Intimate Partner Violence among Chinese Transwomen:

Associations with Sexual Risk Behaviors and HIV Testing

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Abstract

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Intimate partner violence (IPV) is an emerging risk factor for HIV infection. Given the high vulnerability of and limited research on transwomen in China, we described IPV, sexual risk behaviors, HIV and sexually transmitted infections (STIs) testing rates and results, and investigated the pathways that link IPV to HIV infection among this population. We conducted a cross-sectional survey and collected blood samples for HIV and syphilis testing among transwomen in Shanghai, China (*N* = 199). With logistic regression, we examined sexual risk behaviors and HIV/STI testing history among participants with and without IPV experience. Over half of the respondents reported IPV (57.3%) and the prevalence of unprotected sex range from 51.9% (with sex workers) to 87.8% (oral sex); 85.9% had ever tested for HIV and 49.3% for other STIs. Self-reported positivity results were: HIV (2.3%), HSV-2 (8.3%), gonorrhea (18.8%), and syphilis (17.8%). Lab-confirmed positivity was 5.0% for HIV and 6.5% for syphilis. Respondents with a history of IPV were significantly less likely to report HIV testing in the past 12

months (aOR 0.20, 95%CI 0.10-0.38). Transwomen self-reported a high prevalence of IPV, which was related to a lower probability of HIV testing. The prevalence of HIV and other STIs was lower than reported in previous studies of Chinese transwomen, while the HIV/STI testing rates were higher. Findings suggest transwomen in China are at risk for IPV and need enhanced HIV prevention services to promote HIV testing in an IPV setting.

Introduction

Transgender individuals are a diverse group whose gender identity does not correspond to the sex assigned at birth.[1] This population shoulders substantial HIV and STI disparities.[2] Specifically, transwomen have an HIV acquisition risk that is 12 times higher than the general population.[3] A meta-analysis of 88 studies on transgender health in the United States reported the mean prevalence estimate for laboratory-confirmed HIV for transwomen was 14.1%, significantly higher than that for transmen (3.2%).[4] Similarly, a systematic review of 32 original English-language studies with laboratory tests on HIV and sexually transmitted infections (STIs) indicated a higher prevalence of HIV, syphilis, gonorrhea, and chlamydia in transwomen than in transmen.[5]

Intimate Partner Violence (IPV)

Intimate partner violence (IPV), defined as violent behaviors of a physical, sexual, or psychological nature occurring between spouses or intimate partners, is a common and negative social determinant of health.[6-7] Transwomen are at a higher risk of IPV victimization compared to cisgender people. Transgender individuals were 2.2 times more likely and 2.5 times more likely to experience physical and sexual IPV respectively, compared to cisgender individuals.[8] Transwomen IPV survivors were four times as likely to report sexual violence and financial violence from intimate partners than transmen and cisgender survivors.[9]

IPV, sexual risk behaviors, and HIV/STIs infection are extensively intertwined, [7]with each increasing the risk of the others.[10] IPV is associated with higher odds of HIV infection among transwomen.[11] High-risk sexual behavior such as inconsistent condom

use is one of the pathways that link IPV and HIV/STIs.[13] Controlling for HIV status, age, and immigrant status, IPV (psychological, sexual, and physical) was associated with an increased probability of unprotected receptive anal sex among Latino men who have sex with men (MSM).[14] Lesbian, gay, bisexual, and transgender (LGBT) individuals who reported forced sex with their partners were 10.3 times more likely to engage in unprotected sex than those without forced sex.[15] Similarly, a study of 389 transwomen Lima, Peru found an association between physical intimate partner violence and condomless receptive anal intercourse (aPR 2.22, 95%CI 1.19-4.13).[16] Violence may reduce the survivor's ability to dictate the timing, circumstances, and safety of subsequent sexual encounters, thus increasing indirect vulnerability to HIV infection.[17] Fear of partner anger and rejection were also reasons why transwomen engaged in risky sex.[18]

