Characterizing A Subset of MSM Who Also Have Intercourse with Cisgender Women in Lima, Peru: A Cross-Sectional Secondary Data Analysis with a Prospective Cohort Component

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Abstract

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Background: MSM are disproportionately affected by HIV in Lima, Peru. A subset of MSM, men who have sex with men and women (MSMW), have unique sexual behavior and demographic characteristics that are distinct from MSM overall. Due to their bisexual behavior, MSMW may play an important role in facilitating HIV transmission to cisgender women. Since an initial study done in 2002, there have been limited reports looking at this subset of MSM in Peru. The purpose of this study is to characterize demographics and sexual behavior of MSMW compared to men who have sex with men only (MSMO), compare MSMW's sexual behavior with male versus cisgender female partners, compare sexual behavior with male partners between MSMW and MSMO, and compare HIV incidence between the two groups.

Methods: Data for these analyses were collected as part of the larger *Sabes* study, a treatment as prevention study in Lima, Peru, conducted between 2013 to 2017. We identified participants based on a question about sexual behavior with cisgender women in the last 3 months. All participants were tested for HIV at baseline. Chi-square, Fisher exact tests, and t-tests were used to draw conclusions about differences in characteristics between MSMO and MSMW

subgroups as well as differences in sexual behavior with male partners between the two groups. We used logistic regression with clustering on each MSMW to compare partnerships with cisgender female vs cisgender male partners. Finally, we calculated HIV incidence among MSMO and MSMW.

Results: Compared to MSMO, MSMW had significantly lower levels of education and were more likely to self-identify as bisexual. A higher proportion reported insertive sexual role. Most (93%) MSMW reported vaginal sex in the last three months; 78% reported not using a condom. Among MSMW who reported anal sex with their female partners (26%), 67% reported not using a condom. There was no statistically significant difference in MSMW's partner type (stable vs. not) or location (e.g. home vs. public location such as hourly hotel) of sexual intercourse between male and female partners. MSMW were more likely to have anal insertive sex and half as likely to have anal receptive sex with male partners compared to MSMO. MSMW were twice as likely to indicate high risk for alcohol abuse and were more likely to engage in transactional sex. HIV incidence in MSMO did not differ significantly from that in MSMW (11.9 vs. 8.8/100 person-years) (Rate ratio:1.3, 95% CI: 0.9-2.1).

Conclusion: There are distinct sociodemographic factors and sexual behaviors among MSMW compared to MSMO. While some of these may signal lower HIV risk (e.g. insertive sex role, lower HIV prevalence among women), others likely carry higher HIV risk (e.g. low condom use, alcohol abuse, transactional sex). Understanding these distinct differences between the two populations provides insight into possible intervention strategies and gaps in current practices.

Keywords: MSM, MSMW, bisexual, HIV, Peru, cisgender women

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Introduction:
In Peru, men who have sex with men (MSM) as well as transgender women are disproportionately affected by HIV with a prevalence of 15% and 14% respectively.[i] Despite almost universal access to ART throughout Peru, funded largely by the Peruvian government, many individuals remain undiagnosed and untreated for HIV.[ii] MSM are a heterogeneous group of individuals among whom some engage in bisexual behavior and have been classified as men who have sex with men and women (MSMW).[iii,iv] One review found that 50% of MSM reported ever having sex with a cisgender woman.[v] MSMW have unique sexual risk behavior compared to their MSMO counterparts and report unprotected sex with cisgender male and cisgender female partners.[vi] In addition, sexual risk behavior in MSMW can differ from that in MSMO; for example, in a North American study, MSMW had a higher likelihood of using substances during sex which, in turn, was associated with increased risk of unprotected anal sex.[vii] However, they are also less engaged in and aware of HIV prevention strategies, such as pre-exposure prophylaxis.[viii] Bisexual behavior among MSM may contribute to HIV transmission from high-risk to low-risk groups.[ix] Social circumstances are different among MSMW compared to MSMO (e.g., lower levels of education, higher prevalence of homelessness, more use of alcohol and marijuana among MSMW in Los Angeles).[iii] Most of the current body of evidence regarding the sexual behavior of MSMW vs. MSMO in Peru comes from a single study conducted over a decade ago.

