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Venues for Meeting Sex Partners and Partner HIV Risk Characteristics: HIV Prevention Trials Network (HPTN064) Women's HIV Seroincidence Study (ISIS)

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Abstract

Identifying venues where women meet sexual partners, particular partners who increase women's risk of acquiring HIV, could inform prevention efforts. We categorized venues where women enrolled in HPTN 064 reported meeting their last three sex partners as: (1) Formal, (2) Public, (3) Private, and (4) Virtual spaces. We used multinomial logistic regression to assess the association between these venues and women's individual characteristics and reports of their partners' HIV risk characteristics. The 2099 women reported meeting 3991 partners, 51 % at Public, 30 % Private, 17 % Formal and 3 % at Virtual venues. Women meeting partners at Formal venues reported more education and condom use than women meeting partners at other venues. Fewer partners met through Formal venues had “high” risk characteristics for HIV than through other

venues and hence may pose less risk of HIV transmission. HIV prevention interventions can help women choose partners with fewer risk characteristics across all venue types.

Keywords

HIV; Women; Venue; Sexual risk behavior; Sexual partners

Introduction

HIV infection disproportionately affects Black women, who have 20 times the rate of new HIV infection as compared to white women in the United States [1]. Though new HIV infections decreased slightly among Black women in 2010, they still accounted for 64 % of all new HIV infections among US women [1]. While many studies of HIV risk focus on individual risk factors, recent studies have demonstrated that HIV vulnerability arises from the interactions among individuals and their social milieu and physical environments [2, 3]. Several theoretical frameworks offer explanations for these interactions. Ecological frameworks such as the Social Ecological Framework or Bronfenbrenner's Ecological Systems Theory highlight the influential role of interactions between individuals and others in their interpersonal relationships, organizational settings, community networks and environments [4–6]. Similarly, behavioral theories such as the Social Cognitive Theory further support the concept of reciprocity between personal, behavioral, and environmental factors, explaining that observations of behaviors within a particular environment and the expected outcomes associated with such behaviors affect one's behavioral decisions (i.e. partnering with men met at from a specific venue) [7]. Given the reciprocal relationship between environment and individual characteristics and behaviors, the venues where women meet sexual partners are one socio-environmental factor that may shape women's HIV risk,. The degree of risk of HIV transmission posed by partners whom women meet at various locations also contributes to women's HIV risks. Understanding where women meet partners who pose a greater risk for women acquiring HIV could inform HIV prevention efforts [8, 9].

Though HIV risk among women is an on-going public health crisis, and the social context of venues contribute to that risk, most venue-based HIV studies have been limited to populations of men who have sex with men (MSM). Among these studies with MSM populations, venues are typically limited to those locations men go specifically to meet sexual partners [10–12]. MSM studies have identified bars and clubs, bathhouses and sex clubs, public parks, gyms, and other cruising locations as venues to meet sex partners [12–14]. Some MSM studies further group venues for meeting sexual partners based upon whether: (1) sex occurs on-site [15]; (2) the venue is public (i.e., park, bathroom) [15]; (3) the venue is private (e.g., home); (4) the venue is Internet-based (e.g., chat room, website) [13]; and/or (5) the meeting spot is considered a “gay” venue (e.g., bar, club, internet site) [16]. Venue studies also characterize the places individuals meet sexual partners based on personal characteristics, such as age [11], race, history of substance use, number of lifetime sexual partners [16], sex of the partners the individuals are seeking [10], and HIV-status [17]. Again, most of these studies were conducted among populations of MSM [12, 17, 18].

In addition, evidence from Internet studies, again conducted among MSM, suggests that partners met online were perceived as riskier [10–12, 18–20].

We have found no studies of venue among US women, particularly among low-income Black women who are at increased risk of HIV infection. The few studies that have sought to describe venues where women meet sex partners have focused mainly on female sex workers (FSW) internationally [21–23]. For example, in China, FSW who met patrons outdoors had a higher prevalence of syphilis compared to those meeting clients indoors and in entertainment venues [24–26]. Women who work in service venues (e.g. massage parlors, hair salons, hotels, etc.), but do not self-identify as FSWs, were more likely to have two or more partners in the past 12 months and a positive syphilis test [26]. These findings suggest that venue plays a role in modulating HIV risk among women as well. More research is needed to understand where women who are not sex workers meet partners, and the risk characteristics of partners met in a broad range of venue types.