Sexual Risk Behaviors

Sexual behaviors such as unprotected receptive anal intercourse and multiple sexual partners are risk factors for HIV/STIs transmission.[19] Transwomen consistently report engagement in receptive anal sex with men and thus are biologically vulnerable to HIV/STIs. A risk behavior survey of 67 transwomen in Houston, Texas found that 27% of the respondents were HIV positive and condoms were used less than half of the time during anal sex with either primary or casual partners.[20] A review of 29 studies on risk behaviors of transgender individuals in the U.S. reported one third to one-half of the transwomen reported sexual risk behaviors such as unprotected receptive anal intercourse and multiple casual partners.[21] More than a third of 599 transwomen in

Florida, New York City, and San Francisco reported high-risk behaviors in the past year, including unprotected receptive anal sex and commercial sex work.[22]

HIV/STI Testing

HIV and STI testing is a crucial step toward prevention because it raises serostatus awareness and links HIV/STI-positive individuals to medical care.[23] Despite the high prevalence of HIV/STI, IPV, and sexual risk behavior, transgender individuals are less likely to get tested for HIV and other STIs than cisgender individuals due to barriers such as stigma and lack of health care services.[24] A systemic review of 29 studies on transgender populations in the U.S. reported a discrepancy between lab-tested and self-reported HIV positivity among transwomen, indicating more than half of the transwomen in the studies were not aware of their HIV status.[21]

Despite the high risk of HIV infection among women with IPV experiences from any current or former intimate partner, one study reported only 52.8% of them have ever been tested for HIV.[25] The studies on the association between HIV testing rates and IPV experiences among women produced mixed results. Nasrullah et al. reported higher rates of HIV testing among women with IPV experience compared to those without IPV experiences from their previous or current intimate partners (threatened physical violence, attempted physical violence, completed physical violence, and unwanted sex), which might be due to higher perceived risk.[25] However, Etudo et al. reported experiences of psychological and physical abuse were associated with less HIV testing in the past year, and more barriers to HIV testing.[26] The low testing rate might be due to barriers such as the stressful testing process, the fear of knowing the results, or the lack of knowledge of HIV transmission and thus underestimate their risk of HIV acquisition.[27]

Disclosure of HIV testing results might be especially stressful considering the potential negative response from the partner.[28] Gonzalez-Guarda et al. found female IPV survivors who have experiences of risk of high-lethality violence are more likely to request testing but not more likely to actually get tested, which might be due to their partners' controlling behavior.[29]

Similar results have been reported among transwomen individuals. Experiences or the risk of experiencing IPV may limit transwomen's access to HIV prevention and care and lead to low HIV testing rates. One qualitative study on home HIV-testing kit for partner testing among transwomen found some participants felt they were at risk for violence for bringing up testing with their current partners or for having positive results from HIV testing.[30] IPV experiences, especially forced sex, may increase HIV testing rates due to increased perceived risk of HIV infection. Logie et al. reported transwomen with IPV experience are more likely to have tested for HIV in the past 6 months.[12]

Chinese Transwomen

Transwomen across different settings have a high prevalence of HIV infection, with those in resource-poor countries especially vulnerable.[31s] Nevertheless, transwomen are not included in routine HIV and STI surveillance in China.[32s] Research on transwomen sexual health in China is limited. One study on 1,320 men who have sex with men (MSM), recruited through two major Chinese LGBT online platforms in Guangzhou and Chongqing, revealed that transwomen in China compared to cisgender MSM, have a higher prevalence of HIV (11.1% vs. 5.7%) and syphilis (31.2% vs. 15.7%).[33s] Yan et al reported similar results where HIV prevalence among 250 transwomen in eastern China was 14.8%, higher than what was found in other key HIV

populations in China.[34s] A study by Zhang et al. used online platforms to recruit 1424 MSM from eastern, northern, and southern provinces in China. In their study, transwomen reported more risky sex, including commercial sex (21.3% vs. 5.1%) and group sex (26.2% vs. 9.2%) than cisgender MSM in the last 12 months.[35s] Moreover, Chinese transwomen evidenced an increased risk of IPV compared with cisgender MSM. Among the 61 transwomen participants in the study by Zhang et al., 65.6% reported ever experiencing IPV.[35s] A nationwide survey of transgender and gender-nonconforming people (including genderqueers and cross-dressers) population (*N* = 2060) in China conducted by Beijing LGBT Center and Peking University reported 96.2% of the participants with a partner, spouse, or a child experienced some form of partner violence.[36s] Despite these risks, transwomen in China are less likely to get tested for HIV (34.6% vs. 62.0%) than cisgender MSM in China.[33s] We could locate no research examining the association between IPV and high-risk sexual behaviors or HIV testing among transwomen in China.

