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ORIGINAL PAPER

HIV Prevention Interventions for Female Sexual Partners of Injection Drug Users in Hanoi, Vietnam: 24-Month Evaluation Results

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Abstract Vietnam's HIV epidemic is driven by injection drug use. Most IDUs are sexually active and may infect their female sexual partners (SPs). We implemented peer-based HIV prevention interventions for SPs in Hanoi. This paper reports on an evaluation of these interventions based on cross-sectional surveys of SPs. Our data show that this population can be reached, relationships improved, and consistent condom use increased (27% at 24 months up from 16% at 12 months: $P = 0.002$). Self-reported condom use at last sex was 3.5 times higher among participants in the intervention than among non-participants after controlling for selection bias, indicating a possible intervention effect. However, no significant association was found for consistent condom use in the previous 6 months. Many SPs remain at risk for HIV and interventions must promote a range of HIV prevention strategies including consistent condom use, lower risk sexual activity, and ARV treatment as prevention.

Keywords HIV prevention · Sexual partners of IDUs · Vietnam

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Introduction

The HIV/AIDS epidemic in Vietnam has been driven largely by injection drug use. HIV prevalence among injection drug users (IDUs) varies widely by province—from 0.9 to 56% according to the 2009 Integrated Biological and Behavioral Surveillance (IBBS) survey [1]—but the nationwide prevalence is thought to be 25–30%. Approximately 60% of all reported HIV cases have been among IDUs, at least 90% of whom are men [1, 2]. Vietnam has also seen an increasing number and proportion of HIV cases among women. According to the 2009 IBBS, 51% of IDUs had regular sexual partners and 20% had visited sex workers in the past 12 months [2]. Studies in Bac Ninh, Lang Son, and Ha Giang provinces show that at least 50% of IDUs are sexually active [[3, 4]; Abt Associates, unpublished data, Ha Giang Province].

Studies from Vietnam [3, 5–7], Thailand [8], China [9, 10], South Asia [11], Indonesia [12], Russia [13], and the U.S. [8, 14, 15] reveal low rates of condom use by IDUs with their primary sexual partners, especially their wives and regular girlfriends. Most of this literature does not address the very serious dimension of HIV serodiscordance in primary sexual relationships. Although results from studies in Asia differ, some suggest that female sexual partners of IDUs may not to be drug users themselves or have sex partners outside their primary relationships [6]. This suggests that sexual transmission of HIV from IDUs to their partners may be an important factor in evolving HIV epidemics in Vietnam and elsewhere.

This paper reports 24-month results from an evaluation of HIV prevention interventions for female sexual partners (SPs) of IDUs in Hanoi, Vietnam's capital city. The interventions SPs of male IDUs who are former or current residents of target drug detention centers ("06 centers")

and prisons, as well as of other IDUs in the community. For the purposes of this project, primary sexual partners are defined as wives or cohabiting girl friends of IDUs.

Our interventions focus on serodiscordant couples in which the woman is HIV-negative, couples in which the woman is HIV-negative but does not know the HIV status of her husband or boy friend, and seroconcordant couples in which both partners are HIV-negative. The project covers four districts—Dong Da, Hai Ba Trung, Hoang Mai, and Long Bien—which were chosen because they have among the largest numbers of IDUs and individuals sent to 06 centers and prisons and were most receptive to the planned interventions because of the support of mass organizations (such as the Women's Union) and local authorities. This project is among the first in Vietnam to focus HIV prevention interventions on sexual partners of IDUs. The interventions were implemented in June 2008.

The objectives of the interventions are to help SPs reduce their risks of acquiring HIV infection. The project employs a peer district coordinator and 4–5 other peer educators (PE) in each district. Each PE has an active caseload of approximately 50 SPs. The PEs assess the needs and situations of each SP and provide risk reduction information, materials, commodities, and referrals tailored to each client. Consistent condom use is a key goal but one that is very challenging to achieve particularly in this population, so our PEs also promote other HIV prevention approaches including lower-risk sexual activity and ARV treatment for the male partner where indicated, with high adherence. Regular HIV testing is also promoted through referrals to fixed site and mobile VCT. Other referrals are also provided, including to STI testing and treatment, reproductive health and family planning services, legal aid, and harm reduction programs (needle/syringe programs and methadone maintenance treatment).