To address these issues, we conducted secondary analyses of a US east coast sample of the 2099 low-income women in the HIV Prevention Trials Network (HPTN) 064 Study to determine where women had met their current/recent sexual partners, and assess the association between meeting venues and both women's individual characteristics and their report of their partner's HIV risk characteristics. Specifically, we sought to identify: (1) participant characteristics associated with specific types of venues where they meet sexual partners and (2) participant characteristics and venues types associated with meeting riskier sexual partners.

Methods

Study Design

In this study, we analyzed data from HPTN 064, a multi-site, longitudinal cohort study of 2099 women from ten communities with a high prevalence of poverty and HIV. Detailed study methods have been described previously [27]. Women were recruited using venue-based sampling from May 2009 to July 2010 in six geographic areas of the US (Atlanta, GA; Baltimore, MD; New York City, NY; Newark, NJ; Raleigh/Durham, NC; Washington, DC). Eligible individuals living in these areas: (1) were 18–44 years of age; (2) self-identified as women (trans-gender individuals were eligible); (3) reported at least one episode of unprotected vaginal and/or anal sex with a man in the 6 months before enrollment and with at least one additional personal or partner HIV risk characteristic, and; (4) agreed to receive results from HIV rapid testing. Exclusion criteria included a self-reported history of a previous HIV-positive test result. Participants underwent HIV testing and audio computer-assisted self-interviews (ACASI) at study entry and at 6-month intervals for up to 12 months. ACASI data consisting of demographic, psychosocial, and behavioral data, including alcohol and substance use, ongoing physical and emotional abuse, depression, number of sex partners, main and casual partners, condom use at last vaginal and anal sex, partner characteristics, and history of transactional sex collected at study enrollment serve as the data source for our analyses. The study was approved by institutional review boards at each study site and collaborating institutions, and a Certificate of Confidentiality was

obtained from the Office for Human Research Protections in the U.S. Department of Health and Human Services.

Measures

Participant Characteristics—We asked women to self-report regarding the following psychosocial and non-sexual HIV-risk behavior variables: (1) general health status (poor vs. all other responses), (2) binge drinking (four or more drinks on one occasion at least monthly), (3) substance use (use of any cocaine, amphetamine-type stimulants, inhalants, sedatives, hallucinogens-excluding cannabis, or opioids within the last six months), (4) physical, emotional, or sexual abuse within the last 6 months, and (5) depressive symptoms [7 out of 21 on a shortened Center for Epidemiologic Studies—Depression Scale (CES-D)-S] [28]. To assess participant sexual risk behaviors, we asked each participant to report: (1) the number of male sex partners in the previous 6 months (1 vs. <1); (2) whether they had at least one main and casual partner (yes vs. no for each); (3) condom use at last vaginal and last anal sex in the past six months; (4) HIV status of last vaginal and last anal sex partner in the last six months (HIV– negative vs. HIV+ or unknown); and (5) whether they had a history of transactional sex.

Venues Where Participants Met Each of Their Three Most Recent Partners—

For each of up to three male sexual partners reported by participants over the past 6 months, participants indicated the venue where they had met the partner, choosing from among 10 venue options. Based on the methods used to categorize venues in previous studies [13, 14], as well as the distribution of responses to this question, we collapsed these 10 venues into four broader categories (Table 1): (1) locations with formal organizational structures to which women return in some regular pattern (e.g. work, church/church activity, or school); (2) public locations (e.g., bar/nightclub/dance club, social organization/health club, or on the street/hanging out); (3) private locations (e.g., private party or at a friend's house); and (4) virtual locations, such as the Internet. Women could also choose to write-in a venue in an “other” category. All “other” venues were coded and assigned to one of the four categories.

