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HIV status communication with sex partners and associated factors among high-risk MSM and transgender women in Lima, Peru

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Introduction

Peru's men who have sex with men (MSM) and transgender women (TW) are at the center of a concentrated HIV epidemic with an HIV seroprevalence of 13.9% and 30%, respectively(1, 2). In Lima, an estimated 55% of HIV incidence occurs among MSM and TW(3). At present, there is little information on HIV serostatus communication and its relationship with sex practices in this context. Nagaraj et al reported that only 24% of all MSM and TW knew the HIV serostatus of at least one of their three most recent partners, totaling only 14.0% of these partners(4). The lack of communication regarding HIV serostatus is a barrier to effective HIV prevention because communication and knowledge between one's own and sex partner's HIV status can inform sexual risk perception and influence safer sex decision making(5).

In Peru, HIV is spread primarily through condomless anal sex. HIV status communication, HIV+ individuals telling others that they are living with HIV and HIV-negative individuals telling others that they do not have HIV, may inform practices during sexual encounters. In the past, multiple factors have been associated with HIV status communication in studies carried out in the United States and Europe, which have primarily focused on disclosure among HIV positive individuals. Individual factors associated with decreased HIV status communication include younger age, increased drug or alcohol use, lower socioeconomic status, positive HIV serostatus, more time since last HIV test, shorter length of time since

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Conflict of Interest

All of the authors declare that they have no conflicts of interest.

Compliance with Ethical Standards

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study.

infection, and less illness severity(6–9). Interpersonal factors associated with increased HIV status communication are longer duration of relationships, trust and privacy in the relationship, location of sexual encounter, and partner HIV serostatus(10–13). Social and cultural factors such as shame, stigma and fear of rejection also influence HIV status communication(14). Although Carballo-Diéguez et. al. included HIV positive and HIV negative individuals, all of the other research has been focused on disclosure solely from HIV positive individuals.

The advances in treatment effectiveness also influence the concentration of risk of HIV infection. A recent modeling paper estimated that in Peru the probability of HIV transmission was the same for individuals with known infection and those with unknown infection(15). In the context of adequate treatment and undetectable viral loads, risk from an HIV positive partner with known infection and on treatment may be less than risk from a partner of unknown infection status(16). The availability of treatment has been associated with increased disclosure between spouses(17).

HIV status communication continues to be a sensitive subject that many MSM/TW find uncomfortable for “fear that the discussion may ‘kill the mood,’ bring unwanted reminders of disease and death to the erotic scenario, or turn a romantic encounter into a cold, contractual discussion”(6). These reasons may influence a seropositive person to be less likely to disclose status than a seronegative person(6). Many seropositive individuals are faced with difficult decisions around how and when to disclose to their partners(13), often without the tools or support to do so.

The type of relationship is also important for disclosure, partnerships described as ‘steady, close or exclusive’ are more likely to yield disclosure than those described as ‘casual, unfamiliar or nonexclusive’(10, 12). A lack of HIV status communication may result from concerns about privacy as well as fear of stigma or rejection by the sex partner. In casual encounters a lack of privacy was associated with less disclosure in one study as was shame surrounding an HIV diagnosis(11). Individuals are more likely to disclose seropositivity to seropositive partners than to seronegative or unknown partners because of a lowered perceived risk of rejection from other positive partners(14).

In most contexts, HIV status communication remains uncommon and is unexpected by sex partners. Status communication is considered to be socially risky as once a positive status is disclosed, it could be told to others and the information is no longer completely controlled by the positive individual(11, 13). In the Peruvian context, discussion of HIV status remains highly stigmatized; it is a taboo topic of conversation among MSM, particularly if they just met(18). Additionally many HIV positive people do not know their serostatus due to infrequent HIV testing(19).

