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Pre-Exposure Prophylaxis Awareness Among Gay and Other Men who have Sex with Men in Vancouver, British Columbia, Canada

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Abstract

Men who have sex with men (MSM) account for approximately half of Canada's new HIV infections. Pre-exposure prophylaxis (PrEP), a recently established and effective HIV prevention tool for MSM is currently not approved nor publicly funded. We recruited MSM via respondent-driven sampling to complete a self-administered computer-based interview. Stratified by HIV status, multivariable logistic regression identified factors associated with PrEP awareness. Of 673 participants, 102/500 (20.9%) HIV-negative and 63/173 (26.5%) HIV-positive men were aware of PrEP, but none had used it. One third of PrEP-aware MSM spoke about it with friends or sex partners. Self-declared knowledge was limited. Factors associated with PrEP awareness varied by HIV status, but included greater HAART optimism for HIV-negative MSM. Among HIV-negative MSM, being PrEP unaware was associated with younger age, not always having condoms, and preferring receptive versus insertive anal sex. Future longitudinal research should identify early adopters of PrEP and its associated impacts.

Keywords

HIV/AIDS; primary prevention; pre-exposure prophylaxis; health promotion

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INTRODUCTION

The number of new HIV diagnoses has remained relatively stable among gay, bisexual, and other men who have sex with men (MSM) who continue to be disproportionately represented compared with other exposure categories. In Canada, MSM account for approximately half of estimated new HIV infections in 2013 and about one third of all new AIDS cases in 2011 (1,2). Combination HIV prevention to reduce incidence includes strategic use of all effective behavioural, structural, and biomedical interventions, and capitalizes on the inherent secondary prevention benefits of expanded access to ART (3).

Pre-exposure prophylaxis (PrEP) is an effective biomedical HIV prevention strategy that involves the use of antiretroviral chemoprophylaxis prior to potential HIV exposure. Over the past five years, seven large randomized control trials have evaluated the efficacy of PrEP as a daily dose of tenofovir disoproxil fumarate (TDF) and/or combination tenofovir-emtricitabine (TDF-FTC): 44% efficacy in iPrEx (MSM), 62% for TDF and 73% for TDF-FTC in Partners PrEP (Heterosexual Sero-discordant Couples), 63% in TDF2 (heterosexual men and women), no effect in FEM-PrEP (African women), no effect in VOICE (African women), 49% in Bangkok Tenofovir Study (IDU), and 86% in PROUD (MSM) (4–10 respectfully). Efficacy was positively associated with adherence levels (4,6,7). Among MSM, the initial iPrEx study found 44% efficacy (4), while recent results from two more recent studies (PROUD and Ipergay) found similar reductions of 86% in incident HIV (10,11). The PROUD trial investigated the efficacy of daily PrEP (TDF-FTC) between immediate and 12-month delayed treatment arms (10). The Ipergay trial investigated the efficacy of “on demand” PrEP (a double dose 2–24 hours before sex, then a single dose 24 hours and 48 hours after sex) by randomizing participants to active TDF-FTC or placebo (11). In both of these trials PrEP was offered as a component of a comprehensive prevention strategy including risk-reduction counseling, provision of condoms, access to HIV testing and regular screening for sexually transmitted infections (4,10,11).

TDF-FTC is not currently licensed for use as PrEP in Canada, but a regulatory application for use as PrEP has been filed in August 2015 (12). The United States Food and Drug Administration have approved it for this indication since 2012. Previous studies of PrEP awareness and use in the US over the past decade have found that the proportion of participants who were aware of PrEP was low (13–38% of respondents) and it was rarely used (<2% of those surveyed) (13–22). All of these studies were conducted in the US, and few specifically examined PrEP knowledge after the iPrEx results were available in 2011 (14,17,22). Among MSM surveyed in the United States, PrEP awareness increased from 13% in the two months before iPrEx results were released to 19% one month after the iPrEx results were released (17), to 30.3% in August 2013 and 48.5% in January 2014 (22). PrEP use has increased slightly but remains uncommon: 0.9% one month after iPrEx results were released (17), 1.5% in August 2013 (22), and 2.3% in January 2014 (22).