In the present study of transwomen in China, we aimed to (1) report the prevalence of IPV, sexual risk behaviors, and both self-reported and laboratory-based HIV/STIs; (2) describe HIV/STI testing behaviors and motivators and barriers related to HIV testing, and (3) examine the associations of IPV with sexual risk behaviors and HIV testing behavior.

Materials and Methods

Data Collection

A local non-governmental organization (NGO) with expertise working with sexual and gender minorities assisted in recruiting a convenience sample (*N* = 199) in

Shanghai, China from 2016 to 2017. The inclusion criteria were: (1) assigned male sex at birth; (2) self-identify as a transwoman or transsexual; (3) has had anal and/or oral sex with a man in the last 12 months; (4) presently resides in the metro Shanghai area; (5) plans to reside in the metro Shanghai area for the next 12 months. We excluded individuals who could not provide verbal and written informed consent or who were under the influence of alcohol or drugs. Eligible participants completed the consent form and the online survey in Mandarin. Each participant received 100 RMB (~US$15.00) as an incentive. The Shanghai Municipal Center for Disease Control and Prevention (SCDC) approved the study. The NGO partner is in the same building as the voluntary counseling and testing site of SCDC, where all participants underwent testing for HIV and syphilis after completing the survey.

Measures

Socio-demographic Variables. The socio-demographic information collected included *hukou or* official residential status (which confers access to local services), age, sexual orientation, ethnicity, occupation, education, marital status (unmarried/married/divorced/ cohabitation), and monthly income.

Intimate Partner Violence (IPV). Intimate partner violence in the past five years was measured with seven items adapted from a previous study by Dunkle et al. on IPV among MSM in China ("hit you or threw something at you", "threatened to stop helping you with money or with housing", "verbally threaten to harm you physically or emotionally", "verbally threatened to physically or emotionally harm someone you care for", "forced you to have sex", "damaged or destroyed your property", "threatened to tell others the sexual relationship between you two").[37s] Participants indicated the number

of partners from whom they experienced each IPV in the past five years. The seven items were summed and dichotomized because the summed count does not necessarily represent the severity of IPV. This is also consistent with how previous studies scored the IPV measures.[9,11,33s] The composite IPV item represents the experience of IPV in the past five years as (1) *any* versus (0) *none*. Chronbach's alpha of this measure in this sample is 0.86.

Sexual Risk Behaviors. Seven sexual risk behaviors were assessed using 7 items, asking whether participants had engaged in each of seven sexual behaviors (screeners) in their lifetime, in the past 12 months, and the past 6 months and, if so, whether they used a condom during that behavior (actual items). The sexual risk behaviors assessed included unprotected sex with a main partner, unprotected sex with sex workers, unprotected oral sex, unprotected anal sex, unprotected sex after alcohol, and unprotected sex after drug. Information about participants' lifetime sexual contact and risky sex with men and women was also collected.

Self-reported Lifetime HIV/STI Testing, Results, and Treatment. For HIV, Herpes Simplex Virus type2 (HSV-2), syphilis, gonorrhea, and other STIs, participants were asked whether they had ever been tested, testing results, whether they had received treatment, and treatment outcomes. Participants also reported the latest date for HIV testing and reasons for and against getting tested. A binary variable was created from the response of the latest HIV testing date to representing HIV testing behavior in the past 12 months (1) or not (0).

HIV and Syphilis Testing

Following Chinese HIV testing standards, all participants went through two HIV screening tests followed by a confirmatory Western Blot Assay (HIV BLOT 2.2; Genelabs Diagnostics Pte Ltd., Singapore). Serum samples were collected by nurses and screened for anti-HIV IgG antibody using an ELISA technique (Kehua Biotechnology Co. Ltd., Shanghai, China). All samples that screened positive in the first test were subject to the second antibody testing using ELISA tests. The positive samples were then confirmed by a Western Blot Assay.