Ideally, individuals should discuss their status with their sex partner to inform risk assessment and encourage safer sexual practices, especially in the case of sero-discordance, but also if both partners believe themselves to be negative(5). However, just as non-status sharing does not imply unsafe sexual practice, knowledge of serostatus does not mean that individuals will necessarily use this information to protect themselves or others. Some

individuals may decide to place themselves at risk for infection despite serodiscordance or unknown sero-status. Serodiscordant couples aware of their status may engage in condomless anal sex as a result of alcohol or drug use prior to intercourse, or as a result of the perception of intimacy or commitment to the relationship(9). Or these couples may engage in unprotected sex due to an informed decision based on the positive partner having an undetectable viral load, however this level of HIV literacy is rare(20). Some individuals also actively seek out unprotected high-risk sexual encounters(21). Conversely, nondisclosure of serostatus may not necessarily imply higher risk, wherein the seropositive individual, although not having shared their serostatus, may use a condom to protect their unaware partner(9).

We explore factors associated with HIV status communication among MSM and TW in Lima, Peru. Factors associated with HIV status communication can be used to focus HIV interventions on increasing communication with sex partners around HIV status within this population.

Methods

Design Overview

The *Comunidades Positivas* randomized control trial used a 2 x 2 factorial design trial testing a community-level intervention (Positive Communities) and a biomedical intervention (enhanced partner treatment, EPT). In this trial, 24 "*barrios*" (i.e. low-income neighborhoods) in the region of Lima were randomized and assigned to one of four intervention settings. Neither intervention was effective at reducing HIV/STI incidence(22). Independent of intervention assignment, MSM and TW were recruited from each barrio and assessed for the outcomes of interest at baseline, 9 months, and 18 months. Each assessment included a behavioral interview and serology for HIV-1.

Inclusion Criteria

Participants were biological males at birth between the ages of 18 and 45 at baseline who self-reported at least one sexual encounter with a man in the past 12 months and a sexual preference for men over women to the study team at recruitment, lived or worked near the intervention area, showed willingness to participate in the study, and planned to stay in the community for the entire 18-month study period.

Participant Recruitment

Lower-income barrios with visible MSM/TW communities were selected and through a snowball technique potential participants were identified and invited to enroll in the study. Selection of- and participant recruitment in the first 16 barrios took place in the metropolitan area of Lima between March and May, 2008. In the remaining 8 barrios (4 within Metropolitan Lima and 4 in Lima Province), these processes took place between September and December 2009.

Data Collection

Data at baseline, 9-month, and 18-month assessments were gathered in rented storefronts or apartments with interviews and collected specimens. All participants signed informed consent, completed a behavioral survey and then went through pre-test counseling for HIV/STI with a trained counselor as required by Peruvian law. Following counseling a trained phlebotomist drew a 10 ml blood sample. HIV results were provided within two weeks of initial visit along with post-test counseling. Newly diagnosed HIV cases were referred to the Peruvian HIV antiretroviral treatment program.

Laboratory Methods

HIV antibody status was determined using Genetic Systems HIV-1/HIV-2 EIA (BIO-RAD Laboratories, Redmond, WA). Positive results were confirmed with GenScreen HIV-1 Western Blot (BIO-RAD Laboratories, Redmond, WA).

Protection of Human Subjects

The study was approved by the Institutional Review Boards of the University of California, Los Angeles IRB#07-10-014-02A and the Universidad Peruana Cayetano Heredia IRB#52975. Data were collected from eligible participants who gave their written informed consent to participate in the study. Study implementation was overseen by an independent Data and Safety Monitoring Board.

Measures Used

We use two dependent variables assessing HIV status communication, the first at baseline and the other over three study visits. The baseline variable is at the partnership-level and accounts for HIV status communication for relationships between study participant and up to three of their reported recent sex partners. Over the three longitudinal study visits, HIV status communication is defined as telling at least one of the participant's sex partners at the baseline, 9 or 18 month follow-up. All HIV status communication variables were based on the participant's perceived HIV status during their survey, rather than on their HIV test results during the study visit. This is because their reported HIV status communication during the survey would be based on their perceived HIV status, prior to receiving their HIV test results. At baseline, this is limited to participants HIV testing history. At the follow-ups, all participants had received HIV testing during their previous study visit. In our analyses, we assumed all participants were honest in their disclosure of their perceived HIV serostatus, i.e. if they reported being HIV positive we assume this is the HIV serostatus they communicated to their sex partners.