We undertook the present study to evaluate PrEP awareness following licensure in the US, and to describe the socio-demographic, behavioral, and psychosocial factors associated with PrEP awareness amongst a large population-based sample of MSM in Metro Vancouver, Canada. The Momentum Health Study was conducted within the context of other established

province-wide HIV prevention strategies (23), as part of the Seek and Treat for Optimal Prevention (STOP) program funded by the British Columbia (BC) Ministry of Health, which expands access to HIV testing and treatment in BC, with a particular emphasis on hard-to-reach and vulnerable populations (24).

METHODS

Data were drawn from participants enrolled in the Momentum Health Study, a longitudinal bio-behavioural prospective cohort study of HIV-positive and HIV-negative MSM in Vancouver, Canada. Respondent driven sampling (RDS) was used to recruit MSM in the Greater Vancouver area (25) from February 2012 to February 2014. To be eligible, participants had to be men aged 16 or older, living in Metro Vancouver at the time of enrolment, reported sex with another man in the 6 months prior to survey, and able to complete a questionnaire in English. Once informed consent was provided, participants completed a ninety-minute study visit in-person at the study office, which was located in the West End, Vancouver's traditional gay neighborhood. A computer-assisted, self-administrated (CASI) questionnaire was used to collect socio-demographic, psychosocial, and behavioral variables. Subsequently, a nurse-administered questionnaire included clinical screening and questions regarding history of STI diagnoses. Participants were then trained in RDS recruitment and given a number of vouchers to recruit additional MSM from their socio-sexual networks. Participants were given $50 for their study visit and provided with $10 for each successful peer they recruited into the study. All Project Investigators' institutional Research Ethics Boards granted ethical approval.

Main outcome measures: PrEP Awareness

Questions regarding PrEP were first added in November 2012. Participants were prompted with the following definition of PrEP ("'PrEP' stands for Pre-Exposure Prophylaxis. It's a treatment that may reduce the chances of you contracting HIV if taken before risky sex") and asked, "have you ever heard of PrEP?". The primary outcome in this study was PrEP awareness as based on responses to that question (Yes versus No). Among those aware of PrEP, participants were then asked how much they thought they knew about PrEP ("Not much, or nothing at all", "A bit in general", or "A lot") and whether they talked about PrEP with friends or sex partners in the past six months (Yes versus No). HIV-negative and participants of unknown HIV status were asked whether they had used PrEP in the previous six months (Yes versus No). Data for each variable were collected from participants' first response to the main outcome questions, irrespective of study visit. We examined the first response to the PrEP questions obtained up until the end of February 2014.

Independent Variables of Interest

Independent variables included demographic factors, sexual behavior and substance use, prevention strategies, sexual health and risk, and attitudes and beliefs regarding HIV treatment, prevention, and condoms (see Table 1 for details). Lastly, attitude and belief variables included self-assessed risk for and likelihood of HIV transmission, level of agreement with the following statements (i.e., "I always have condoms with me when I have sex") and previously validated psychological scales. The Treatment Optimism scale (study

Cronbach's α=0.82) uses 12 items to measure positivity/optimism and skepticism regarding HAART (26). Example items include "A person with undetectable viral load cannot pass on the virus" and "HIV/AIDS is a less serious threat than it used to be because of new treatments". The Sexual Altruism scale has two 7-item subscales (study α = 0.81 and 0.87 respectively), a *personal* one regarding their own or their partner's sexual health and a *communal* one regarding collective well being of the gay community and one's role in that (27). Example items from the personal subscale are, "I don't want any partner of mine to get any disease from me" and "By having safer sex, I am setting an example for others", while from the communal subscale examples include, "safer sex is everybody's responsibility" and "having safer sex is a way I can help protect the next generation of gay men". The Revised Sexual Sensation Seeking Scale (R-SSS, study α=0.73) uses 11 items to measure the need for varied, novel, and complex sexual experiences and willingness to take personal physical and social risks to enhance sexual sensations (28). Example items include "I like wild "uninhibited" sexual encounters" and "I am interested in trying out new sexual experiences".