Syphilis was detected by RPR (Rapid Plasma Reagin; Rongsheng Diagnostics, Shanghai, China) without titration, followed by TPPA (Treponema pallidum particle agglutination assay; Fujirebio, Tokyo, Japan). All laboratory tests were performed according to the manufacturers' instructions.

Data Analysis

Following descriptive analyses, logistic regressions were used to estimate the association between IPV in the past 5 years and seven sexual risk behaviors and HIV testing in the past 12 months, controlling for demographic variables (age, *hukou*, income, education level, age, and occupation).

Results

Socio-demographic Characteristics

Participants ranged in age from 18 to 66 years, with a mean of 32.98 (*SD* = 8.91). Most participants were of Han ethnicity (94.5%), had a current main partner (72.9%), had graduated from college (62.3%), and earned 8,000 RMB (~ US$1,119) or above monthly (53.3%). About half of the participants (53.3%) did not have Shanghai *hukou* but were living in Shanghai and planned to stay for the next 6 months (Table 1).

Prevalence of Intimate Partner Violence

More than half of the sample (57.3%) reported experiencing IPV. Notably, more than a third of participants endorsed the IPV experience where a partner verbally threatened to physically or emotionally harm them (35.7%), hit or threw something at them (34.7%), and verbally threatened to physically harm someone they care for (33.2%; Table 2).

Prevalence of Sexual Risk Behaviors

All participants reported sexual behavior with men (mean age of initiation was 20.28), with 76.4% of the sample reporting unprotected sex with men in lifetime. About one-third of the participants had had sex with women (mean age of initiation was 22.38), with 48.3% reporting unprotected sex with women (Table 3). Prevalence of engaging in sexual risk behaviors ranged from 50.0% (unprotected sex after using drugs) to 87.9% (unprotected oral sex) in participants' lifetime, from 51.9% (unprotected sex with sex workers) to 87.8% (unprotected oral sex) in the past 12 months, and from 48.0% (unprotected sex with sex workers) to 87.6% (unprotected oral sex) in the past 6 months (Table 4).

HIV/STI Testing Rates and results

Of the 171 (85.9%) individuals reporting lifetime HIV testing, four (2.3%) reported an HIV-positive test result, while the lab-based HIV prevalence is 5.0%. The most common reasons for testing HIV were: had unprotected oral, anal, or virginal sex (24.8%); was asked by partner or boyfriend (20.2%); started having sex with a new partner (19.1%). The most common reasons for not testing for HIV were: afraid that the result might be positive (33.9%); does not like needles (29%); did not have the time to get tested (14.5%).

Almost half the participants reported ever testing for another STI (49.3%). The self-reported prevalence of syphilis is 17.8%, while the lab-based syphilis prevalence is 6.5%. The majority of those who reported HSV-2, gonorrhea, and syphilis infection received treatment and were cured. (see Table 5 for testing rates, prevalence, treatment, and outcome of HIV/STIs).

Associations of IPV with Sexual Risk Behaviors and HIV Testing

Controlling for age, income, hukou (residential status), and occupation, IPV events in the past five years were not associated with any sexual risk behaviors in the past 12 months. Although IPV experience was associated with an increased probability of having unprotected anal sex, this association was not significant (aOR 1.11, 95%CI 0.50-2.40; see Table 6).

Controlling for demographic factors, participants with IPV experience were less likely to report testing for HIV in the past 12 months (aOR 0.20, 95%CI 0.10-0.40). Post-hoc analyses revealed that IPV experience in the past 5 years was significantly associated with endorsing fear of positive results as a reason for not getting tested for HIV ($\chi^2(1, 199) = 15.6$, $p < .001$).; see Table 7).