Knowledge of sex partner's HIV status was captured at the partnership-level for the baseline analysis. The longitudinal analysis coded HIV status communication with at least one of up to three partners of their HIV serostatus as having knowledge of partner HIV serostatus. Communication of partner's HIV serostatus included conversations in which the partner stated they were positive, negative, or unaware of their serostatus.

At baseline, separate partnership-level variables take into account how up-to-date the participant's HIV serostatus knowledge would be upon disclosure, based on length of their

relationship with the sex partner and time since their last HIV test. We coded those who had an HIV test during or within one year of a relationship as communicating an up-to-date HIV serostatus. Those who had an HIV test more than a year before a relationship are coded as communicating an out-of-date HIV serostatus. Those who 'communicate' an HIV serostatus despite never having had an HIV test are coded as having no serostatus knowledge. HIV positive participants were coded as aware of HIV status regardless of time since last HIV exam because their status does not change.

Other variables of interest included socio-demographics, gender identity, sexual risk behaviors, and substance use at last sex. Gender identity was based on self-reported identification as transgender or self-identification as a man. Sexual risk behavior included the number of sex partners and insertive and receptive anal sex practices. Insertive and receptive acts were based on aggregate counts of these behaviors with the participants' last three sex partners in the previous 6 months. Participants identified their sex partners as stable, casual or as sex work clients. Participants were defined as having unmet basic needs if they reported any month in the past year where they did not have money to cover their basic needs.

Statistical Analysis

At baseline, the outcome of HIV status communication was explored comparing participants reporting and not reporting HIV status communication using chi-squared statistics. Variables used include individual level and partnership level characteristics.

Participants who reported never having had an HIV test were excluded from the analysis presented in Table 1, this exclusion was to provide data on those communicating an HIV status they had information on. In all other analyses, never-testers are included as a separate category. As all study participants underwent HIV testing in the study, in the longitudinal analysis HIV status communication was not limited by HIV testing history.

Analyses were conducted at baseline to explore HIV status communication at the partnership-level. In the baseline analysis, we modeled individual-level HIV status communication utilizing generalized estimating equations using Poisson regression to calculate prevalence ratios (PRs), an exchangeable correlation structure, and robust estimate of variance. For the longitudinal analysis, we modeled individual-level HIV status communication using generalized estimating equations to estimate odds ratios (ORs), with an exchangeable correlation structure, and robust estimate of variance.

For both the baseline and longitudinal analysis, the multivariable models included all variables that had a bivariate p-value less than or equal to 0.10 or those variables considered important a priori regardless of bivariate p-value, including age and gender identity. All analyses were conducted using Stata 13 (College Station, TX).

Results

Population Characteristics

A total of 504 MSM and 207 transwomen participants were enrolled at baseline, at the 9-month follow-up 619 participated (86.2%), and the 18-month follow-up 574 (79.9%) participated. Our descriptive analysis focused on participants who had previously had an HIV test and received the results, this was 559 (78%) at baseline. In this study, participants were primarily low income, between the ages of 25 to 35 (45.3%) with an average age of 30 years, the majority originated from the metropolitan region of Lima (53.3%), primarily identified as gay/homosexual (61.9%), and most had up to a high school degree (70.1%).

At baseline, 56.7% (317/559) of participants who had previously been tested for HIV reported their serostatus to at least one of their sex partners. Considering up to 3 sex partners reported by each participant, they had communicated their HIV serostatus to 41.7% of all reported sex partners (465/1116). At the first and second follow-up measurements, HIV status communication to one partner increased to 58.8% and 60.8% respectively. Study participants reported knowing the HIV serostatus of 38.3% of their sex partners at baseline. Only 4% of the study participants communicated their serostatus but were not aware of their partner's serostatus.