Partner HIV Risk Characteristics—For each of the last three sexual partners that the participant reported, we asked her to describe five characteristics of that partner, namely whether the woman thought that, in the past 6 months: (1) the partner was having sex with other people at the same time that he was in a sexual relationship with her, and if so, how many other people (0 vs. 1); (2) the sex of the partner (only women vs. all other responses); (3) partner's HIV status, whether HIV-negative, HIV-positive, or unknown; (4) partner's history of incarceration for at least 24 h (yes or unknown vs. no); and (5) partner's history of injecting drug use (yes or unknown vs. no). In addition, we categorized each partner as either at “higher” or “lower” risk for HIV infection, based upon four partner risk characteristics reported by the participants. Specifically, men were categorized as “higher risk” if women reported them as having at least one of the following: (1) HIV-seropositive or unknown status, (2) “definitely” or “probably” having other partners, (3) history of injecting drug use, or (4) history of incarceration. Those without any of these features were considered “lower risk.”

Data Management and Statistical Analysis

Counts and percentages were used to describe the sample of participants, the frequency of partners met in each venue type, and partner risk characteristics. For both sets of analyses, the unit of analysis was the partnership. To explore the association between the women's individual characteristics and the venues where they met each sex partner, we first conducted bivariate analyses, using multinomial logistic regression with clustering and a robust variance for the nominal outcome—venue [29]. We adjusted for clustering since each participant could report on up to three sexual partners. All variables associated with the outcome at $p < 0.1$ were included in the multivariate multinomial logistic regression model. When the multinomial analysis showed statistically significant differences ($p < 0.05$) between venues we used binary logistic regression (with clustering and robust variances) to conduct pair-wise comparisons between venues. To explore the association between the venue where women met each sex partner and the partner's HIV risk characteristics, we conducted bivariate analyses using binomial and multinomial logistic regression with robust variances for the clustered binary and ordinal outcomes. The score test p value was calculated to determine statistical significance ($p < 0.05$). All analyses were conducted using SAS version 9.2 (SAS Inc., Cary, NC).

Results

Of the 2099 women participating in HPTN 064, most were African-American (86 %). Just over half of the participants reported annual household incomes of \$20,000 or less (55 %). Nearly one-quarter of the participants reported substance use (22 %) and monthly binge drinking (24 %) at baseline; ongoing abuse and depressive symptom were more commonly reported (Table 2). Most women had at least one main partner (92 %) and had unprotected sex at the last episode of vaginal sex (82 %). Additional characteristics of the study women are presented in Table 2.

Venues for Meeting Sexual Partners

Overall, women reported meeting 4038 sexual partners, of whom 3991 had complete data for these analyses. Venue categories at which these partners were met had the following distribution: Public (51 %), Private (30 %), Formal (17 %), and Virtual (3 %) venues. “Other” venue responses represented from 5 to 24 % of the venue categories, with broad heterogeneity. For example, Public venues included 373 “other” write-in venues including but not limited to gas stations, stores, hotels, restaurants, hospitals, and subway stations. Table 1 provides the proportion of each venue category that consisted of the “other” venue responses.

Participant Demographic and Psychosocial Characteristics by Venue: Bivariate Analyses

Venues where women met sexual partners varied by both age and level of education of the woman (Table 2). Women who were younger were statistically significantly more likely to report meeting partners at Virtual venues compared to women ages 34 years and older ($p < 0.05$). Specifically, 3.6 % of women ages 18–26 years reported meeting partners at Virtual venues compared to only 0.8 % of women ages 34 years and older. Women ages 27–33 years more often reported meeting partners in Public (50.5 %) and Private (31.1 %) venues than

Formal (14.6 %) venues compared with their counterparts ages 18–26 years ($p < 0.05$). Compared to women with a high school education or higher, women with less than a high school education were more likely to report meeting partners in Public (56.1 %) and Private (28.1 %) venues, and less likely to report meeting partners in Virtual (2.4 %) venues ($p < 0.05$).