Discussion

Transwomen in China are at high risk for IPV, sexual risk behavior, and HIV/STI acquisition yet remain understudied. The self-reported HIV prevalence rate in our transwomen sample (2.3%) is lower than what was reported in the previous two studies on Chinese transwomen.[34s,35s] However, the lifetime HIV testing rate we found (85.9%) is higher than that reported by Best et al. (34.6%) and by Zhang et al. (41.0%), where the study data were collected in 2013 and 2014 respectively.[33s,35s] Almost half of the

participants (45.2%) in our study had ever tested for syphilis, compared to only 15.7% in transwomen participants in Best et al.[33s] The percentage of participants who had ever tested for any STI is also higher in our study (49.3%) than in Zhang et al. (32.8%).[35s] The increased HIV/STI testings found in our study might be due to the committed national efforts in the promotion of HIV/STI testing and the steady improvement of prevention programs in the past decade.[38s] Between 2008 and 2017, the number of HIV testing facilities in China increased from 7,600 to 30,500.[39s] This increase in testing rates might also be due to the differences in demographic characteristics of the participants between our study and the study by Best et al. and Zhang et al, with participants in our study being slightly older and earn a higher monthly income.

We also detected a discrepancy between lab-based and self-reported HIV positivity, with the lab tests resulting in a higher HIV prevalence than the self-reported HIV prevalence. This discrepancy is consistent with the systematic review that reported the lab-confirmed positivity of HIV among transwomen was 27.7%, while the self-report result was 11.8%.[21] One interpretation of the discrepancy is that some participants might have developed HIV positivity since their last test but are unaware of it. This suggests that regular lab-tests should be promoted among the high-risk population to increase awareness of serostatus, consistent with the guideline by CDC in 2017 that recommended a testing frequency of every three to six months among gay, bisexual and other MSM.[43s]

The finding of inconsistent condom use in this survey of 199 transwomen in Shanghai is consistent with previous studies on sexual risk behaviors among transwomen in China.[33s, 35s] Given that unprotected sexual behavior is a critical pathway

toward HIV transmission and acquisition, intensive interventions to promote condom use are warranted.

More than half of the transwomen participants reported ever experiencing IPV and being threatened to be harmed physically or emotionally is the most common IPV event in this transwomen sample. Inconsistently with previous findings, this study did not find a statistically significant association between IPV events and sexual risk behaviors. [40s] Given the limited sample size, this study might not have enough statistical power to detect the association. Moreover, the responses to different types of IPV experience were summed and dichotomized to produce a composite score, which might have limited the measure's ability to reflect the different dimensions of IPV among transwomen. This IPV measurement also did not contain any item that reflects the unique IPV experience of transgender individuals such as psychological abuse related to gender expression and transition. The verbal abuse such as calling the individual not real men or women may reduce the individuals' self-esteem and make them more vulnerable to further abuse. Being outed to friends or family may endanger transgender individuals' employment, social support, and personal safety.[44s] Peitzmeier et al. developed four questions to assess transgender-related IPV (T-IPV). They found T-IPV was more prevalent among those transmen participants with physical or sexual IPV experiences and that T-IPV was associated with negative health outcomes.[45s] More studies are needed to develop and validate IPV measurement that captures different dimensions and unique manifestations of IPV among transwomen.

IPV experience was associated with a lower probability of HIV testing in the past 12 months. The post hoc analyses indicated that participants in an IPV setting are more

likely to be afraid of testing results. One possibility is that they're aware of their high risk of HIV infection but are too scared to find out the truth. It is also possible that participants might avoid testing because a positive test result may elicit negative reactions or violence from their partners.[41s] Future research should further investigate the specific motivators and barriers of HIV testing in an IPV setting to inform intervention development. Resources should be established to protect transwomen from IPV and to promote safe sex and HIV testing in an IPV setting. Higher education level predicts a higher probability of HIV testing, which is consistent with previous studies that suggested education and HIV knowledge are correlates of HIV testing rates.[42s]

Limitations

This study used cross-sectional data to examine IPV's associations with sexual risk behaviors and HIV/STI testing behaviors. Future studies could use longitudinal data to draw causal inferences regarding the relationships between IPV and sexual health. Given that IPV has different manifestations in transwomen populations (e.g., limiting access to their medications), the measurement used in this study might not capture IPV experience among transwomen.[44s] Future research could build quantitative surveys on qualitative understanding of the subjective experience of IPV among the transwomen population, by using a set of items that tap into participants' perceived severity of each IPV event. It is also important to investigate the key mediators and moderators of the associations, which will allow the development of interventions that are targeted at the key factors to help IPV survivors cope and reduce the negative consequences of IPV.

