with their HIV testing.

Despite the low prevalence of female condom use, two-thirds of non-users expressed interest in trying the female condom. Younger women were significantly more likely to be interested in trying the female condom, which may reflect more openness to unfamiliar safer-sex strategies. Although interest in trying female condoms was lower among women who reported injecting drugs with clients during sex acts, 55 % of these women reported using male condoms with male clients in the past month (data not shown). This suggests that these women are considering at least some level of protection to reduce their exposure to HIV/STIs.

Although female condom use was not more likely among women with histories of physical or sexual abuse in multivariate analyses, interest in female condom use was more likely among women with such histories. Women with lifetime histories of suffering physical or sexual violence or both may feel empowered to take the initiative to protect themselves rather than assert their power with clients or regular partners to negotiate male condom use, which could result in violence or threats of violence. Although barriers to male condom use have been noted,

Table 2 HIV risk factors associated with interest in female condom use among FSW-IDUs who never used female condoms,Tijuana and Ciudad Juárez, Mexico ($N = 561$)

Characteristic	Interested in using female condoms[a] ($n = 377$)	No interest in using female condoms[a] ($n = 184$)	Test statistic	p value	Unadjusted OR (95 % CI)	Adjusted OR (95 % CI)
Sociodemographics						
Median age (IQR)	32 (27, 39)	35 (29, 42)	Z = 2.66	0.008	**0.97 (0.95–0.99)**	1.01 (0.98–1.04)
Median yrs education (IQR)	7 (6, 9)	6 (5, 9)	Z = 1.06	0.291	1.04 (0.98–1.11)	–
Median yrs sex worker (IQR)	11 (6, 17)	12 (7, 21)	Z = 2.73	0.006	**0.97 (0.95–0.99)**	**0.96 (0.93–0.99)**
Has children < 18 years	135 (35.81)	58 (31.52)	$\chi^2 = 1.01$	0.604	0.94 (0.85–1.04)	–
Marital status						
Single	188 (49.87)	90 (48.91)	$\chi^2 = 0.07$	0.964	–	–
Married/common-law	139 (36.87)	70 (38.04)			0.95 (0.65–1.39)	–
Divorced/separated/widowed	50 (13.26)	24 (13.04)			0.98 (0.58–1.73)	–
City of residence						
Tijuana	170 (45.09)	117 (63.59)	$\chi^2 = 16.93$	<0.0001	**0.47 (0.33–0.68)**	0.67 (0.44–1.03)
Ciudad Juárez	207 (54.91)	67 (36.41)			–	–
Sex worker type						
Street worker	324 (86.17)	167 (90.76)	NA		–	–
Dance hostess	1 (0.27)	1 (0.54)			0.51 (0.03–8.27)	–
Barmaid	17 (4.52)	7 (3.80)			1.25 (0.51–3.07)	–
Other	34 (9.04)	9 (4.89)			1.94 (0.91–4.14)	–
Male condom use						
% unprotected vaginal sex w/spouse/steady partners[b], mean (SD)	97 (17)	93 (25)	t = 1.41	0.160	1.01 (0.99–1.02)	–
% unprotected vaginal sex w/non-regular clients[b], mean (SD)	59 (35)	66 (39)	t = 2.10	0.037	**0.99 (0.98–0.99)**	–
% unprotected vaginal sex w/regular clients[b], mean (SD)	67 (37)	70 (37)	t = 1.01	0.311	0.99 (0.99–1.00)	–
Median USD[c] earned for sex with a condom, median (IQR)	20 (15, 30)	20 (14, 30)	Z = 1.44	0.150	0.99 (0.99–1.01)	–
Median USD[c] earned for sex without a condom, median (IQR)	30 (20, 45)	30 (20, 55)	Z = 0.250	0.803	0.99 (0.99–1.00)	–
Substance use						
Used alcohol or drugs before or during sex with a client[b]	352 (93.37)	168 (91.80)	$\chi^2 = 0.45$	0.500	1.26 (0.65–2.45)	–
Injected drugs with client around time of sex[b]	233 (68.33)	136 (82.42)	$\chi^2 = 11.19$	<0.0001	**0.46 (0.29–0.73)**	**0.59 (0.36–0.97)**
Number of IDU[d] male clients[b], median (IQR)	2 (0, 5)	3 (0, 6)	Z = 2.88	0.676	1.00 (0.99–1.01)	–
Number of IDU[d] non-client sex partners[b], median (IQR)	1 (0, 1)	1 (0, 1)	Z = 2.17	0.030	1.00 (0.98–1.02)	–
Abuse history						
Ever physically abused	211 (56.42)	60 (33.15)	$\chi^2 = 26.43$	<0.0001	**2.61 (1.80–3.78)**	**1.98 (1.26–3.10)**
Ever forced/coerced into sex	207 (55.50)	71 (39.01)	$\chi^2 = 13.30$	0.0003	**1.95 (1.36–2.80)**	**1.73 (1.12–2.66)**
Ever physically abused by client	86 (22.99)	22 (12.02)	$\chi^2 = 9.47$	0.002	**2.19 (1.32–3.63)**	–
Client ever used/threatened violence when proposing condom use	50 (13.26)	25 (13.59)	$\chi^2 = 0.01$	0.916	0.97 (0.58–1.63)	–
Client angry due to suggestion of condom use[b]	147 (45.23)	69 (43.40)	$\chi^2 = 0.15$	0.703	1.16 (0.89–1.52)	–