Statistical Analyses

All analyses were stratified by participants' self-identified HIV status, conducted using SAS® version 9.3 (SAS, North Carolina, United States) and adjusted by weights generated using RDSAT version 7.1.46 (29) to reflect better population estimates (30). In order to address potential bias introduced through peer-chain recruitment, the RDS-II (Volz-Heckathorn) weights used consider homophily (the tendency to recruit subsequent participants with the same characteristics) and network size (31). Descriptive statistics were generated, including crude frequencies and RDS-adjusted population parameters. Logistic regression was used to determine whether there were any differences in level of PrEP awareness by month over the duration of the study period after controlling for study visit number. Univariate and multivariable logistic regression was used to identify covariates of PrEP awareness. Model selections were conducted using a backward elimination technique based on two criteria (i.e., Akaike Information Criterion (AIC) and Type III p-values) until the final model reached the optimum (minimum) AIC (32). All statistical tests were two-sided and considered significant at $\alpha<0.05$.

RESULTS

Sample Demographics

A total of 719 participants were recruited into the baseline (visit #1) cross-sectional study, 524 of which self-identified as HIV-negative and 195 as HIV-positive. Overall, and after RDS-adjustment, 68.3% were Caucasian, 80.3% identified as gay, the median age was 33 years (1^{st}-3^{rd} quartile: 26–47 years), 65.7% had formal education greater than high school, 19.1% were currently a student, 74.1% had an annual income of less than CAD $30,000, and 51.8% lived in downtown Vancouver. Descriptive information on demographics, substance use, sexual behavior, partner characteristics, sexual health, and attitudes and beliefs are shown in Table 1 stratified by self-identified HIV status.

PrEP Awareness and Use

Of all 673 participants who answered questions regarding PrEP awareness (500 HIV-negative and 173 HIV-positive), 165 (18.4%) had heard of PrEP, but none had used it. There were no statistically significant trends month-by-month in PrEP awareness among HIV-negative or unknown status MSM (p=0.40) or HIV-positive MSM (p=0.06). Stratified by self-identified HIV status, 102/500 (20.9%) of HIV-negative or unknown status men and 63/173 (26.5%) of HIV-positive men were aware of PrEP. For HIV-positive men, the crude proportion PrEP-aware (36.4%) was reduced to 26.5% by RDS weights, which indicates that men from larger networks were more likely to be PrEP aware and that HIV-positive men were more likely to recruit participants who had similar PrEP awareness to themselves (high homophily). This was not the case for HIV-negative or unknown status men. Among the 102 PrEP-aware HIV-negative men, 31.2% had talked about PrEP with friends or sex partners in the past 6 months; in terms of self-declared knowledge, 11.0% indicated that they knew “a lot” about PrEP, 46.8% “a bit in general” and 42.1% “not much, or nothing at all”. Among the 63 PrEP-aware HIV-positive men, 27.3% had talked about PrEP with friends or sex partners; in terms of self-declared knowledge, 25.4% knew “a lot”, 43.8% “a bit in general” and 30.8% “not much, or nothing at all”. Tables 2a and 2b show the RDS-adjusted prevalence of PrEP awareness and univariable associations for all independent variables of interest for HIV-negative and HIV-positive MSM respectively.

The adjusted multivariable logistic regression models are shown in Table 3a and 3b, again stratified by self-identified HIV status. HIV-negative/unknown status MSM were more likely to be aware of PrEP if they were older, a student, reported being the receptive partner with ten or more anal sex partners over their lifetime, attended group sex events, and reported a prevention strategy of only having condomless anal sex with HIV-positive partners who are on treatment or have low viral loads, and had higher levels of HAART optimism. HIV-negative MSM were less likely to be aware of PrEP if they were not White-identified, preferred to bottom during anal sex, reported 6–19 recent sex partners versus only one in the past six months, and agreed to a lesser extent that they always had condoms when having sex. HIV-positive MSM were more likely to be aware of PrEP if they reported being the insertive partner with ten or more anal sex partners over their lifetime, and reported a prevention strategy of only having condomless anal sex with HIV-positive partners who are on treatment or have low viral loads. HIV-positive MSM were less likely to be aware of PrEP if they were not White-identified and used cocaine in the past six months. Reporting any recent condomless anal sex with a serodiscordant or status unknown partner was marginally associated with lower odds of PrEP awareness for HIV-positive MSM.