In a population-based study of MSM in Peru from 2002, 26% of participants reported sex with both men and women in the past year.[x] As has been reported elsewhere[vii,xi], MSMW were less likely than MSMO to be HIV infected (11% vs. 21%). MSMW were less likely than MSMO to report receptive anal intercourse with men.[x] They were also less likely to report condom use at last vaginal sex (37%) than at last insertive (46%) or receptive (43%) anal intercourse.[x] More recent data on MSMW in Peru indicates that if MSMW were to become HIV positive, they would be less likely to disclose their HIV status to their female partners due to fear of rejection and stigma.[xii] In a qualitative analysis within the same study, the authors concluded that MSMW who identified as heterosexual reported a lower perceived HIV risk, likely due to their self-identification as such.[xii] In Peru, in the past 15 years there have been many efforts aimed at targeting HIV treatment and prevention among the general MSM population,[ii] but outreach tailored to MSMW is limited. More information is needed about subgroups within the larger MSM community. An extensive literature search revealed few research projects in Peru that have specifically studied the behaviors and risk of MSMW; those that have either collected behavioral data pertaining to the previous twelve months or did not include detailed questions about sexual behavior and female partnerships. Unlike the 2002 study, this study has detailed partner information from the last three months, which may indicate more ongoing behavior rather than single isolated events. In addition, this study not only asks about sexual behavior with male and female partners but asks more detailed information about where they meet these and where they have sex with them, which may indicate more specific avenues for outreach and intervention. This study aims to provide pertinent information to inform current HIV prevention strategies. It will provide more in-depth information about MSMW such as where they meet their male and female partners. Knowing this detailed information may be helpful in creating tailored efforts that specifically target the MSMW subpopulation in Peru for more direct engagement in HIV testing and prevention programs.

The purpose of this cross-sectional secondary data analysis with a prospective cohort component is to compare the sexual practices, behavior and characteristics of MSMO and MSMW Lima, Peru. The aims of this study are to:

- Aim 1: Describe the demographic characteristics and sexual behavior of MSMW and MSMO

    - Hypothesis: MSMW will differ from MSMO in sexual identity, number of female partners and demographic characteristics. Most MSMO and most MSMW study participants will identify as homosexual or bisexual; the proportion identifying as heterosexual will be greater among MSMW.
- Aim 2: Compare characteristics of and behaviors with male and female nominated partners of MSMW who report both (e.g., partner type [stable, casual, client, one-time, paid], sexual practices, meet up locations).
    - Hypothesis: MSMW will be more likely to nominate female partners than male partners as stable partners. Condom use will be higher with male partners than with female partners.
- Aim 3: Compare characteristics of and behaviors with male partners of MSMW vs MSMO (e.g., sexual practices).
    - Hypothesis: MSMW will be more likely to have insertive anal sex with male partners and will be more likely to use condoms with male partners than MSMO.
- Aim 4: Using prospectively collected data, compare incidence of HIV among MSMW and MSMO who were HIV negative at baseline visit.
    - Hypothesis: MSMW are less likely to become HIV infected over the course of the study than MSMO.