Among participants who reported communicating a seronegative result at baseline, 16.3% communicated an out-of-date status (i.e. older than 1 year prior to the start of their relationship) and 11.5% communicated without having ever been tested. Biological HIV results of participants disclosing an out-of-date seronegative status, and who believed themselves to be seronegative, found that 20.1% were HIV positive at baseline compared to 6.2% among participants who reported a more recent seronegative test result ($P<0.01$). Of those who communicated a seronegative result without having ever been tested, 9.4% were found to be HIV seropositive at baseline compared to 6.2% among participants with more recent seronegative test results ($P = 0.36$).

Baseline HIV status communication was not significantly different based on age, region of origin, or gender identity. However, there were significant differences in HIV status communication which increased with post-secondary educational ($P<0.01$) and being employment ($P = 0.03$). (see Table 1)

Several partnership level characteristics were associated with HIV status communication at baseline, those who shared their HIV status were more likely to engage in condomless receptive anal sex than those who did not ($P = 0.01$). Participants were more likely to disclose if they believed they were seronegative ($P<0.01$). Being in longer relationships ($P<0.01$) or considering the relationship stable ($P<0.01$) were also associated with HIV status communication. Participant knowledge of their partner's serostatus ($P<0.01$) was also positively associated with HIV status communication by the participant. (see Table 2)

Baseline Model

In the baseline multivariable analysis, HIV status communication was positively associated with their sex partner sharing their HIV status (aPR 5.20). HIV status communication was

negatively associated with a self-reported HIV positive status at baseline (aPR 0.68) or having an unknown HIV status (aPR 0.85) (see Table 3). In the bivariate analysis, many additional factors were associated with HIV status communication, but after adjustment for the partner sharing their HIV status the other variables were no longer significant. As the partner sharing their HIV status may represent a strong confounder of other factors, we also conducted an analysis without adjusting for if their partner shared their HIV status. In this analysis, additional variables are associated with HIV status sharing including increased relationship length and increased with partnership stability.

Longitudinal Model

In the longitudinal multivariable analysis, HIV status communication was positively associated with having a post-secondary education (aOR 1.50), having a stable partner (aOR 1.45), having been with a partner for more than 2 years (aOR 1.67), and if their sex partner had told the participant their HIV status (aOR 1.86). HIV status communication was negatively associated with being HIV positive at baseline (aOR 0.55) and often lacking in basic needs (aOR 0.58) (see Table 4).

Discussion

Our study population reported having discussed their HIV serostatus with 42% of their last three sex partners. The previous report on knowledge of sex partners' HIV serostatus among Lima's MSM population was much lower at 24%(4) than this reported knowledge in our study population, 38%. The reasoning behind this difference may be due to the lower number of stable partners and the increased number of bisexual men in their sample. Our analysis helps to elucidate the barriers to and facilitators of HIV status communication. Our data does not address the reasoning driving HIV status communication between sex partners; this should be the focus of further study.

HIV status communication in this population followed many of the same patterns as have been reported in previous studies in other areas of the world with disclosure being more frequent within long term, stable partnerships(7, 11, 13, 14, 23–25). However, only one of these studies included individuals who were HIV negative, the remainder addressed disclosure solely among HIV positives. As previously mentioned, this lack of HIV status communication may be mediated by several factors including stigma, the fear of rejection, discomfort with bringing up HIV before sex, or because of privacy concerns. In the other study including HIV negatives(24) there was no difference in disclosure between HIV negatives and positives, whereas in our results HIV positive individuals were less likely to serodisclose compared to HIV negatives. Although HIV-related communication has been linked to safer sex; careful attention is needed to context prior to promoting HIV disclosure for prevention, especially given the combination of less likelihood of disclosure from HIV positives and insufficient HIV testing. Additionally, only 60% of the participants reporting that they were HIV positive at baseline also reported being on ART (data not shown). The best estimate for the care cascade among MSM and transgender women in Peru is that 12% have achieved virologic suppression(26). Although HIV positive individuals on treatment

with an undetectable viral load are much less likely to infect their partners(27), this can only work in the presence of effective treatment.