Methods

Evaluation of the interventions is primarily through serial cross-sectional surveys of SPs in the 4 target districts. This paper reports on the baseline (May 2008) and 12-, and 24-month follow up surveys (June, 2009 and August, 2010). We also employ process monitoring data. We previously reported results of the baseline survey [5].

All three surveys were conducted at Dong Da Hospital and consisted of an informed consent process, a behavioral interview of about 45 minutes' duration and an HIV test, with pre- and post-test counseling. Nursing staff of the hospital were trained to conduct the surveys.

Inclusion criteria for the baseline survey were: residing in one of the target districts; being at least 18 years old; and having a current primary sexual partner who had been or still was in a 06 center or prison. In the 12- and 24-month surveys, we included SPs of community IDUs who had not been in 06 centers or prisons.

Female sexual partners were recruited for the surveys by several methods. For the baseline, we contacted an initial set of 47 potential respondents across the four districts using addresses found in lists of residents of and returnees from 06 centers and prisons provided to us by the Women's Union and/or local authorities. For the followup surveys we began with 9 "seeds" in each district who were identified by the project's peer educators from among project clients. Thereafter, in all surveys we employed "snowball" referrals to recruit the remainder of the samples. Only five of 237 (2%) qualified individuals declined to participate in the baseline survey, 12 of 303 (4%) in the 12-month, and 15 of 293 (5%) in the 24-month survey.

The behavioral interviews were conducted face-to-face and completed in hard copy by the interviewers. They included questions on basic demographics, marital status, sexual relationships and condom use with primary and other sexual partners, drug use, commercial sex work, sexually transmitted infections, HIV knowledge, history of HIV testing, HIV status of primary male sexual partner, perceived risk for HIV infection, and exposure to HIV prevention services. The followup surveys asked specifically about exposure to the SP interventions. The survey also included questions on gender power dynamics (such as the extent to which the male partner dictated sexual activities) and other relationship characteristics (such as whether the male partner would become angry or violent if the woman requested condom use and whether the woman "felt trapped" in the relationship). Most of these questions were drawn from a normed scale [16].

The survey questionnaire and blood sample for HIV testing were coded only by a study ID number designed to be unique but easy to reconstruct if lost because it was composed of elements of common knowledge to respondents such as date of birth and first letter of family name. Following the blood draw, a rapid HIV test (Abbott Determine 1/2, USA) was conducted but no provisional results were given to the participant, pursuant to Vietnam's national testing protocol. Initially positive samples underwent confirmatory testing (which included Bio-Rad, France; ELISA Genscreen HIV 1/2 V2, Fujirebio, Inc., Japan; and Serodia SFD, France) with positive result confirmed when all three tests were positive, also according to the national protocol. Participants were given a card with their study ID number and telephone number of the clinic where they could call in 2 weeks to arrange for receipt of their results and post-test counseling. It was not possible to test the male sexual partners of the women participants. Therefore, male partners' HIV status and the couples'

seroconcordance/discordance was based on the women SPs' responses to survey questions.

Data were entered using Epi-Info, version 6.04d (January 2001) and sent to Abt Associates headquarters in the U.S. for analysis, which employed SAS, version 9.2.

We used simple frequencies and cross-tabulations to describe demographics, risk factors (including HIV serodiscordance/concordance), and relationship characteristics. We used Chi-square tests for trend, estimated in a logistic regression, to assess changes over time in relationship characteristics.