DISCUSSION

Among MSM surveyed from November 2012 to February 2014 in Metro Vancouver, PrEP awareness was greater among HIV-positive men (approximately 1 in 3 being aware) compared with HIV-negative men (approximately 1 in 5 being aware). No one reported PrEP use. The level of self-assessed knowledge regarding PrEP was low, and less than half of MSM had ever discussed PrEP with friends or sexual partners.

Factors associated with PrEP awareness among HIV-negative MSM in our current study highlight a nexus of potentially increased risk for HIV acquisition. As found in previous studies (14,18,19,21), HIV-negative MSM in Vancouver with greater numbers of sexual partners were more likely to be PrEP aware. Fortunately, other risk factors for HIV acquisition such as receiving drugs in exchange for sex and attending group sex events were also positively associated with PrEP awareness. However, HIV-negative MSM who were younger, reported less consistent access to condoms when having sex, and reported a preference to bottom (receptive anal sex role) during anal intercourse were significantly less likely to be aware of PrEP. Given the far increased risk of HIV acquisition during condomless receptive anal sex, PrEP may be a particularly valuable strategy for these men. Efforts to educate about or increase access to PrEP must target and ensure equitable uptake among HIV-negative MSM most likely to acquire HIV.

Numerous psychosocial measures were positively associated with PrEP awareness at the univariable level for HIV-negative MSM, including greater HAART optimism, personal sexual altruism, and sexual sensation seeking. Only HAART optimism remained as a significant psychosocial predictor of PrEP awareness in the multivariable model. We believe this is the first study to demonstrate an empirical link between HAART optimism and PrEP awareness for HIV-negative MSM, which is a logical extension of confidence in antiretroviral treatment options for HIV and the improved prognosis of an HIV diagnosis. No previous study on PrEP awareness has used the Sexual Sensations Scale although one study used a similar scale – the Arousal Barriers to Condom Use Scale – to find that participants who scored higher were more likely to be PrEP aware (15). For HIV-positive MSM, personal and communal sexual altruism were marginally significantly associated with PrEP awareness at the univariable level, but not in the multivariable model. Altruism has been identified as key factor that would help facilitate positive use of and possible integration of PrEP (33). PrEP-aware, HIV-positive MSM were more likely to report asking their sex partners about their HIV status, which indicates that PrEP may be a lead-in for conversations regarding disclosure.

Regardless of HIV status, PrEP awareness was associated with participants who reported only having condomless anal sex with partners on HIV treatment or who have low viral loads. These results are consistent with a study in San Francisco which found that PrEP-aware men were more likely to adhere to a seroadaptive strategy than men who were PrEP-unaware (34). One possible explanation is that PrEP awareness might be a proxy for higher sexual health literacy or greater access to sexual health information, which participants may draw on to practice various seroadaptive strategies. Unfortunately, the current study's questionnaire did not include any direct items on sexual health literacy or health information access. PrEP-aware participants may also be part of a social/sexual network where seroadaptive strategies are the norm and they have translated their higher sexual literacy into their personal risk reduction practices. HIV-positive MSM were included in this analysis as they could play a particularly important role as PrEP educators given their knowledge of HIV transmission, treatments, and adherence. This is supported by our findings that participants with larger network size and higher levels of homophily with respect to PrEP awareness were key factors for HIV-positive MSM, but not for HIV-negative MSM. Future research should investigate more directly the impact of social and sexual networks on PrEP

awareness, and how PrEP use may impact users and their networks. Qualitative interviews with participants who are PrEP-aware may provide additional information on the association between seroadaptive strategies and PrEP, as well as how they heard about PrEP (e.g. the Internet, traditional media sources, peers, healthcare provider, etc.) and whether their source is credible and knowledge is accurate.