Conclusion

Transwomen in this study reported high levels of IPV, which was related to a lower likelihood of testing for HIV and other STIs. The prevalence of HIV in transwomen participants in this study was lower than that of one previous study on Chinese transwomen. The lifetime testing rates of HIV and STIs, however, were higher than reported in previous studies, suggesting national efforts in promoting HIV/STI testing may be having an impact. Targeted interventions should be designed to prevent HIV/STI transmission by reducing IPV and promoting HIV/STI testing. Additionally, national campaigns should be launched to decrease the stigma and trans-phobia which could potentially reduce transgender identity targeted IPV. Sexual health education to promote safe sex, condom negotiation, and HIV/STI testing, especially in an IPV setting, is needed to protect IPV survivors from HIV/STI acquisition.

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Table 1. Sample Characteristics

Demographics	*Total* (N = *199*) n (%)
Age (in years)	
18-29 years old	84(42.2)
30-41 years old	79(39.7)
42-53 years old	28(14.1)
> 53 years old	8 (4.0)
Mean (SD)	32.98 (8.91)
Range	18.00 - 66.00
Ethnicity	
Han	188 (94.5)
Other	11 (5.5)
Marital status	
Single	159 (79.9)
Married	17 (8.5)
Divorced	13 (6.5)
Widowed	0 (0.0)
Cohabit	10 (5.0)
Education	
Elementary	3 (1.5)
Middle school	25 (12.6)
High school or equal	47 (23.6)
College or above	124 (62.3)
Occupation	
Freelance	66 (33.2)
Government	10 (5.0)
Sex worker	11 (5.5)
Student	16 (8.0)
White-collar	58 (29.1)
Manual worker	38 (19.1)
Current residency (hukou)	
Shanghai	93 (46.7)
Other	106 (53.3)
Income (RMB)	
less than 2000 (~US$280)	13 (6.5)
2000-4999 (~ US$280-700)	24 (12.1)
5000-7999 (~US$705-1119)	56 (28.1)
8000 and more (~US$1127)	106 (53.3)

Gender and sexual identity	
Out TG or TS	11 (5.5)
Closeted TG or TS	89 (44.7)
Out homosexual	11 (5.5)
Closeted homosexual	78 (39.2)
Out bisexual	1 (0.5)
Closeted bisexual	9 (4.5)
Heterosexual	0 (0.0)
Others	0 (0.0)
Have a main partner or not	
No	54 (27.1)
Yes	145 (72.9)

Table 2. Intimate partner violence (IPV)

Intimate Partner Violence	*Total* (N = *199*) n (%)
They hit you or threw something at you.	
No	130 (65.3)
Yes	69 (34.7)
Threatened to stop helping you with money or with housing.	
No	141 (70.9)
Yes	58 (29.1)
Verbally threatened to harm you physically or emotionally.	
No	128 (64.3)
Yes	71 (35.7)
Verbally threatened to physically harm someone you care for.	
No	133 (66.8)
Yes	66 (33.2)
Forced you to have sex when you didn’t want to.	
No	158 (79.4)
Yes	41 (20.6)
Damaged or destroyed your property.	
No	146 (73.4)
Yes	53 (26.6)
Threatened to tell others about your sexual relationships.	
No	154 (77.4)
Yes	45 (22.6)
Overall (N = 199)	
No	85(42.7)
Yes	114(57.3)

Table 3. Lifetime sexual contact with men and women

Sexual contact with men and women	*Total* (N = *199*) n (%)
Sex with men lifetime	
Yes	199 (100.0)
No	0 (0.0)
Age of first sex with men	
Mean (SD)	20.28 (4.73)
Range	8.00 - 50.00
Unprotected sex with a man lifetime	
No	47 (23.6)
Yes	152 (76.4)
Sex with Women lifetime	
Yes	58 (29.1)
No	141 (70.9)
Age of first sex with female (n = 58)	
Mean (SD)	22.38 (4.88)
Range	14.00 - 36.00
Unprotected sex with a woman lifetime	
Number Missing	141
No	30 (51.7)
Yes	28 (48.3)