Methods:

Study Design, Setting, Population

The data for this analysis is from the *Sabes* study, an HIV treatment-as-prevention intervention, which enrolled >3000 MSM and TW in Lima, Peru between 2013-2017.[xiii] The intervention included testing HIV-negative participants monthly for HIV, and then rapidly linking those who were infected to a study of timing of ART initiation (ART was initiated immediately or deferred until 24 weeks after diagnosis).[xiii] MSM were recruited from multiple sites in Lima, including HIV research organizations (Health and Education Civil Association, IMPACTA, and Asociación Vía Libre), a community-based organization (Epicentro), and one government-run clinic (the Barton Clinic in Callao, Peru).[xiii] Participants were eligible to participate in *Sabes* if they had been assigned male sex at birth, reported having had sex with a male in the last 12 months, were at least 18 years of age, and were unaware of their HIV status. In addition, they had to be at high risk for HIV acquisition due to one or more of the following characteristics: they had a partner who was HIV positive (acute or recent infection), they had symptoms of recent HIV infection and were seeking HIV testing, they practiced risky sexual behavior (e.g., no condom use during anal intercourse in last six months, anal intercourse with more than five male sex partners during last six months, self-identification as a sex worker, diagnosis of a sexually transmitted infection during the last six months or at screening, or being a sexual partner of an HIV-infected man or TW in the last six months).[xiii] Individuals were not eligible to participate if they were transgender women taking feminizing hormones or had any physical, mental, or other condition that would impair their ability to safely participate in the study.[xiii] Participants voluntarily presenting to participating sites were screened for eligibility. In addition, peer navigators recruited participants from pre-specified social venues (saunas, adult movie theaters, sex-work areas, discotheques, bars, beauty parlors, sporting events) and referred eligible individuals to study sites.[xiii] Participants were screened for HIV at baseline and if negative, were enrolled in Step 2 for continued HIV testing, and those who were HIV positive were enrolled in Step 3 for HIV care including immediate versus deferred ART.

Data Sources and Measures

Data for this analysis were collected at the *Sabes* enrollment visit, via a structured, computer-assisted questionnaire, self-administered in Spanish.[xiii] The roughly 150 questions collected data on demographics, sexual behavior, drug and alcohol use, and stigma and coping. The questionnaire collected data specific to any sex acts with female partners, and with male or transgender female partners, in the last three months. In addition, items asked specifically about the three most recent sex partners the participant had, including those partners' genders, what the participant understood to be those partners' sexual identities, the number of sex acts participants engaged in with those partners, when the most recent sex act occurred, where they met this partner, whether the participant had other partners during the period he was having sex with each nominated partner, partners' HIV status, when partners last tested for HIV, whether partners had a preference for insertive or receptive anal sex, where sex acts occurred, the sex acts engaged in with each partner, and whether the participant anticipated having sex with each partner in the future). Participants completed the questionnaire while waiting for their HIV test results to be prepared.

Prior to analysis, to harmonize results for two similar questions, we combined answers to create a single binary variable. For example, based on several questions related to whether or not a participant reported condomless anal sex with female partners (yes/no) and number of female partners with whom they reported condomless anal sex (n), we created the variable “anal sex with female partner without a condom” with the answer yes/no. The same methodology was repeated for similar outcomes (anal sex with condom, oral sex with condom, oral sex without condom, and sexual behavior with men). Questions related to alcohol use were scored using the WHO-validated Alcohol Use Disorder Identification Test (AUDIT).[xiv] Data were received de-identified, and therefore, the Institutional Review Board at the University of Washington granted this project an IRB exemption. During analysis, all data were stored on a locked and encrypted laptop for security purposes.

Analysis:

All analyses were conducted using R version 1.1.456. Any participant who reported having a transgender partner in the last three months or identifying as transgender (N=149) were excluded from analysis. Because the participants did not know their HIV status at the time of completing the questionnaire, all eligible participants regardless of HIV status were combined in the analysis for Aims 1-3. For Aim 1, participants (n=2685), who were all cisgender men, were split into two categories based on whether or not they reported a cisgender female partner in the last three months. Men who did not report a cisgender female partner were categorized as MSMO (n=2203), and men who did were categorized as MSMW (n=455, of whom 98 nominated at least one female partner as one of his last three partners in the last three months and gave detailed information on this partner). Key variables for Aim 1 include education level, sexual identity, transactional sex, substance use with sex, and aggregate sexual behavior with women for MSMW. We compared demographic and behavioral characteristics using prevalence ratios. For binary outcomes, we used chi-squared tests or Fisher-exact tests to evaluate the statistical significance of any differences seen, and p-values are reported in the table (alpha=0.05 used as cut-off in significance testing). To compare continuous variables, t-tests were used. In addition, we completed a sub-analysis looking at vaginal and anal sex (with and without a condom) with female partners comparing MSMW found to be HIV positive or HIV negative at the baseline visit. Questions related to substance use were scored using the Alcohol Use Disorder Identification Test (AUDIT),[xiv] which has been validated for use in Spanish and has been used previously in Peru.[xv,]