This is one of few quantitative studies outside of the United States to provide prevalence estimates for, and factors related to, PrEP awareness and use among MSM using RDS methodology to obtain weighted population estimates (29–31). A strength of this study was the use of various previously validated scales to assess psychological factors associated with PrEP awareness (26–28). Further, the use of RDS enabled us to have increased representation of participants who identified as non-White (32.0%) compared with the general population of Canada and Vancouver (1). Also, unlike other studies that used interviewer-conducted surveys (14,15,18,19), we used CASI to decrease the likelihood of social desirability bias in the responses. We also stratified our analysis to understand further the factors associated with PrEP awareness that may differ by HIV status.

The PrEP awareness prevalence from this study is lower than some other studies (13,16,19,21), most likely because PrEP remains to be licensed in Canada and as a result there has not been a formal public health PrEP campaign. Nevertheless, this study's PrEP awareness prevalence is still higher than some other studies (17,18), likely due to more time since the iPrEx efficacy trial results were available in 2011 (4) and approval by the US FDA in 2012, or possibly due to the existence of HIV prevention strategies such as TasP and STOP in BC (23,24) as well as education and advocacy by local gay community organizations (35). The PrEP awareness prevalence found in this study is higher than the only other Canadian study that found a PreP awareness of 14% amongst HIV-negative MSM undergoing HIV testing a sexual health clinic in Toronto, Canada in 2010 (36), which is likely due to the reasons stated above. It will be important for future research to understand who the "early adopters" of biomedical innovation are (37), which may be possible in our study given its longitudinal design.

Readers should be cautious when interpreting our findings due to the fact that we did not assess participants' interests in, willingness to use, access to or attitudes about PrEP (14,16–19,36). Further research using qualitative study designs could provide more detailed information on how to incorporate PrEP within existing public health, clinical, and health promotion programs in Canada. Given the recent regulatory application for TDF-FTC use as PrEP in Canada (12), research should identify which MSM in Canada hold private medical insurance that would cover these drugs, as there is no current public-payer program or plan in place for PrEP.

There are several implications of our findings that may be relevant to physicians, program planners, researchers, and policy makers in Canada. Physicians must be aware of and educated regarding PrEP. Demand can also be driven by patients' request. However, given the low PrEP awareness among MSM in our study, this is unlikely to play a major role, in the absence of further community and health professional education efforts. Community organizations that offer programs or support services to MSM can play an important role in

educating their members who may benefit the most from PrEP, such as clients that engage in sexual activities with greater probability for HIV transmission. Further, MSM who did not identify as White were less likely to be aware of PrEP. Health promotion and care delivery must overcome structural barriers to ensure cultural relevance and equitable access for all MSM.

CONCLUSION

Overall PrEP knowledge was low amongst MSM in our current study in Metro Vancouver, and no respondents had used PrEP. PrEP awareness was associated with a number of factors that could be associated with greater risk of transmission although certain groups had disparities in awareness. It will be important to examine how uptake of PrEP impacts direct users themselves, their sexual partners and networks, and broader gay communities. Researchers, public health, and healthcare providers can play a pivotal role to ensure optimal integration of PrEP into our HIV and sexual health response.