Table 4. Specific Sexual practices

	Lifetime n (%)			*Past 12 months* n (%)			*Past 6 months* n (%)		
	Yes	*No*	*NA* [a]	*Yes*	*No*	*NA*	*Yes*	*No*	*NA*
Sex with main partner	161 (80.9)	38 (19.1)		139 (86.3)	22 (13.7)	38	128 (92.1)	11 (7.9)	60
Unprotected sex with main partner	117 (72.7)	44 (27.3)	38	91 (65.5)	48 (34.5)	60	77 (60.2)	51 (39.8)	71
Sex with sex workers	37 (18.6)	162 (81.4)		27 (73.0)	10 (27.0)	162	25 (92.6)	2 (7.4)	172
Unprotected sex with sex workers	21 (56.8)	16 (43.2)	162	14 (51.9)	13 (48.1)	172	12 (48.0)	13 (52.0)	174
Sex with casual partners	92 (46.2)	107 (53.8)		74 (80.4)	18 (19.6)	107	64 (86.5)	10 (13.5)	125
Unprotected sex with casual partners	64 (69.6)	28 (30.4)	107	48 (64.9)	26 (35.1)	125	42 (65.6)	22 (34.4)	135
Oral sex	190 (95.5)	9 (4.5)		181 (95.3)	9 (4.7)	9	170 (93.9)	11 (6.1)	18
Unprotected oral sex	167 (87.9)	23 (12.1)	9	159 (87.8)	22 (12.2)	18	149 (87.6)	21 (12.4)	29
Anal sex	189 (95.0)	10 (5.0)		175 (92.6)	14 (7.4)	10	169 (96.6)	6 (3.4)	24
Unprotected anal sex	149 (78.8)	40 (21.2)	10	128 (73.1)	47 (26.9)	24	114 (67.5)	55 (32.5)	30
Sex after alcohol use	59 (29.6)	140 (70.4)		30 (50.8)	29 (49.2)	140	25 (83.3)	5 (16.7)	169
Unprotected sex after alcohol	33 (55.9)	26 (44.1)	140	20 (66.7)	10 (33.3)	169	17 (68.0)	8 (32.0)	174
Sex after drug use	20 (10.1)	179 (89.9)		5 (25.0)	15 (75.0)	179	4 (80.0)	1 (20.0)	194
Unprotected sex after drug	10 (50.0)	10 (50.0)	179	3 (60.0)	2 (40.0)	194	2 (50.0)	2 (50.0)	195

[a] Not applicable.

Table 5. Self-reported HIV and STI testing

	Testing n (%)	*Positivity* n (%)	*Treatment* n (%)	*Cured* n (%)
HIV (n)	199	171	4	NA
Yes	171 (85.9)	4 (2.3)	3 (75)	NA
No	28 (14.1)	162 (94.7)	1 (25)	NA
Don't know	0	4 (2.3)	0	NA
Refuse to answer [a]	NA	1 (0.6)	NA	NA
HSV-2 (n)	199	12	3	0
Yes	12 (6.0)	1 (8.3)	0	NA
No	187 (94.0)	9 (75)	3 (100)	NA
Don't know	0	2 (16.7)	0	NA
Gonorrhea (n)	199	32	7	7
Yes	32 (16.1)	6 (18.8)	7 (100)	7 (100)
No	167 (83.9)	25 (78.1)	0	0
Don't know	0	1 (3.1)	0	0
Syphilis (n)	199	90	17	15
Yes	90 (45.2)	16 (17.8)	15 (88.2)	13 (86.7)
No	109 (54.8)	73 (81.1)	2 (11.8)	1 (6.7)
Don't know	0	1 (1.1)	0	1 (6.7)
Other STIs (n)	199	199	14	11
Yes	14 (7.0)	NA	11 (78.6)	9 (81.8)
No	185 (93.0)	NA	3 (21.4)	2 (18.2)
Don't know	0	0	0	0

[a] "Refuse to answer" option was only available in the question regarding HIV testing results.