For Aim 2, the units of analysis are the recent sexual encounters with a man and a woman nested within the same participant ($n_{participants}$= 26). Participants in analysis must have nominated a woman and a man among their three most recent partners within the last three months. For this reason, we completed a cluster logistic and multivariate logistic regression using generalized estimating equations (GEE) to estimate prevalence ratios (family=Poisson). Outcomes were condomless insertive anal and condomless oral sex, and adjustment covariates included where participants met their partners, partner type, and where they reported having sex with their partners. Robust variances are included.

For Aim 3, prevalence for each outcome variable was calculated. There was only one observation for each variable per participant, so clustering was not indicated. Because the high prevalence of outcomes would have exaggerated the magnitude of their associations with independent variables, for Aim 3, we used Poisson regression with robust standard errors to generate prevalence ratios for each outcome.[xvi]

In Aim 4, we used a subset of the overall MSM population (n=2684) who were HIV negative at baseline and calculated HIV incidence among MSMO and MSMW to compare the two groups.

Results:

MSMO had higher levels of education ($p < 0.001$). A greater proportion of MSMW identified as bisexual than did MSMO (table 1.1). A higher proportion of MSMW reported an insertive sexual role with partners compared to MSMO (table 1.1).The two groups did not differ with respect to report of HIV testing in the last 12 months, condom use at last sexual intercourse (see Table 1.5), or in most types of venues where participants met their sexual partners of any gender (e.g., bar/club, theater, videobooth, etc) (see Table 1.6). MSMO were more likely than MSMW to meet their partners in saunas (22% compared to 16% among MSMW, p = <0.010).

In a sub-analysis comparing MSMW who were diagnosed as HIV positive (n=61) versus HIV negative (n=394) at enrollment (participants didn't know their status at the time they completed the questionnaire), both HIV negative and positive individuals reported the same median number of female partners, two. Fewer HIV positive MSMW reported vaginal sex with female partners than HIV negative MSMW (84% vs 95% respectively, p-value 0.003). There were no statistically significant differences in the proportion of HIV positive or negative MSMW who reported vaginal sex without a condom (69% vs. 79% respectively, p-value 0.142) or anal sex without a condom (64% vs 68% respectively, p-value 0.749) with female partners. Among MSMW overall who reported anal sex with their cisgender female partners (26%), 67% reported condomless anal sex. A slightly higher proportion of MSMW reported having paid money for sex in the last six months (21% compared to 16% among MSMO, p-value 0.010). However, among both MSMW and MSMO who reported transactional sex, MSMW were more likely to receive money for sex (39% vs 23% among MSMO, p-value <0.001) and were more than twice as likely to report identifying as a sex worker (21% MSMW vs 8% MSMO, p-value <0.001). MSMW were twice as likely to report sex under the influence of both drugs and alcohol in the last three months (10% among MSMW versus 5% among MSMO, p-value <0.001). Based on their responses to AUDIT items, MSMW were twice as likely to indicate high risk for alcohol abuse (p-value 0.002, table 1.5).