The respective HIV status of the partners is an extremely important factor in determining current and future HIV risk levels in primary sexual relationships. Therefore, we conducted bivariate tests of association (Pearson Chi-square) between HIV seroconcordance/discordance and condom use and relationship characteristics. The concordance measure used three categories: concordant (including both negative and both positive), discordant (including woman positive/man negative and woman negative/man positive), and unknown (including woman negative, man unknown and woman positive, man unknown). We then employed an ordered logistic model, which included covariates of demographic factors (age, education and marital status) and sub-site (district of residence), to test further the associations identified in the bivariate analysis. We used an ordered logit model because the three concordance categories represent a hierarchy of risk for HIV transmission from highest (discordant) to lowest (concordant). (Details of the model are available from the corresponding author.)

We also assessed associations between condom use (at last sex and frequency in past 6 months) and participation in the HIV prevention interventions. To do this we first employed bivariate analysis and more descriptive logit models adding demographics (including age of participants), personal behaviors, and relationship factors. We further sharpened the analysis using three logistic regression models, as follows:

1. The most conservative analysis exploited the fact that the interventions were only in operation at the time of the 12-month and 24-month surveys. We used participation in the survey waves themselves as proxies for having contacted the interventions. We assumed no participation in interventions for respondents in the baseline survey (although respondents may have contacted other HIV prevention programs) and contact with our SP Project in the followup surveys.
2. This was a more direct analysis that employed as a dummy variable whether or not the SP reported on the survey any contact with the interventions. This analysis also included dummy variables for the post-baseline surveys to capture unmeasured heterogeneity in these surveys. However, this analysis likely suffered from two forms of selection bias: (a) SPs with more power in their relationships; or (b) those in HIV serodiscordant relationship where she was HIV-negative may have been both more likely to contact the interventions and better able to negotiate condom use regardless of whether they participated in the interventions.
3. We conducted a propensity score analysis to correct for the possible selection bias in analysis #2. We predicted each SP's probability of contacting the interventions and made four propensity groups, each composed of women with similar personal and relationship characteristics. Based on these characteristics, group 1 was the most likely to contact the interventions and group 4 the least likely to do so, but all of the groups contained both women who did and did not report contacting the interventions. We then ran a logistic regression exploring the association between SPs' self-reported contact with the interventions and their self-reported condom use. In this way, we compared the effect of the interventions among groups of women with a similar likelihood of contacting the intervention.

Ethical Review

The protocol and instruments were approved by the Institutional Review Boards (IRB) of Abt Associates Inc. and the Hanoi School of Public Health. Respondents were given an incentive of 100,000VND (~$5) for their participation in the survey.

Results

In the first 2 years the interventions reached approximately 40% of the total number of SPs in the four target districts. This percentage is based on dividing the estimated number of IDUs with primary SPs (the number of IDUs in the four districts estimated by Hanoi Provincial HIV/AIDS Center multiplied by the estimated percentage of IDUs having primary SPs, from IBBS 2006) by the number of women SPs reached by our intervention in each district, from program monitoring data. The interventions reached an average of 1,513 women SPs each year of the project. Each client had an average of 34 contacts per year with the intervention, including individual contacts, both face-to-face and by mobile telephone, and participation in group meetings.

Demographics of Survey Participants

Table 1 presents selected demographics and other characteristics of the surveyed SPs. About 40% were less than 30 years old and about 60% had education through secondary school only. The vast majority was married and had children with their primary partner. These characteristics were quite consistent across survey waves, although the follow up survey samples were somewhat younger than the baseline sample.

Relationship Characteristics

Figure 1 shows the trends among SPs in selected relationship characteristics. This shows declining prevalence of characteristics that may reflect troubled relationships and difficulty for SPs in negotiating consistent condom use with their husbands or boy friends.

HIV Prevalence, HIV Risk Factors, and HIV Testing

Table 2 presents the results of the HIV testing of SPs in the three surveys, as well as some factors related to HIV status. Fourteen percent of the SPs tested HIV-positive on the baseline survey. Prevalence appears to have dropped sharply in the 12- and 24-month surveys, but this is probably an artifact of the sampling strategy in the follow up surveys, which captured mainly participants in the interventions the majority of whom are, by design, HIV-negative SPs in serodiscordant or unknown status relationships. Based on self-reports to peer educators, among more than 1,800 total clients only 2 reported seroconverting to HIV in the first year and only 1 in the second year.