In addition, venues for meeting sexual partners varied by several behavioral characteristics of the women, including history of substance use, transactional sex, and condom use at last vaginal sex. Compared to women with no history of substance abuse, women with a history of substance use were more likely to report meeting partners in Public (63.8 %) venues and less likely to report meeting partners in Private (23.6 %) and Virtual (1.2 %) venues ($p < 0.05$). Women who reported no or unknown condom use at last vaginal sex ranged from 3.0 % to 50.9 % across venue types. Based upon the adjusted p-value for the global test, there was a trend of condom use association ($p = 0.08$) with venue (Table 3). Finally, when compared with women with no history of sex exchange, women reporting a history of sex exchange were more likely to report meeting partners in Public (59.7 %) venues and less likely to report meeting partners in Private (25.2 %) venues ($p < 0.05$).

Participant-Reported Partner Risk Characteristics by Venue Type: Bivariate Analyses

All partner risk characteristics studied (HIV-seropositive or unknown status, having concurrent partners, having male or unknown gender concurrent partners, a history of incarceration, and a history of injecting drug use) showed a statistically significant association with venue type in the bivariate analyses. Women reported a higher proportion of partners from Public and Virtual venues as HIV-positive or unknown serostatus (56 and 67 %, respectively) compared to partners from Formal and Private venues (47 and 49 %, respectively). Similarly, a higher proportion of partners from Public and Virtual venues were reported as having at least one or an unknown number of concurrent partners (CPs) (66 and 76 %, respectively) compared to partners from Formal and Private venues (57 and 61 %, respectively). Finally, women reported a higher proportion of partners from Public and Virtual venues as having male of unknown gender CPs (22 and 19 %, respectively) compared to partners from Formal and Private venues (13 and 14 %, respectively) (Table 3). All five partner risk characteristic variables were found to have statistically significant differences among venue types in pairwise comparisons (Table 4). In general, partners met in Virtual or Public venues were perceived to have more characteristics we categorized as risky than those met in Private or Formal venues.

Participant and Venue Factors Associated with Partner Risk in Multivariate Analyses

Using the derived composite risk variable described above, 83.5 % of partnerships were categorized as “higher risk”. The HIV risk level of sexual partnerships varied by the locations in which women met sexual partners and by the individual characteristics of the woman. In the adjusted multivariate model, the odds of participants forming sexual partnerships with higher risk partners were greater for Public (OR 1.7; $p = 0.0096$), Private (OR 1.4; $p = 0.0067$), and Virtual (OR 2.2; $p < 0.0001$) venues than Formal (reference group) venues. In addition, women who had a history of emotional, physical, or sexual abuse

(OR 1.5; $p = 0.0002$), or had a history of depression (OR 1.4; $p = 0.0025$), had greater odds of having higher risk partners. (Table 5).

Discussion

We believe that this is the first study to assess amongst US women at high risk for HIV acquisition where they had met their current/recent sexual partners, characteristics of women meeting partners in different venues, and characteristics of partners met in different venues. While women met their current/recent sexual partners at a variety of venues, we categorized these as Public, Private, Formal, and Virtual types and found women met the most (51 %) partners in Public venues, such as bars, nightclubs, and hanging out on the street.