Being in a stable partnership facilitated HIV status communication; this is most likely due to greater trust within stable relationships(23). Relationship type and characteristics are also tied to sex partner disclosure to participant, the strongest associated factor in our study. The conversation around HIV status is likely prompted by the level of emotional, rather than physical, intimacy of the relationship(28). Knowing a sex partner's HIV status was the most strongly associated variable predictive for increased HIV status communication. Although we do not have information on order, it is likely that in most instances serodisclosure occurred as part of a conversation. Awareness of a sex partner's HIV status is a probable confounder of many other factors such as type of relationship and individual factors such as HIV testing history, and may even be the result of the participant initiating the conversation and prompting their partner to share their HIV status. Confounding by knowledge of partner's HIV status is evidenced by the many variables that lose significance after adjustment by if the sex partner shared their HIV status.

Partner-specific analysis found that participants with an up-to-date HIV test were more likely to communicate their HIV status, independent of other variables. It may be that frequent HIV testing and HIV-related communication are both related to increased consciousness of HIV risk and/or health care seeking, which may influence these participants likelihood to engage in a disclosure conversation with their partners. The association between recent HIV testing and disclosure should be harnessed to increase both behaviors, i.e. during post-test counseling frequent HIV testing and disclosure for both negatives and positives should be promoted along with frequent HIV testing. However, the lack of frequent testing is a key barrier in this context(29) and HIV status communication is predicated on the idea that HIV status is known. Unfortunately individuals were too often communicating an HIV status that was inaccurate.

In our study, there are three groups that present the greatest challenge to effective HIV prevention programs. The first are seropositives who do not serodisclose to their sex partners. Existing guidelines call for serostatus disclosure. It is important to take into account that this study occurred in the Peruvian context where, programs for contact tracing to find sex partners potentially exposed to HIV do not exist due to both lack of resources and concerns about patient confidentiality. At the time of diagnosis, HIV positive individuals are recommended to tell their partners and this is the extent of the existing help with disclosure. The lack of contact tracing or other partner notification services has been noted as a limitation many countries(30), especially given the availability of treatment. Additionally, knowingly infecting someone with HIV (or any infectious disease) is a criminal offense. Therefore, the onus of disclosure is placed on the HIV positive individual with very little help from the existing health system. Improving the context including not criminalizing HIV transmission, decreasing HIV-related stigma, and normalizing HIV should be more overarching goals in addition to interventions promoting serostatus disclosure with sex partners. Care for HIV positives should encourage disclosure to sex partners to promote safer sexual encounters(31, 32). This can be facilitated by normalizing HIV to reduce stigma

and fear. Treatment is effective, but remains hidden as there are very few people living openly with HIV.

The second concerning population are those who have been not been recently tested for HIV, but continue to “disclose” as HIV negative. This type of disclosure may lead to a false sense of security in decision making for subsequent sex acts. Additionally, these individuals were more than three times as likely to be seropositive than those who had an up-to-date serostatus. The third concerning group is of those who serodisclose as HIV negative but report that they have never previously had an HIV test. Some of this could be due to participant confusion regarding the question; however we believe that the trained study interviewers would have facilitated understanding. This occurred with sufficient frequency in the sample (11.5%) for us to believe that this should be addressed. The true HIV prevalence in this population was 9.4%, additional evidence of the need for frequent HIV testing. It should be noted that although the HIV seroprevalence in the groups with out-of-date serostatus and no serostatus knowledge was higher than the up-to-date groups, this may be an artefact of HIV positives that frequently tested dropping out of the up-to-date group while the HIV positives in the other groups remained unaware of their HIV status, thus increasing the reported prevalence.