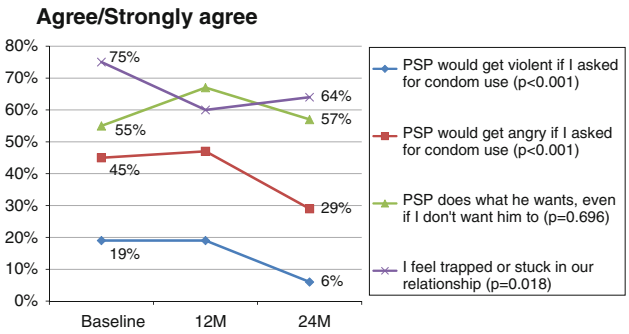

Fig. 1 Trends in relationship characteristics

Although the percentage of SPs in serodiscordant relationships declined somewhat across the survey waves, a consistent 68–71% of SPs in all waves were either in serodiscordant or unknown status primary relationships. Self-reported rates of current sex work and IDU were very low among SPs, indicating that their primary risk factor was sexual relations with their male partners.

As shown in Table 3, increasing percentages of SPs reported having been previously HIV tested—from 38% at 12 months to 65% at 24 months ($P < 0.001$). Although we have no baseline for this measure, almost 80% of SPs in the

Table 1 Characteristics of sample of female sexual partners

	Baseline		12 months		24 months	
	Total		Total		Total	
	N	Percent (%)	*N*	Percent (%)	*N*	Percent (%)
Age						
18–30	105	45	114	39	109	39
31–40	63	27	136	47	117	42
>40	64	28	42	14	52	19
Highest education level						
Primary school or illiterate	29	13	23	8	14	5
Secondary school	114	49	151	52	148	53
High school	84	36	109	38	104	37
College/University	5	2	8	3	12	4
Marital/living status						
Married	202	88	268	92	244	89
Cohabiting	21	9	12	4	24	9
Single	0	0	0	0	0	–
Separated/divorced	3	1	5	2	1	1
Widowed	3	1	6	2	4	2
Have children with current primary sexual partner	191	82	256	88	235	85

Table 2 HIV status and risk factors

	Baseline		12 months		24 months	
	Total		Total		Total	
	N	Percent (%)	*N*	Percent (%)	*N*	Percent (%)
HIV status, this survey						
Positive	32	14	27	9	18	6
Negative	200	86	264	91	260	94
HIV concordance						
Concordant	72	31	107	37	109	39
Discordant	107	46	92	32	80	29
Male partner unknown	53	23	92	32	87	32
History of sex work	20	9	14	5	19	7
Current SW	10	4	9	3	9	3
Current IDU	14	6	10	3	5	2

Table 3 HIV testing/treatment

	Baseline		12 months		24 months	
	N	Percent (%)	*N*	Percent (%)	*N*	Percent (%)
Previously HIV tested	86	37	111	38	179	65**
Why not tested?						
Inconvenient time					10	10
Clinic is too far					2	2
No transportation means					4	4
Don't think it is necessary					43	43
Afraid of husband/partner(s)					1	1
Scared of testing					36	36
Referred to VCT			189	87	191	79*
Went to VCT after being referred					125	65
HIV positive male partner on ARV treatment					69	84

* *P* value for change across waves between 0.05 and 0.001

** *P* value for change across waves <0.001

24-month survey reported having been referred to VCT and of those 65% actually went to a VCT site. Among SPs not previously tested, the most frequent reasons were a belief that testing was not necessary for them, fear of the results, or factors of inconvenience more related to the woman's own situation than to accessibility of the testing site. At 24 months, SPs with known HIV-infected male partners reported that 84% of them were on ARV treatment. However, we have no baseline for this measure.