Women with more education and fewer behavioral risk factors tended to meet their sexual partners through Formal venues, the same venues in which women reported that male partners they met there had fewer characteristics that could put them at risk of HIV (i.e., HIV-positive or unknown serostatus, concurrent partners, male or unknown gender concurrent partners, and history of incarceration). Similarly, the findings from the multivariate model further demonstrated that, based upon partner characteristics, women meeting partners in Formal venues may have less risk of encountering partners with HIV and HIV risk than do those meeting partners in other venues. Social cognitive theory suggests that individuals expect certain behavioral outcomes based on their observations of the environment in which a behavior occurred and past experiences with that behavior. [7]. However, it is unclear from our analyses if women with more education and fewer behavioral risk characteristics actually expected to find lower risk partners in Formal venues, and hence formed sexual partnerships with men from these venues. Further understanding the motivations behind women's sexual partnerships, by venue type, would help clarify the relationship between outcomes expectancies and partnering in specific venue types. In addition to interactions between individuals and the venue environment influencing sexual partnerships, it is also possible that partnership patterns are influenced by similarities among those within shared networks (i.e. homophily) [30]. These findings suggest that one environmental factor that may have a reciprocal relationship with individual characteristics and behaviors is the venues where sexual partners are met. However, further study to test how these theoretical concepts are operationalized in women meeting sex partners is warranted. While these findings are not entirely surprising, few studies that have investigated the role of venue in HIV risk have included the kinds of formal venues, like churches, schools, or work settings that we assessed in this study [13, 31]. In addition, most studies of venues where MSM go specifically to meet sexual partners have largely limited their focus to bathhouses [12], public restrooms [18], bars and clubs, cruising areas and public parks, and the Internet [13, 19, 20]. Most recently, in a qualitative study by Scrimshaw et al., a small proportion of men who have sex with men and women attempting to conceal their same-sex partnerships also met sex partners through a combined category of "through friends, work, or in the neighborhood" within the past year [13]. While the MSM study was small (only 4 out of 46 participants in a convenience sample), the 9 % was much lower than the 39 % met in Private (e.g. friend's homes) and 17 % in Formal (e.g. school, work) venues among women in this study. We suggest that women at risk of HIV may seek sexual partners in a somewhat broader range of venue types than MSM. Differences in venues for meeting

sex partners between MSM and women who have sex with men may be partially driven by MSM's need to conceal their same-sex partnerships. The need for concealment can stem from nondisclosure of male sex partners to female sex partners, social stigma towards same sex behaviors, and the common desire to maintain a masculine image [13].

Many studies have demonstrated that having less education is associated with having greater HIV risk. For example, in the Centers for Disease Control and Prevention's National HIV Surveillance Behavioral System, education and income, both proxies for socioeconomic status, were highly predictive for HIV infection [32]. In that sample of heterosexual men and women living in urban areas with high HIV prevalence, those with less than a high school education had more than twice the HIV prevalence of those with at least a high school education. Similar trends existed for those who were unemployed and those with annual incomes below the poverty level. The current study's findings provide additional insight into the relationship between education and HIV risk as lower educational attainment is related to where women met their sexual partners, with less educated women meeting more of their partners at the venues with the greatest report of partners with HIV risk characteristics. These findings also highlight the potential compounded effects due to the relationship between education and employment opportunities, as women with less education may also have less access to Formal venues, particularly work, which these findings indicate are a venue to meet lower risk sexual partners. We suggest that for women at increased risk of HIV, the association between HIV risk and venue may have less to do with where women choose to meet sex partners, and more to do with constraints placed on their access to venues based on limited socioeconomic status.

While some differences existed across venue types, condom use at last vaginal sex was generally very low for women in this study across venue types, reflecting study recruitment criteria. This lack of protection is particularly concerning, as most partners (83.5 %) met our definition for “being at higher risk of having HIV infection”. Even among women meeting partners in the venues where a greater proportion of risky partners were met, only 14–19 % reported using condoms at last vaginal sex. Further research is needed to determine the extent to which women's reports of partner characteristics reflect actual partner risk characteristics or women's beliefs about the kinds of men they expect to find at different venues. In addition, studies on women's perceptions of sexual norms for each venue type, as well as women's reasons for selecting venues to attend and for selecting sexual partners are needed and could also provide further context on HIV risk.

Not surprisingly, women with less than a high school education, histories of substance use and sex exchange were more likely to report meeting sexual partners through Public venues than other women. These findings are consistent with other studies [33]. Public and Private venues, as characterized in this study and other venue-based research [34, 35], are most often associated with alcohol and substance use, which may both attract women already engaging in risk behaviors and facilitate engagement in risk behaviors [33].