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Table I

Sample demographics and descriptive statistics stratified by HIV status

	HIV-negative (n=524)				HIV-positive (n=195)			
	n	**%**	**RDS %**	**RDS 95% CI**	**n**	**%**	**RDS %**	**CI**
Demographic Variables								
Age								
< 30	**267**	51.0	**49.0**	43.0 55.1	**8**	4.1	**3.7**	0.6 6.8
≥ 30	**257**	49.1	**51.0**	44.9 57.0	**187**	95.9	**96.3**	93.2 99.4
White								
Yes	**390**	74.4	**69.8**	63.9 75.7	**149**	76.4	**68.1**	57.4 78.8
No	**134**	25.6	**30.2**	24.3 36.1	**46**	23.6	**31.9**	21.2 42.6
Sexual Identity								
Gay	**445**	84.9	**82.2**	77.3 87.0	**167**	85.6	**82.7**	74.2 91.2
Bisexual/Other	**79**	15.1	**17.8**	13.0 22.7	**28**	14.4	**17.3**	8.8 25.8
Education								
Greater than high school	**407**	79.2	**71.0**	64.9 77.0	**130**	68.1	**66.0**	55.6 76.5
Some/completed high school	**107**	20.8	**29.0**	23.0 35.1	**61**	31.9	**34.0**	23.5 44.4
Neighborhood								
Downtown Vancouver	**222**	42.4	**45.0**	38.9 51.1	**134**	68.7	**68.9**	59.3 78.5
Other Vancouver	**187**	35.7	**31.3**	26.0 36.7	**36**	18.5	**18.9**	10.4 27.4
Outside Vancouver	**115**	22.0	**23.7**	18.6 28.7	**25**	12.8	**12.2**	6.4 18.1
Current Student								
No	**392**	75.0	**74.7**	69.5 79.9	**176**	90.3	**90.3**	85.1 95.6
Yes	**131**	25.1	**25.3**	20.1 30.5	**19**	9.7	**9.7**	4.5 14.9
Annual Income (Canadian dollars)								
< $30,000	**313**	59.7	**69.1**	64.0 74.2	**144**	73.9	**79.3**	71.6 87.1
≥ $30,000	**211**	40.3	**30.9**	25.8 36.0	**51**	26.2	**20.7**	12.9 28.4
Current Regular Partner								
No	**323**	61.6	**63.1**	57.4 68.9	**123**	63.1	**66.3**	56.6 76.1
Yes	**201**	38.4	**36.9**	31.1 42.6	**72**	36.9	**33.7**	23.9 43.4

	HIV-negative (n=524)				HIV-positive (n=195)				
	n	%	RDS %	RDS 95% CI	n	%	RDS %	CI	
Sexual Behavior & Substance Use									
Anal Sex Preference									
Bottom	**173**	33.0	**32.1**	26.3 37.8	**68**	34.9	**37.4**	26.9 47.9	
Versatile	**132**	25.2	**23.7**	18.6 28.7	**61**	31.3	**27.8**	18.6 37.1	
Top	**195**	37.2	**39.4**	33.5 45.4	**58**	29.7	**23.9**	15.8 32.1	
No anal sex	**24**	4.6	**4.8**	2.1 7.5	**8**	4.1	**10.9**	2.0 19.7	
Number of Male Anal Sex Partners, P6M									
0	**65**	12.4	**12.7**	8.8 16.6	**24**	12.4	**15.4**	7.2 23.5	
1	**80**	15.3	**18.3**	13.1 23.4	**27**	13.9	**20.2**	11.2 29.2	
2–5	**225**	42.9	**40.8**	35.1 46.6	**65**	33.5	**27.9**	19.1 36.6	
6–19	**113**	21.6	**19.8**	14.8 24.8	**33**	17.0	**16.8**	9.3 24.3	
20+	**41**	7.8	**8.4**	4.5 12.2	**45**	23.2	**19.8**	10.1 29.4	
Number of Lifetime Insertive Anal Sex Partners									
< 10	**252**	48.1	**51.3**	45.3 57.4	**42**	21.5	**32.4**	21.5 43.2	
≥ 10	**272**	51.9	**48.7**	42.6 54.7	**153**	78.5	**67.6**	56.8 78.5	
Number of Lifetime Receptive Anal Sex Partners									
< 10	**260**	49.6	**54.7**	48.7 60.7	**34**	17.4	**27.4**	16.7 38.2	
≥ 10	**264**	50.4	**45.3**	39.3 51.3	**161**	82.6	**72.6**	61.8 83.3	
Attended Group Sex Event, P6M									
No	**410**	78.2	**79.4**	74.4 84.4	**129**	66.2	**74.0**	65.0 83.0	
Yes	**114**	21.8	**20.6**	15.6 25.6	**66**	33.9	**26.0**	17.0 35.0	
Received Drugs in Exchange for Sex, P6M									
No	**464**	88.6	**88.3**	83.9 92.6	**139**	71.3	**71.1**	60.6 81.5	
Yes	**60**	11.5	**11.7**	7.4 16.1	**56**	28.7	**28.9**	18.5 39.4	
Substances Used, P6M (mutually exclusive variables):									
Alcohol	**463**	88.5	**87.3**	82.9 91.8	**146**	74.9	**71.9**	61.6 82.2	
Crystal Methamphetamine	**59**	11.3	**12.4**	7.9 16.8	**77**	39.5	**32.6**	22.7 42.5	
Cocaine	**133**	25.4	**28.1**	22.3 34.0	**47**	24.1	**28.8**	18.3 39.3	
Ecstasy	**135**	25.8	**23.6**	18.6 28.6	**41**	21.0	**14.2**	7.7 20.8	
Ketamine	**59**	11.3	**11.3**	7.2 15.4	**35**	18.0	**14.2**	7.1 21.2	