Condom Use, Relationship Characteristics, and HIV Serodiscordance/Concordance

Figure 2 shows that rates of consistent condom use among SPs increased between the 12- and 24-month surveys but

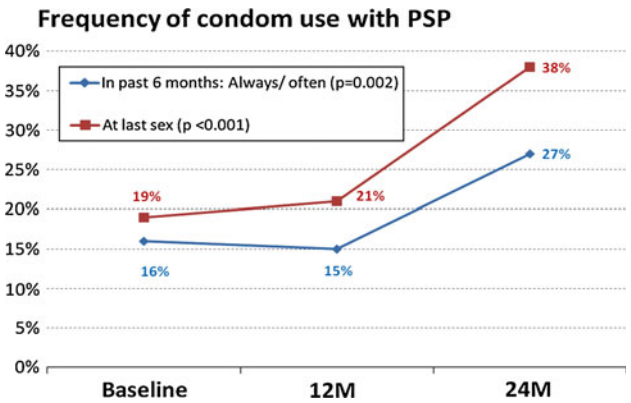

Fig. 2 Self-reported frequency of condom use with primary male partner

Table 4 Condom use and relationship characteristics, by HIV concordance

	Concordant	Discordant	Unknown	Total	*P* value	
	Percent (%)	Percent (%)	Percent (%)	Percent (%)	Bivarate	Ordered logit
Frequency of condom use with PSP						
Always/often in past 6 months						
Baseline	15	17	17	16	0.949	0.403
12-month	12	24	12	16	0.052	0.059
24-month	30	31	17	26	0.067	0.586
Used condom, last sex with PSP*						
Baseline	17	21	19	19	0.851	0.337
12-month	16	29	18	21	0.061	0.050
24-month	41	49	27	39	0.017	0.942
*PSP would get violent if I asked for condom use:***						
Agree/strongly agree						
Baseline	8	24	25	19	0.057	0.065
12-month	9	30	17	19	0.004	0.001
24-month	5	10	6	7	0.001	0.001
*PSP would get angry if I asked for condom use:***						
Agree/strongly agree						
Baseline	29	52	53	45	0.006	0.004
12-month	31	65	45	46	<0.001	<0.001
24-month	17	39	37	30	<0.001	<0.001
*PSP does what he wants, even if I don't want him to:***						
Agree/strongly agree						
Baseline	42	56	70	55	0.003	0.055
12-month	56	75	74	68	0.030	0.020
24-month	44	72	62	58	0.004	<0.001
*I feel trapped or stuck in our relationship:***						
Agree/strongly agree						
Baseline	65	76	87	75	0.029	0.903
12-month	46	71	66	60	0.008	0.002
24-month	50	75	74	64	0.003	0.002

* *P* value based upon Yes and No responses only

** *P* value based upon four levels of the value of this variable

still remained well below 50%. The most frequently cited reasons for not using condoms across the survey waves were that male partners objected, SPs did not think of it or did not consider it necessary. Table 4 shows that condom use increased in HIV- concordant, -discordant, and unknown status relationships but that there was still no statistical association between concordance/discordance and condom use. While the frequency of these relationship issues declined over time, serodiscordant and unknown status relationships remained those in which male partners were more likely to get angry (39 and 37% vs. 17% for concordant: $P < 0.001$ in ordered logit analysis) if the woman asked for condom use and at 24 months more than half of SPs still reported that their partner "does what he wants even if I don't want him to" and that they felt "trapped or stuck in their relationship", regardless of HIV concordance/discordance status.

Association Between Participation in Interventions and Condom Use

Among respondents to the 12-month survey, 76% reported contact with the interventions and this figure rose to 90% at 24 months. Bivariate analysis showed that those who contacted the interventions were more likely to have used a condom at last sex ($P < 0.001$) and to have used condoms consistently (i.e., "always" or "often") in the past 6 months ($P = 0.001$). In multivariate analysis, the intervention effect was maintained for condom use at last sex ($P = 0.038$) but not for consistent use in the past 6 months.