In Aim 2, prevalence ratios (PR) with 95% confidence intervals (CI) were calculated using cluster analysis for male and female partnerships of each MSMW (Table 2). We classified where the participant met their partner as cruising environments, places men go to find a sexual

partner (bars, discos, saunas, streets or online), or non-cruising environments, where one would go for a more general purpose than finding a sex partner (through friends or family, at a party or gym, or through work or school). Among MSMW, when looking at detailed partner information (as opposed to aggregate data in Aim 1), there was no statistically significant difference in the locations where MSMW met their female vs. male partners (PR: 0.8, 95 % CI: 0.7-1.0), whether they classified their female partner as stable compared to their male partner (PR: 1.9, 95% CI: 0.9, 4.1), or where they reported sex with their partner (PR: 1.4, 95% CI: 0.8, 2.6). MSMW were less likely to report condomless anal sex (adjusted PR: 0.7, 95% CI: 0.3-1.3) and oral insertive sex with their female partners compared to male partners (adjusted PR: 0.8, 95% CI: 0.5-1.0), although these differences did not reach statistical significance, perhaps due to small sample size.

For Aim 3, MSMW were more likely to report insertive anal sex with male partners (PR: 1.3, 95% CI: 1.1-1.4) and half as likely to report receptive anal sex with male partners compared to MSMO (PR: 0.5, 95% CI:0.4-0.6) (Table 3). While not statistically significantly different than MSMO, among MSMW, condomless anal sex was common: 76% reported no condom use during anal insertive sex with men. There was no statistically significant difference in incidence of HIV infection among MSMW (8.8 new infections per 100 person-years) compared to MSMO (11.9 new infections per 100 person-years, resulting in a rate ratio of 1.3 (95% CI: 0.9-2.1) (Table 4). The low number of person-years for MSMW in this analysis may have precluded statistical significance in this Aim.

Discussion:

This study validated findings from prior literature on this sub-population, such as the findings that MSMW were less educated[vii] and were more likely to identify as bi- or heterosexual.[x] This study also found that MSMW engage in more insertive than receptive anal sex with male partners compared to MSMO, which is consistent with prior literature,[x] and that they have a mixed pattern of substance use with sex.[iii] MSMW were twice as likely to report sex under the influence of both drugs and alcohol in the last three months and twice as likely to indicate high risk for alcohol abuse. MSMW were more likely to engage in transactional sex and to self-identify as sex workers. While the difference in HIV incidence between MSMW and MSMO was not statistically significant, our findings suggest greater incidence among MSMO.

When MSMW were asked about sex acts with female partners in the last three months, regardless of whether she was one of their last three partners, MSMW reported high rates of condomless vaginal and condomless anal sex with their female partners (67% of MSMW who reported anal sex with female partners reported not using a condom). High rates of condom non-use were also reported for the three most recent partnerships: condoms were not used in 42% of anal insertive sex acts with male partners and 32% of anal insertive sex acts with female partners (p=NS).

HIV incidence did not differ significantly between MSMO and MSMW, but high estimates among both groups highlights the risk to all partners of MSMO and MSMW. This is not trivial from a public health standpoint. Poly-substance use during sex among MSMW and high AUDIT scores identify important areas for potential intervention and impact. This is critical information when considering ways to create intervention strategies for this subset of MSM and their female partners as the characteristics and behaviors highlighted in this study are distinctly different than the larger MSM population as a whole. Lesser education levels and more transactional sex

among MSMW suggest that interventions employing financial incentives could have an impact on risk behavior.

The MSMW whose data we analyzed reported sexual partnerships with cisgender female partners in the prior three months; the brevity of that period suggests that their partnerships with women are not isolated, one-off instances. The approach to Aim 2 further restricted the 455 MSMW overall to 26 MSMW who reported both a male and a female partner among their three most recent partnerships, a further indication that recent bisexual behavior among this particular group may be ongoing. Restricting observations from participants in this way ensured that we were not comparing MSMW who may have had one isolated sexual encounter with a female, which strengthens the associations found. More intervention strategies aimed at cisgender female partners and at MSMW who have both male and female partners are needed to address the HIV epidemic in Lima, Peru, and globally.