It is not surprising that a greater proportion of younger women met partners through Virtual venues, compared to older women in this sample. However, in contrast to findings from studies of MSM in which 40–68 % of men used the Internet to seek sexual partners [36],

very few women (3 %) met partners via Virtual venues, though those who did tended to have higher levels of education similar to the women meeting partners in Formal venues. Unlike women meeting partners in Formal venues however, those who met partners virtually reported individual and partner level characteristics that increased their risk for acquiring HIV. However, the level of risk of partners met through different types of virtual venues may differ; but we did not differentiate between types of virtual venues. Our finding is consistent with previous studies that found that people who meet sexual partners on the Internet report having higher risk characteristics; such as, younger sexual debut [33, 36, 37], more sexual partners [33, 37, 38] and more same sex partners [33, 39], greater drug use [37, 38], more transactional sex [38], more unprotected anal sex [36, 38, 39], and history of an STI [33, 36, 38, 39], than those not meeting partners via the Internet. Similar to Internet-focused studies with MSM [10–12, 18–20], the findings from the current study suggest that risk perceptions differ by the venue where partners are met. Further study is needed to determine how these perceptions may be related to the women's actual sexual risk behaviors with partners met in different venue types.

Strengths and Limitations

The primary strength of this study is that it is the first to assess where women at risk of acquiring HIV meet sex partners, and the relationship between venues and risk characteristics among women and their partners. Limitations include the self-reported data of a sensitive nature that have inherent reporting biases, though previous studies indicate that ACASI supports more accurate reporting of sensitive behaviors than other types of data collection [40, 41]. Previous literature also suggests that sexual partnership dynamics vary by the level of intimacy (e.g. main vs. casual) and length of partnership (e.g. longevity). Through our data collection, we assessed whether each participant had at least one main and at least one casual partner; however, we do not have this information at the partnership level and therefore cannot gain insight into partnership dynamics based on this criterion. Unlike most studies of venues where individuals meet sex partners among MSM/MSMW, women in this sample were not necessarily attending these venues to seek sexual partners [13, 42]. It remains unclear how motivations to attend a particular venue may influence the patterns of risk characteristics and risk behaviors observed among women in this sample. In addition, due to the cross-sectional study design, we cannot determine the causal direction of the relationships we did observe. Our data suggest associations between study participant risk characteristics and venues where sexual partners were met, and between venue and the level of risk among sexual partners at different venue types. Regardless, understanding interrelationships among perceptions, venue attendance, and partner selection, can be informative.

We found that the majority of sexual partners were met in Public venues where women socialize and “hang out”. In addition to the fact that Public venues offer high accessibility for HIV prevention activities, these findings further reassure researchers and interventionists that targeting such venues allows access to the locations where at least half of the sexual partners were met. That said, it is crucial to acknowledge that unlike MSM, nearly half of the partnerships were not initiated through Public venues. Strategies to address these partnerships must be considered, particularly since, while the Public venues were perceived

as having riskier partners, the differences of riskiness among the partners at different venue types were not great. Hence, unlike HIV prevention strategies that can target significant proportions of MSM through Virtual or Public venues, careful consideration of strategies by which HIV prevention programs may reach women meeting risky partners in Private and Formal venues is warranted. Based upon theoretical premise, the behavioral modeling and observational learning that takes place in Private and Formal venues may vary greatly from other venue types and contribute to women's perceptions of risk among partners met in these venues [7]. However, given that all venue types were associated with risk characteristics among sex partners, HIV prevention efforts should also acknowledge the complex interplay among perceptions, venue attendance, and partner selection to support women in reducing their risk through safer partner selection. It is plausible, nonetheless, that Private and Formal venues introduce HIV-vulnerable women to lower risk men than do Public or Virtual venues, a finding that could be helpful in community education for HIV risk reduction among lower income, African American women.

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Table 1
Venue categories where women reported meeting partners

Venue categories n (% of total venues) ^a n = 3991	Venue response options n (% of partners met at venue)	
Category 1: Formal n (17 %)	Work	311 (8 %)
	School	292 (7 %)
	Church/church activity	41 (1 %)
	Other (e.g. support group, narcotics anonymous, military)	39 (1 %)
Category 2: Public n (51 %)	Bar/nightclub/dance club	265 (7 %)
	Social organization/health club	112 (3 %)
	On the street/hanging out	1271 (32 %)
	Other (e.g. courthouse, hospital, store, gas station, subway)	373 (9 %)
Category 3: Private n (30 %)	Private party	138 (4 %)
	At a friend's house	763 (19 %)
	Other (e.g. through a friend or relative, drug house)	278 (7 %)
Category 4: Virtual n (3 %)	The internet	81 (2 %)
	Other (e.g. phone)	27 (1 %)