Analysis of factors related to contacting the interventions identified relationship factors ($P < 0.001$), current IDU ($P = 0.062$), and site ($P < 0.001$). Three of the relationship questions were statistically significant predictors of contacting the interventions (male partner thinks the SP is cheating if she asks him to use a condom; SP feels trapped or stuck in relationship; male partner does what he wants) and with all three, if the SP's response indicated that she had more power in the relationship (i.e., by disagreeing with the relationship statements indicating that the male partner was dominant), the more likely she was to contact the interventions.

Table 5 presents the results of the three logistic regressions exploring the associations between contacting the interventions and self-reported condom use at last sex. The first (with participation in the followup surveys as a proxy for contact [OR at 24 months = 2.65, $P < 0.001$]) and second (using actual contact [OR = 2.06, $P = 0.035$]) analyses both show statistically significant associations between contact with the interventions and self-reported condom use at last sex.

The third analysis employing the propensity groups to control for selection bias revealed statistically significant associations among being in groups 1 and 2 (those most likely to contact the interventions), actually contacting the interventions, and reporting condom use at last sex ($P = 0.006$ and $P = 0.015$ for the groups, respectively). In other words, those women who were most likely to contact the interventions, whether through having more power in their relationships or being in an HIV-serodiscordant relationship, were the ones that appeared to benefit from the intervention. Odds ratios based on the parameter estimates indicate that SPs in propensity groups 1 and 2 who actually contacted the interventions were 3.5 times more likely to use a condom at last sex than those in these groups who did not contact the interventions.

The other condom use measure, self-reported use "always" or "often" in the past 6 months did not show significant association with intervention contact. In a model employing only baseline and 12-month data, we found a weakly significant relationship between likelihood of contacting the intervention and more frequent condom use in the past 6 months ($P = 0.060$), but that relationship disappeared when we added the 24-month data.

Discussion

The evaluation of HIV prevention interventions for SPs of IDUs in Hanoi over 24 months reveals that this group can be reached, risk factors can be reduced, and relationships can be improved. The serial cross-sectional survey design makes it difficult to draw clear causal connections between the interventions and the observed trends. However, the analysis showing higher rates of condom use at last sex among participants in interventions than non-participants is suggestive of an intervention effect. Based on the results by propensity group, the effect appears to be an additive one: that is, being more likely to contact the interventions and actually contacting the interventions are jointly predictive of condom use at last sex.

The declines in some problematic relationship factors related to HIV risk may have resulted from the interventions being able to improve condom negotiation skills among SPs. Other promising developments include the increasing rates of condom use and declines in problematic relationship characteristics in HIV-serodiscordant and unknown status relationships, which are those in which SPs' risk of acquiring HIV are greatest.

Despite the promising trends observed through 24 months, many SPs remain at risk for HIV infection due to their continued high rates of HIV serodiscordant and unknown status relationships and the continued low rates of condom use in these relationships. This finding reinforces the need for interventions to promote a range of HIV prevention strategies including consistent condom use, lower risk sexual activity, and ARV treatment as prevention. Continued attention is also needed to regular HIV testing of SPs, especially those in relationships posing high risk of HIV acquisition.

The reported results and their discussion should be considered in light of several limitations and uncertainties. The apparent reduction in HIV prevalence among SPs from baseline to followup surveys may reflect the sampling strategy for the follow up surveys which began with seeds identified by our project's peer educators and so clients of the project were likely over-represented in the followup samples. Since the project focuses on women in serodiscordant or unknown HIV status couples, the samples likely over-represent HIV-negative SPs. The baseline prevalence of 14% may be more representative of the population of SPs in our four target districts of Hanoi.

However, it is also possible that the real prevalence among SPs did decline during this period but, since we have no comparison group data, we could not make any inferences about the relationship between prevalence trends and presence of the interventions. Moreover, the small number of HIV seroconversions based on participants' self-reports is encouraging but should not be considered an intervention effect because the self-reporting could be incomplete and we have no comparison group data.