Addressing the lack of HIV status communication is an issue that has multifactorial causes, here we have looked at factors at the individual and partnership levels, but population level issues such as stigma and fear of HIV infection remain paramount and influence the willingness of individuals to engage with partners about HIV. One study cautioned against HIV disclosure given it’s associated with unprotected sex and here people’s inaccurate HIV knowledge echoes that concern. However, this ignores the need to combat HIV-related stigma and how engage with partners about HIV can help to do so. HIV post-test counseling should promote HIV status communication as a way to normalize HIV infection. Although HIV status communication is mentioned to HIV positives, it is generally ignored for those who test HIV negative. HIV status communication is a small, but necessary step needed to achieve additional HIV testing, increasing HIV knowledge. The eventual goal would be to normalize HIV infection to reduce stigma and promote prevention. To achieve HIV status communication, the benefit of status sharing should be understood and methods to communicate with partners should be included in post-test counseling sessions.

Our study has several potential limitations. The first is the potential bias of participants underreporting casual or client relationships. Data was gathered on the last three sex partners of each study participant. Participants who reported more than three partners in the last year, who made up more than 75% of the population, did not report data on disclosure with their other sex partners. As shown in the data, more casual or client partnerships are associated with poor disclosure and knowledge of partner’s serostatus. Therefore, it is likely that we are over-reporting these statistics because of lack of data from more casual encounters. Additionally, the content and quality of the HIV status communication studied is unknown, these may have been in-depth conversations or very brief informational exchanges. We do believe that despite the limitations, the information included in this analysis is still highly beneficial for HIV prevention programs and to understand HIV serostatus disclosure.

Conclusions

Our study found that less than half of MSM and TW engaged in a serostatus disclosure conversation with one of their partners and fewer still were aware of the serostatus of their sex partners. These figures result from the relationship characteristics, most importantly if their partner disclosed their HIV status, as well as of individual factors such as perception of current HIV serostatus. Unfortunately, it appears the factors which place an individual at most risk for spreading HIV to their sex partner, i.e. being HIV seropositive, having sex work clients, and not having an up-to-date HIV test, are the same factors that decrease the likelihood of HIV serodisclosure. Those who take precautions to protect themselves are more likely to protect others, while those who do not protect themselves are less likely to protect others. If we are to combat concentrated HIV epidemics we have to place emphasis on normalization of HIV infection, which can be facilitated by individual and community engagement in serodisclosure conversations. But this has to be coupled with improved HIV education to reduce HIV-related fear and stigma, including information on the effectiveness of HIV treatment and the need for frequent HIV testing. Future research should focus on the dynamic of the HIV disclosure conversation, such as the factors that would increase serodisclosure with partners. Interventions should explore how to support accurate HIV serostatus disclosure as part of HIV prevention programs.

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Table 1

Baseline HIV status communication and associated individual characteristics of MSM and TW from Lima, Peru, 2009–2011

Individual characteristics (n=559)	Communicated their HIV status (317, 56.7%)	Did not communicate their HIV status (242, 43.3%)	p-value
Age (quartiles)	n/N (%)	n/N (%)	
18–20	23/46 (50.0%)	23/46 (50.0%)	0.14
21–24	59/115 (51.3%)	56/115 (48.7%)	
25–35	142/235 (56.1%)	111/253 (43.9%)	
36–45	93/145 (64.1%)	52/145 (35.9%)	
Gender Identity			
Man	212/378 (56.0%)	166/378 (43.9%)	0.71
Transgender	104/179 (58.1%)	75/179 (41.9%)	
HIV Status Belief			
Negative	266/436 (61.0%)	170/436 (39.0%)	**0.01**
Positive	17/41 (41.5%)	24/41 (58.5%)	
Educational level			
Secondary or less	200/392 (51.0%)	192/392 (49.0%)	**<0.01**
Post-secondary	117/167 (70.1%)	50/167 (29.9%)	
Employment Status			
Employed	193/319 (60.5%)	126/319 (39.5%)	**0.03**
Unemployed	93/184 (50.5%)	91/184 (49.5%)	
Use of condoms with paid sex			
No paid sex	137/227 (60.4%)	90/227 (39.6%)	0.31
Always	106/190 (55.8%)	84/190 (44.2%)	
Sometimes/Never	74/141 (52.5%)	67/141 (47.5%)	
Lack money in last 12 months			
Never	30/51 (58.8%)	21/51 (41.2%)	**0.04**
Rarely	113/174 (64.9%)	61/174 (35.1%)	
Sometimes	126/237 (53.2%)	111/237 (46.8%)	
Very often	48/97 (49.5%)	49/97 (50.5%)	
# of sex partners in 1 year (quintiles)			
0–2	58/105 (55.2%)	47/105 (44.8%)	0.47
3–5	67/105 (63.8%)	38/105 (36.2%)	
6–12	64/119 (53.8%)	55/119 (46.2%)	
13–40	62/106 (58.5%)	44/106 (41.5%)	
41+	65/123 (52.8%)	58/123 (47.2%)	