^aVenue category percentages include the "other" write-ins that were coded to each category

Table 2
Baseline characteristics of women in HPTN 064

Characteristics ^a	N = 2099	Percent or IQR
Individual characteristics		
Demographics		
Median age, years	29	IQR: 23–38
Hispanic ethnicity	245	12
African–American race	1802	86
Education		
Less than high school	777	37
High school graduate or equivalent	1322	63
Household income		
\$10,000 or less	933	44
\$10,001 to \$20,000	225	11
\$20,001 or More	197	9
Refused/don't know/no answer	744	35
Good or better general health status	1751	84
Food insecurity	971	47
Psychosocial and non-sexual HIV risk behaviors		
Substance abuse at least weekly in the past 6 months ^b	459	22
Binge drinking at least weekly in past 6 months ^c	498	24
Ongoing emotional, physical or sexual abuse in the past 6 months	768	37
Depressive symptoms ^d	692	36
Sexual behaviors		
Median number # of male partners in past 6 months [IQR]	2	IQR: 1–3
Has at least one main partner	1937	92
Has at least one casual partner	1430	69
Unprotected sex at last episode of vaginal sex ^e	1698	82
HIV-negative last vaginal sex partner	1199	57
Any anal sex in past 6 months	796	38
UAI at last episode of anal sex ^e	637	31
History of transactional sex	776	37

^aData are based on 2099 participants unless otherwise indicated and values are presented as numbers (percentages) unless otherwise indicated

^bDoes not include cannabis or alcohol

^cBinge drinking: defined as 2–3 alcoholic beverages per week

^dThe Center for Epidemiologic Studies—Depression Scale (CES-D) was administered, with a score of 7 (on 8-item scale) indicating psychological distress or depressive symptoms

^eIncludes 'don't know' responses

Table 3

Participant characteristics and venue, multivariate model

Variable	Formal %	Public %	Private %	Virtual %	Adjusted p value ^a	Public versus formal	Private versus formal	Virtual versus formal	Private versus public	Virtual versus public	Virtual versus private
Age											
18–26	19.1	45.5	31	3.6	0.0097	Ref	Ref	Ref	Ref	Ref	Ref
27–33	14.6	50.5	31.1	3.9		1.39 [1.04,1.83]^b	1.47 [1.10,1.96]	1.42 [0.80,2.52]	1.03 [0.83,1.27]	1.15 [0.67,1.99]	0.85 [0.49,1.46]
34+	15.5	56.7	26.9	0.8		1.06 [0.80,1.39]	0.96 [0.72,1.27]	0.15 [0.06,0.38]	0.91 [0.73,1.14]	0.26 [0.11,0.63]	0.18 [0.07,0.42]
Education											
<high school	13.4	56.1	28.1	2.4	0.0011	1.53 [1.22,1.93]	1.36 [1.06,1.73]	1.37 [0.78,2.40]	0.85 [0.71,1.01]	0.85 [0.51,1.41]	0.98 [0.58,1.66]
high school	19.4	47.2	30.4	2.9		Ref	Ref	Ref	Ref	Ref	Ref
Substance use											
Yes	11.4	63.8	23.6	1.2	0.0002	1.59 [1.17,2.17]	1.10 [0.79,1.54]	0.50 [0.21,1.28]	0.70 [0.55,0.88]	0.38 [0.17,0.86]	0.65 [0.28,1.50]
No	18.9	46.3	31.6	3.2		Ref	Ref	Ref	Ref	Ref	Ref
Condom use at last vaginal sex											
No/don't know	15.8	50.9	30.3	3	0.084	1.29 [0.99,1.69]	1.36 [1.03,1.80]	1.98 [0.93,4.21]	1.09 [0.87,1.37]	1.30 [0.63,2.65]	1.77 [0.86,3.66]
Yes	22	49.1	27	1.9		Ref	Ref	Ref	Ref	Ref	Ref
Sex exchange											
Yes	12.8	59.7	25.2	2.3	0.0009	1.63 [1.25,2.11]	1.26 [0.95,1.67]	1.02 [0.56,1.86]	0.77 [0.63,0.93]	0.58 [0.34,1.01]	0.79 [0.45,1.39]
No	20.5	43	33.4	3.1		Ref	Ref	Ref	Ref	Ref	Ref