Table 6. IPV and its associations with sexual risk behaviors

Unprotected sex and HIV testing	*IPV*		*Total*	*Adjusted Model* [a]			
(Past 12 months)	*No (%)*	*Yes (%)*	*N*	*Odds Ratio*	*95% CI*		*p*
With a main partner							
No	25 (35.7)	23 (33.3)	48				
Yes	45 (64.3)	46 (66.7)	91	0.73	0.31	1.65	0.457
Total	70	69	139				
Commercial sex [b]							
No	8 (47.1)	5 (50.0)	13				
Yes	9 (52.9)	5 (50.0)	14	NA	NA	NA	NA
Total	17	10	27				
Casual sex							
No	13 (31.0)	13 (40.6)	26				
Yes	29 (69.0)	19 (59.4)	48	0.39	0.11	1.23	0.117
Total	42	32	74				
Oral sex							
No	9 (11.1)	13 (13.0)	22				
Yes	72 (88.9)	87 (87.0)	159	0.65	0.22	1.82	0.411
Total	81	100	181				
Anal sex							
No	24 (87.0)	23 (22.8)	47				
Yes	50 (67.6)	78 (77.2)	128	1.11	0.50	2.40	0.799
Total	74	101	175				
After alcohol use							
No	5 (26.3)	5 (45.5)	10				
Yes	14 (73.7)	6 (54.5)	20	0.30	0.04	1.86	0.203
Total	19	11	30				
After drug use [a]							
No	1 (50.0)	1 (33.3)	2				
Yes	1 (50.0)	2 (66.7)	3	NA	NA	NA	NA
Total	2	3	5				

[a] Adjusted for age, monthly income, education level, Hukou (residential status), and occupation.
[b] More than two cells in the contingency table have an expected frequency smaller than 5. Thus, regression analyses were not conducted on these variables.

Table 7. IPV and its association with HIV testing

Variables	*HIV testing (past 12 months)*		*Total*	*Adjusted Model* [a]			
	No (%)	*Yes (%)*	*N (%)*	*Odds Ratio*	*95% CI*		*p*
Age (Mean (SD))	34.250 (8.810)	31.356 (8.824)	199 (100.0%)	0.98	0.94	1.03	0.440
Monthly Income							
lower than 8000RMB	48 (42.9%)	45 (51.7%)	93 (46.7%)	Ref			
higher than 8000RMB	64 (57.1%)	42 (48.3%)	106 (53.3%)	0.54	0.24	1.21	0.140
Education level							
high school or below	56 (50.0%)	19 (21.8%)	75 (37.7%)	Ref			
College or above	56 (50.0%)	68 (78.2%)	124 (62.3%)	3.76	1.58	9.39	0.003
Hukou (residential status)							
Not Shanghai	63 (56.2%)	43 (49.4%)	106 (53.3%)	Ref			
Shanghai	49 (43.8%)	44 (50.6%)	93 (46.7%)	0.99	0.48	2.00	0.972
Occupation							
Freelance	45 (40.2%)	21 (24.1%)	66 (33.2%)	Ref			
Student	7 (6.2%)	9 (10.3%)	16 (8.0%)	0.81	0.19	3.37	0.769
Government	6 (5.4%)	4 (4.6%)	10 (5.0%)	1.10	0.22	5.01	0.907
Sex worker	8 (7.1%)	3 (3.4%)	11 (5.5%)	1.64	0.27	8.56	0.568
Manual worker	24 (21.4%)	14 (16.1%)	38 (19.1%)	1.30	0.48	3.50	0.605
White-collar	22 (19.6%)	36 (41.4%)	58 (29.1%)	1.73	0.71	4.29	0.230
IPV							
No	27 (24.1%)	58 (66.7%)	85 (42.7%)	Ref			
Yes	85 (75.9%)	29 (33.3%)	114 (57.3%)	0.20	0.10	0.40	0.000

[a] Adjusted for age, monthly income, education level, Hukou (residential status), and occupation.