Some limitations of this study are the low sample size of MSMW due to the nature of the secondary data analysis as well as the fact that MSMW participants were identified based on their response to a question about sex with a female partner in the last three months. If a participant had multiple partners with whom they reported condomless sex and reported many female partners in the last three months, but none were nominated as the three most recent partners, this participant would not have been captured in the Aim 2 analysis. Because this analysis used items that were not designed with this research question in mind, some may have been confusing to participants, particularly those that referred to sex acts with females, e.g., transwomen vs. cisgender female partners. We attempted to mitigate this by removing observations from individuals who reported having any transgender female partners in the past three months. In addition, the data collection instrument administered by CASI had a complex skip pattern, in which several coding inconsistencies were discovered. This resulted in instances in which a participant reported that he had not engaged in a particular sex act, and subsequently reported that the frequency with which he engaged in that act was greater than zero during the past months. To mitigate this, if a participant reported “yes” to the sex act or a frequency of greater than zero for the sex act, the participant was considered to have engaged in the behavior. Participants in the Sabes study were selected specifically due to their high risk for HIV acquisition and as a result, are unlikely to be representative of all MSMW in Lima. However, this study builds on current literature and is largely consistent with other reports. Low numbers of MSMW may have been a factor when no statistically significant differences were found. For example, in calculating HIV incidence under Aim 4, MSMO contributed roughly five times the amount of person-time than did MSMW. A larger study exclusively tailored to recruiting MSMW may help confirm findings from this and prior studies.

The differences in sexual behavior identified in this analysis between MSMW and MSMO may impact risk of HIV acquisition and transmission to cisgender female partners and should be taken into consideration in design and implementation of interventions aimed at this group. The hope is for better targeted HIV treatment and prevention strategies tailored to MSMW and their cisgender female partners both in Lima, and globally.

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Appendix

Table 1.1 Baseline characteristics of MSMO and MSMW with proportions and significance levels

Variable	MSMO n=2203 n (column%)	MSMW n=455 n (column%)	p-value (2-sided)
Education			
Primary or less	104 (5)	25 (5)	
Did not complete secondary	69 (3)	38 (8)	<0.001
Completed secondary	482 (22)	148 (33)	
Post-secondary (incl. trade school)	1548 (70)	244 (54)	
Sexual identity			
Homosexual	1648 (75)	67 (15)	<0.001
Heterosexual	33 (2)	69 (15)	
Bisexual	522 (23)	319 (70)	
Reported preference for sexual position			
Insertive	388 (18)	275 (60)	<0.001
Receptive	645 (29)	29 (7)	
Versatile	1170 (53)	151 (33)	

Test: Chi-square test for significance.

Table 1.2 Female partners of MSMW (aggregate data from the last three months, single observation per participant)

Variable	Total MSMW n (column%)	HIV (+) MSMW n (column%)	HIV (-) MSMW n (column%)	p-value* (2-sided)
Median n female partners	2 (IQR=3)	2 (IQR=2)	2 (IQR=3)	*NA*
Vaginal sex				
Yes	425 (93)	51 (84)	374 (95)	0.003
No	30 (7)	10 (16)	20 (5)	
Total	455 (100)	61 (100)	394 (100)	
Condomless vaginal sex				
Yes	330 (78)	35 (69)	295 (79)	0.142
No	95 (22)	16 (31)	79 (21)	
Total	424 (100)	51 (100)	374 (100)	
Anal sex				
Yes	119 (26)	11 (18)	108 (27)	0.163
No	336 (74)	50 (82)	286 (73)	
Total	455 (100)	61 (100)	394 (100)	
Condomless anal sex				
Yes	80 (67)	7 (64)	73 (68)	0.749
No	39 (33)	4 (36)	35 (32)	
Total	119 (100)	11 (100)	108 (100)	

Test: Chi-squared or Fisher Exact test for p-values.
**p-value comparing HIV (+) to HIV (-) MSMW.*

Table 1.3 Transactional Sex comparing MSMW to MSMO with proportions and significance levels