Since we were unable to test the male primary partners of the women participants, we had to base our classification of couples' HIV seroconcordance/discordance on the survey participants' reports. This is a limitation but we believe

Table 5 Condom use at last sex × participation in interventions

Variable	Post-baseline dummy variables as a proxy for contacting the intervention				Dummy variables for followup surveys and a dummy variable for contacting the intervention				Propensity groups for contacting the intervention			
	Est	Std error	Odds ratio	*P* value	Est	Std error	Odds ratio	*P* value	Est	Std error	Odds ratio	*P* value
Intercept	−1.391	0.282		<0.001	−1.435	0.284		<0.001	−1.519	0.292		<0.001
Dummy: 12-month survey	0.203	0.253	1.225	0.422	−0.387	0.384	0.679	0.314	−0.473	0.383	0.623	0.217
Dummy: 24-month survey	0.974	0.243	2.649	<0.001	0.309	0.400	1.362	0.441	0.004	0.436	1.004	0.993
Contact intervention × propensity group 1	–	–	–	–	–	–	–	–	1.375	0.502	3.955	0.006
Contact intervention × propensity group 2	–	–	–	–	–	–	–	–	1.036	0.425	2.818	0.015
Contact intervention × propensity group 3	–	–	–	–	–	–	–	–	0.597	0.403	1.817	0.139
Contact intervention × propensity group 4	–	–	–	–	–	–	–	–	0.582	0.393	1.789	0.139
Dummy: contact intervention	–	–	–	–	0.723	0.343	2.061	0.035	–	–	–	–
Dummy: age 18–30	−0.163	0.135	0.896	0.226	−0.164	0.136	0.894	0.227	−0.157	0.136	0.882	0.248
Dummy: age 31–40	0.217	0.130	1.312	0.096	0.216	0.131	1.307	0.099	0.189	0.132	1.246	0.152
Dummy: at least attended high school	0.524	0.189	1.689	0.006	0.519	0.189	1.681	0.006	0.478	0.192	1.613	0.013
Dummy: from Long Bien	0.594	0.150	1.715	<0.001	0.560	0.151	1.597	0.000	0.376	0.180	1.151	0.036
Dummy: from Hai Ba Trung	−0.725	0.178	0.458	<0.001	−0.703	0.179	0.452	<0.001	−0.608	0.187	0.430	0.001
Dummy: from Hoang Mai	0.076	0.157	1.021	0.629	0.051	0.157	0.960	0.747	−0.004	0.163	0.787	0.981
HIV seroconcordant	−0.274	0.136	0.924	0.044	−0.262	0.136	0.935	0.054	−0.239	0.138	0.985	0.084
HIV serodiscordant	0.468	0.142	1.939	0.001	0.457	0.142	1.918	0.001	0.461	0.143	1.982	0.001
Dummy: respondent a current IDU	0.441	0.542	1.554	0.416	0.519	0.548	1.680	0.344	0.537	0.548	1.711	0.327
Dummy: respondent at risk for HIV	−0.554	0.217	0.575	0.011	−0.533	0.217	0.587	0.014	−0.497	0.218	0.608	0.023
Group of 7 relationship questions	Group-wise *P* value			0.128	Group-wise *P* value			0.142	Group-wise *P* value			0.073

that our approach was reasonable given the impossibility of testing the men.

Another limitation is that, because the interviews were conducted face-to-face, responses may reflect some social desirability bias. Also, because of the structure of the interview, we were not able to capture much information on sexual partners outside of primary relationships. Such information would be useful for a more complete assessment of SPs' risk factors.

Finally, we acknowledge the mixed results of our analysis of the association between participation in the interventions and condom use: in multivariate analysis, there was a significant association for condom use at last sex but not for consistent condom use in the last 6 months.

Despite these limitations, we believe that the findings presented here indicate the potential positive effects of HIV prevention interventions for SPs, such as those implemented in Hanoi, and the need to improve such interventions so that the high levels of HIV risk in this population may be further reduced and the quality of sexual relationships further improved. In order to increase attention to SPs and improve interventions for them, it is also necessary for governments to recognize the importance of this group in concentrated HIV epidemics such as Vietnam's through its explicit inclusion in HIV/AIDS strategic planning and programmatic budget allocations.

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