Also controlling for: history of substance use, binge drinking, history of abuse, depressive symptoms. age, history of transactional sex, education

^aOverall robust score test for any significant difference between venues

^bBolding indicates significance at <0.05

Table 4

Venue and partner HIV Risk characteristics, bivariate analyses

	Formal n = 683	Public n = 2021	Private n=1179	Virtual n = 108	p- value ^a	Public versus formal	Private versus formal	Virtual versus formal	Private versus public	Virtual versus public	Virtual versus private
Report of partner as HIV-positive or unknown status	47 %	56 %	49 %	67 %	<.0001	1.34 [1.13, 1.58] ^b	1.09 [0.90, 1.31]	1.77 [1.22, 2.58]	0.81 [0.71, 0.94]	1.32 [0.92, 1.90]	1.63 [1.13, 2.35]
Partne s number of CPs as reported by participants											
None	43 %	34 %	39 %	24 %	<.0001	1.39 [1.17, 1.66]	1.13 [0.93, 1.36]	2.01 [1.29, 3.14]	0.81 [0.7, 0.94]	1.45 [0.94,2.21]	1.78 [1.16, 2.74]
1 or unknown ^c	57 %	66 %	61 %	76 %							
Report partner has male CPs or CPs of unknown gender	13 %	22 %	14 %	19 %	<.0001	1.57 [1.33, 1.87]	1.17 [0.97, 1.40]	1.96 [1.34, 2.85]	0.74 [0.64, 0.85]	1.24 [0.87,1.79]	1.68 [1.17, 2.42]
Report of partner as having a history of incarceration or unknown history of incarceration	61 %	73 %	68 %	65 %	0.0003	1.72 [1.44, 2.06]	1.41 [1.16, 1.72]	1.29 [0.85,1.94]	0.82 [0.70, 0.96]	0.75 [0.50, 1.11]	0.92 [0.61, 1.37]
Report of partner as having a history of injecting drug use (IDU) or unknown history of IDU	17 %	28 %	16 %	24 %	<.0001	1.50 [1.19, 1.88]	0.95 [0.74, 1.24]	1.25 [0.78, 2.02]	0.64 [0.53, 0.76]	0.84 [0.53, 1.32]	1.31 [0.83, 2.09]

^aOverall robust score test for any significant difference between venues

^bBolding indicates significance at <0.05

^cReference group

Table 5
Venue and personal characteristics associated with sexual partner HIV risk level, multivariate model

Variables ^a	Higher risk partners OR (CI)	p value
Public ^b	1.74 [1.373, 2.206]^j	<.0001
Private ^b	1.41 [1.1, 1.809]	0.0067
Virtual ^b	2.22 [1.214, 4.052]	0.0096
Age 27–33 ^c	1.02 [0.781, 1.322]	0.9045
Age 34+ ^c	0.83 [0.644, 1.07]	0.1502
High school ^d	1.16 [0.941, 1.428]	0.1653
History of substance use ^e	1.09 [0.823, 1.433]	0.5609
Binge drinking 2–3 times per week ^f	0.98 [0.745, 1.28]	0.8642
Binge drinking 4 times per week ^f	1.50 [0.981, 2.282]	0.0617
History of abuse ^g	1.54 [1.225, 1.941]	0.0002
History of depression ^h	1.44 [1.137, 1.828]	0.0025
History of transactional sex ⁱ	1.07 [0.846, 1.356]	0.5665

^aAlso controlling for clustering of the woman

Reference groups

^bFormal venues

^cAge 18–26 years

^d<High school education

^eNo history of weekly substance use

^fMonthly binge drinking

^gNo history of emotional, physical, or sexual abuse

^hCES-D score of <7

ⁱNo history of sex exchange

^jBolding indicates significance at <0.05