Table 2 continued

Characteristic	Interested in using female condoms[a] ($n = 377$)	No interest in using female condoms[a] ($n = 184$)	Test statistic	p value	Unadjusted OR (95 % CI)	Adjusted OR (95 % CI)
Client violent due to suggestion of condom use[b]	64 (19.75)	41 (25.63)	$\chi^2 = 2.17$	0.140	0.71 (0.46–1.12)	–
HIV/STI status						
Ever tested for HIV	198 (52.52)	82 (44.57)	$\chi^2 = 3.24$	0.072	1.38 (0.97–1.97)	–
HIV	19 (5.04)	9 (4.89)	$\chi^2 = 2.25$	0.325	1.04 (0.46–2.33)	–
Chlamydia	54 (14.32)	20 (10.87)	$\chi^2 = 3.38$	0.337	1.36 (0.79–2.35)	–
Gonorrhea	8 (2.12)	4 (2.17)	$\chi^2 = 2.19$	0.534	0.98 (0.29–2.28)	–
Syphilis titers $\geq$1:8	33 (8.75)	20 (10.87)	$\chi^2 = 0.67$	0.716	0.78 (0.44–1.41)	–

OR (CI) values that are significant are shown in **bold.** Adjusted odds ratios reflect associations after controlling for all other variables that were included in the model

OR odds ratio, *CI* confidence interval, *IQR* interquartile range, *SD* standard deviation

[a] Data are in the format *n* (%) unless otherwise indicated. Some percentages may reflect denominators smaller than the n-value given in the column head due to missing data

[b] In the past month

[c] US dollar

[d] Injection drug user

some female sex workers identify methods to exercise agency and gain personal protection and economic advantage [31]. Prior fieldwork demonstrated female sex workers' eagerness to try the female condom because of its potential use as a bargaining strategy to charge higher prices for sex without a condom while secretly using it [32]. However, it is not clear to what extent it is actually possible to conceal the use of a female condom from a client who refuses to use a male condom [32].

Due to the cross-sectional nature of our study, it was not possible to infer causality within the relationships between female condom use and interest and male condom use, substance use, abuse history, and HIV/STI status. Behavioral risk measures and abuse history were based on self-report and may be subject to recall bias or social desirability bias, though the high prevalence among our sample of reports of physical and sexual abuse, experiences that are known to be underreported, suggests that such biases were of minimal effect. Since the parent study was not designed to comprehensively examine female condom use experiences, we were unable to determine if our comparison group of non-users included FSW-IDUs who lacked knowledge about or access to female condoms, which may have resulted in an overestimate of observed associations. Our measures of violence and threats of violence in the context of condom use negotiation were not specific to type of condom (male or female), which limited the interpretation of this finding. Although the study sample included a large number of FSW-IDUs in Tijuana and Cd. Juárez, the findings may not be generalizable to FSW-IDUs in other cities in Mexico or other countries, since the parent study intentionally recruited high-risk women.

Despite these limitations, our study contributes to the existing literature about the prevalence of female condom use and associated factors by providing findings from an underexplored population of high-risk FSW-IDUs. FSW-IDUs are highly vulnerable to violence from clients, intimate partners, injection partners, and police, which leads to reduced self-efficacy to negotiate male condom use [25, 33, 34]. Our finding that anger from a client in the context of condom use negotiation was associated with female condom use suggests that female condoms may provide one avenue for FSW-IDUs to increase their control over their working conditions. Unique to this study are the assessment of factors associated with an interest in trying a female condom and a focus on FSW-IDUs in the Mexico–US border, where STI prevalence is increasing.

Further research is warranted to elucidate the situational context and relationship dynamics of female condom use in this population of FSW-IDUs. Given the strong association between partner violence and power differentials in sexual relationships, it is crucial to disentangle the interplay of these factors in association with female condom use and

interest. To increase protected sex acts among FSW-IDUs with both regular and non-regular clients, further research is also needed on the acceptability of, and potential barriers to, such alternate methods of STI prevention as female condoms and vaginal microbicides. In the Mexico–US border region, FSW-IDUs are at dual risk for HIV through unsafe practices of both injection and sex. To truly reduce the risk of HIV/STIs in this population, interventions are needed that increase safer injection practices while promoting female-initiated HIV prevention methods (e.g., negotiation of female condom use with clients and regular sex partners). Coupled with HIV prevention interventions, efforts by the state HIV agency and local counseling centers to increase the availability and affordability of female condoms, as well as education about their use, will assist in curtailing the HIV/STI epidemic among FSW-IDUs in the Mexico–US border region.

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