Bolded p-values indicate significance of <0.05.

Table 2

Baseline HIV status communication and associated partnership characteristics of MSM and TW: Lima, Peru, 2009–2011

Partner Specific Variables (n=1116)	Communicated their HIV status (465, 41.7%)	Did not communicate their HIV status (651, 58.3%)	p-value
Insertive anal sex in last 6 months			
Never	360/906 (39.7%)	546/906 (60.3%)	0.06
Always protected	39/87 (44.8%)	48/87 (55.1%)	
At least once unprotected	59/116 (50.9%)	57/116 (49.1%)	
Receptive anal sex in last 6 months			
Never	43/113 (38.1%)	70/113 (61.9%)	**0.01**
Always protected	190/515 (36.9%)	325/515 (63.1%)	
At least once unprotected	215/467 (46.0%)	252/467 (54.0%)	
Drug use by participant or partner at last sex			
No	404/973 (41.5%)	569/973 (58.5%)	0.94
Yes	56/136 (41.2%)	80/136 (58.8%)	
Alcohol use by participant or partner at last sex			
No	237/597 (39.7%)	360/597 (60.3%)	0.15
Yes	228/519 (43.9%)	291/519 (56.1%)	
Length of relationship with the your partner (quartiles)			
Less than 8 weeks	88/248 (35.5%)	160/248 (64.5%)	**<0.01**
8 weeks to 1/2 year	113/273 (41.4%)	160/273 (58.6%)	
1/2 year to 2 years	123/239 (51.5%)	116/239 (48.5%)	
More than 2 years	104/178 (58.4%)	74/178 (41.6%)	
Partner's gender identity			
Man	455/1098 (41.4%)	643/1098 (58.6%)	0.18
Woman	7/10 (70.0%)	3/10 (30.0%)	
Transgender woman	3/8 (37.5%)	5/8 (62.5%)	
Type of relationship			
Stable	279/530 (52.6%)	251/530 (47.4%)	**<0.01**
Casual	167/489 (34.2%)	322/489 (65.8%)	
Client	19/96 (19.8%)	77/96 (80.2%)	
Partner shared their status with you			
Yes and they were negative	312/358 (87.2%)	46/358 (12.8%)	**<0.01**
Yes and they were positive	12/12 (100.0%)	0/12 (0.0%)	
Said they did not know	50/62 (80.6%)	12/62 (19.4%)	
We have not talked about this	88/681 (12.9%)	593/681 (87.1%)	

Bolded p-values indicate significance of <0.05.