Transactional sex in the last 6 months	MSMO n (column%)	MSMW n (column%)	p-value (2-sided)
Gave money for sex			
Yes	357 (16)	97 (21)	0.010
No	1840 (84)	357 (79)	
Total	2197 (100)	454 (100)	
If “yes”, condom used?			
Yes	213 (60)	60 (62)	0.784
No	144 (40)	37 (38)	
Total	357 (100)	97 (100)	
Received money for sex			
Yes	495 (23)	179 (39)	<0.001
No	1702 (77)	275 (61)	
Total	2197 (100)	454 (100)	
If “yes”, condom used?			
Yes	336 (68)	130 (73)	0.264
No	160 (32)	49 (27)	
Total	496 (100)	179 (100)	
Identify as a sex worker?			
Yes	174 (8)	95 (21)	<0.001
No	2023 (92)	359 (79)	
Total	2197 (100)	454 (100)	
If “yes”, condom used at last sexual encounter?			
Yes	117 (67)	73 (77)	0.130
No	57 (33)	22 (23)	
Total	174 (100)	95 (100)	

Test: Chi-square for significance.

Table 1.4 Substance use during sex in the last three months comparing MSMW to MSMO

Substance Use during sex: last three months (and condom use)	MSMO n (column%)	MSMW n (column%)	p-value (2-sided)
Sex under the influence of alcohol?			
Yes	883 (40)	203 (45)	0.082
No	1320 (60)	252 (55)	
Total	2203 (100)	455 (100)	
No condom used?			
Yes	643 (73)	142 (70)	0.461
No	240 (27)	61 (30)	
Total	883 (100)	203 (100)	
Sex under the influence of drugs?			
Yes	27 (1)	5 (1)	1.000
No	2176 (99)	450 (99)	
Total	2203 (100)	455 (100)	
No condom used?			
Yes	19 (70)	3 (60)	0.637
No	8 (30)	2 (40)	
Total	27 (100)	5 (100)	
Sex under the influence of both (drugs and alcohol)?			
Yes	109 (5)	47 (10)	<0.001
No	2094 (95)	408 (90)	
Total	2203 (100)	455 (100)	
No condom used?			
Yes	65 (60)	32 (68)	0.413
No	44 (40)	15 (32)	
Total	109 (100)	47 (100)	

Test: Chi-squared or Fisher Exact test for p-values.

Table 1.5 Other demographic factors comparing MSMW and MSMO with significance levels

Variable	MSMO n (column%)	MSMW n (column%)	p-value (2-sided)
Participated in HIV study in last 12mo (n)			
None	1080 (52)	224 (52)	1.000
Any	1008 (48)	209 (48)	
Total	2088 (100)	433 (100)	
Condom-use during last sex (no time component)			
Yes	965 (44)	186 (41)	0.274
No	1238 (56)	269 (59)	
Total	2203 (100)	455 (100)	
Audit Score			
0-7 (Level I)	902 (54)	145 (45)	0.002
8-15 (Level II)	715 (43)	159 (49)	
16-19 (Level III)	50 (3)	18 (6)	
20+ (Level IV)	0	0	
Total	1667 (100)	322 (100)	
NA	*536*	*133*	

Test: Chi-squared or Fisher Exact test for p-values.

Table 1.6 Location where participants reported meeting partners in the last three months (not specific to sex of partner)

Venue	MSMO n=2203 n (column%)	MSMW n=455 n (column%)	p-value (2-sided)
Bar/club			
Yes	1109 (50)	245 (53)	0.190
No	1094 (50)	210 (46)	
Sauna			
Yes	474 (22)	73 (16)	0.010
No	1729 (78)	382 (84)	
Theater			
Yes	227 (10)	49 (11)	0.832
No	1976 (90)	406 (89)	
Video booth			
Yes	368 (17)	64 (14)	0.187
No	1835 (83)	391 (86)	
Park			
Yes	246 (11)	56 (12)	0.537
No	1957 (89)	399 (88)	
Sports field or center	205 (9)	35 (8)	0.316
Yes	1998 (91)	420 (92)	
No			
Movie			
Yes	185 (8)	43 (10)	0.523
No	2018 (92)	412 (90)	
Party			
Yes	359 (16)	60 (13)	0.112
No	1844 (84)	395 (87)	

Test: Chi-squared test for p-values.

Table 2. Prevalence ratios and 95% confidence intervals using cluster analysis among MSMW looking at both female and male partnerships in the last three months for those participants who nominated both (n=26)

MSMW (n=26)				
Variable	**Male Partner n (column%)**	**Female Partner n (column%)**	**PR (95% CI)**	
How participant met partner[a]:				
Cruising	24 (65)	9 (31)	0.8 (0.7, 1.0)	
Not Cruising	10 (27)	19 (66)		
Missing/other	3 (8)	1 (3)		
Total	37 (100)	29 (100)		
Partner type:				
Stable	9 (24)	14 (45)	1.9 (0.9, 4.1)	
Not stable[b]	29 (76)	17 (55)		
Total	38 (100)	31 (100)		
Location of sex act:				
Home	11 (39)	14 (56)	1.4 (0.8, 2.6)	
Elsewhere[c]	17 (61)	11 (44)		
Total	28 (100)	25 (100)		
PR = Prevalence ratio; CI = Confidence interval				
	Male Partner n=38 n (column%)	**Female Partner n=31 n (column%)**	**Unadjusted PR (95% CI)**	**Adjusted PR (95% CI)**
Condomless anal insertive sex:			0.8 (0.4, 1.6)	0.7 (0.3, 1.3)
Yes	16 (42)	10 (32)		
No	22 (58)	21 (68)		
Condomless oral insertive sex:			0.9 (0.5, 1.5)	0.8 (0.5, 1.0)
Yes	22 (58)	16 (52)		
No	16 (42)	15 (48)		

Test: generalized estimating equation (GEE) with poisson function and exchangeable correlation matrix to estimate PR.

PR = Prevalence ratio; CI = Confidence interval

[a]"Cruising" indicates partner was met on the street, at a bar/discoteque/sauna or online. "Not cruising" mean through friends, family, at a party/gym or at work/school; "other" indicates the participant didn't remember or selected other.

[b]"Not stable" indicates casual, one-off, client, or sex worker.

[c]"Elsewhere" indicates hotel, Turkish bath, public bathroom or other public place (beach, park, etc).

Adjusted PR: partner type, how partner was met, location of sex act.

Table 3. Type of intercourse and condom use comparing MSMW and MSMO with their male partners in the last three months (aggregate male data, single observation per participant)

Type of Sex with Male Partners	MSMO n (%)	MSMW n (%)	PR*	95% CI*
Anal Insertive				
Yes	1564 (71)	405 (89)	1.3	(1.1, 1.4)
No	639 (29)	50 (11)		
Total	2203 (100)	455 (100)		
Anal Insertive (*no condom*)				
Yes	1266 (81)	308 (76)	0.9	(0.8, 1.1)
No	298 (19)	97 (24)		
Total	1564 (100)	405 (100)		
Anal Receptive				
Yes	1689 (77)	174 (38)	0.5	(0.4, 0.6)
No	514 (23)	281 (62)		
Total	2203 (100)	455 (100)		
Anal Receptive (*no condom*)				
Yes	1375 (81)	126 (72)	0.9	(0.7, 1.1)
No	314 (19)	48 (28)		
Total	1689 (100)	174 (100)		

Test: logistic regression using Poisson to estimate PR and 95% CI.
*PR: prevalence ratio
*CI: confidence interval

Table 4. HIV incidence over study period among negative participants at baseline

	MSMO n=2203	MSMW n=455
New infections	193	30
Person-time (years)	1622	340
HIV Incidence (per 100 person-years)	11.9	8.8
Rate Ratio (95% CI)	1.3 (0.9, 2.1)	

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