Table 3

Baseline analysis of HIV status communication and associated individual and partnership characteristics

Variables	Crude PR (95%CI)	Adjusted PR (95%CI)
Individual characteristics		
Age (by 5 year increase)	**1.09 (1.03 – 1.15)** **	1.02 (0.98 – 1.06)
Post-secondary education	**1.37 (1.17 – 1.60)** **	1.06 (0.95 – 1.17)
Self-reported HIV status		
HIV Negative	Ref	Ref
Positive self-reported HIV status	**0.59 (0.39 – 0.90)** **	**0.67 (0.47 – 0.95)** *
Unknown HIV status	**0.70 (0.59 – 0.82)** **	**0.85 (0.76 – 0.95)** **
No. male sex partners, 3 months (quintiles)		
0 – 2	Ref	Ref
3 – 5	0.95 (0.76 – 1.20)	0.93 (0.79 – 1.09)
6 – 12	**0.78 (0.61 – 0.99)**	0.97 (0.81 – 1.16)
13 – 40	**0.76 (0.59 – 0.98)**	0.88 (0.75 – 1.03)
41+	**0.71 (0.55 – 0.92)**	0.92 (0.74 – 1.13)
Reported transactional sex	0.89 (0.76 – 1.04)	
Partnership characteristics		
Receptive anal sex in last 6 months		
Never	Ref	
Always protected	0.83 (0.67 – 1.04)	
At least once unprotected	1.11 (0.90 – 1.37)	
Insertive anal sex in last 6 months		
Never	Ref	Ref
Always protected	1.06 (0.82 – 1.37)	1.03 (0.86 – 1.24)
At least once unprotected	**1.39 (1.16 – 1.67)** **	1.04 (0.89 – 1.21)
Length of relationship with the your partner (quartiles)		
<8 weeks	Ref	Ref
9 weeks – 6 months	1.20 (0.99 – 1.45)	1.03 (0.89 – 1.21)
7 months – 2 years	**1.49 (0.23 – 1.81)** **	0.99 (0.85 – 1.16)
2+ years	**1.68 (1.39 – 2.03)** **	1.05 (0.89 – 1.23)
Type of partner		
Stable	Ref	Ref
Casual	**0.62 (0.54 – 0.71)** **	0.93 (0.83 – 1.05)
Client	**0.46 (0.32 – 0.66)** **	0.74 (0.51 – 1.06)
Partner shared their status with you	**5.96 (4.84 – 7.34)** **	**5.23 (4.15 – 6.59)** **
Partner's gender identity		
Male	Ref	
Female	1.30 (0.86 – 1.93)	
Transgender woman	0.77 (0.45 – 1.30)	

*
p-value <0.05,

**
p-value <0.01

Table 4

Longitudinal analysis of HIV status communication and associated individual and partnership characteristics

Variables	Crude HOR (95% CI)	Adjusted HOR (95% CI)
Age (by 5 year increase)	1.04 (0.96 – 1.13)	0.97 (0.89 – 1.06)
Post-secondary education	**1.51 (1.19 – 1.91)** **	**1.50 (1.16 – 1.93)** **
HIV Prevalence and Incidence		
HIV Negative	Ref	Ref
HIV Positive at Baseline	**0.52 (0.38 – 0.70)** **	**0.55 (0.40 – 0.77)** **
HIV Incident during follow-up	**0.54 (0.31 – 0.93)** *	0.71 (0.40 – 1.27)
UAI last 6 months	**1.35 (1.12 – 1.69)** **	1.20 (0.95 – 1.52)
Has a stable partner	**1.61 (1.26 – 2.06)** **	**1.45 (1.09 – 1.92)** *
Been with a partner 2+ years	**1.77 (1.42 – 2.20)** **	**1.67 (1.32 – 2.11)** **
A partner told them their HIV status	**2.17 (1.72 – 2.73)** **	**1.86 (1.44 – 2.39)** **
Transactional sex	**0.81 (0.65 – 0.99)** *	0.83 (0.66 – 1.05)
Lacked basic needs		
Never	Ref	Ref
Rarely	0.85 (0.61 – 1.20)	0.89 (0.60 – 1.32)
Sometimes	0.76 (0.54 – 1.07)	0.81 (0.54 – 1.22)
Often	**0.46 (0.29 – 0.71)** **	**0.58 (0.35 – 0.94)** *

* p-value <0.05,

** p-value <0.01