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	HIV-negative (n=524)				HIV-positive (n=195)				
	n	%	RDS %	RDS 95% CI	n	%	RDS %	CI	
GHB	**70**	13.4	**13.9**	9.4	18.5	**56**	28.7	**27.2**	17.5	36.9
Prevention Practices									
Behavioral Strategies, P6M (mutually exclusive variables):									
Always using condoms	**335**	64.4	**66.2**	60.6	71.8	**68**	34.9	**33.9**	23.7	44.1
Strategic positioning	**138**	26.5	**22.8**	18.2	27.4	**71**	36.4	**32.1**	22.5	41.8
Anal sex abstinence	**258**	49.6	**42.7**	36.9	48.6	**67**	34.4	**38.1**	27.4	48.8
Sero-sorting for condomless anal sex	**182**	35.0	**30.6**	25.4	35.9	**102**	52.3	**46.8**	36.2	57.5
No condoms if HIV-positive partner has a low viral load or is on treatment	**51**	9.8	**8.2**	5.1	11.3	**68**	34.9	**30.8**	21.3	40.4
Withdrawal	**146**	28.1	**23.5**	18.6	28.3	**56**	28.7	**28.3**	18.9	37.7
Ask Partners Their HIV Status	**326**	62.7	**59.6**	53.5	65.7	**95**	48.7	**37.2**	27.6	46.8
Ask Status Frequency									
Always	**117**	22.3	**20.9**	16.2	25.6	**47**	24.1	**25.7**	16.4	35.0
Almost every time	**107**	20.4	**18.5**	13.8	23.1	**33**	16.9	**10.4**	5.9	15.0
A lot of the time/Sometimes	**167**	31.9	**32.9**	27.2	38.6	**57**	29.2	**27.8**	18.1	37.4
Rarely/Never	**133**	25.4	**27.7**	22.1	33.3	**58**	29.7	**36.1**	25.4	46.9
Tell Status Frequency									
Always	**136**	26.0	**22.9**	18.2	27.6	**63**	32.3	**29.2**	19.7	38.6
Almost every time	**66**	12.6	**10.9**	7.5	14.4	**38**	19.5	**14.2**	8.6	19.9
A lot of the time/Sometimes	**68**	13.0	**14.3**	9.7	18.8	**34**	17.4	**17.4**	9.6	25.2
Rarely/Never	**30**	5.7	**5.8**	2.7	9.0	**22**	11.3	**14.7**	5.8	23.6
Told only when asked	**223**	42.6	**46.1**	40.0	52.2	**38**	19.5	**24.4**	14.5	34.4
Sexual Health & Risk									
HIV Tested Ever									
No	**39**	7.4	**8.4**	5.3	11.5	--	--	--	--	--
Yes	**485**	92.6	**91.6**	88.5	94.7	--	--	--	--	--
HIV Tested in Past 2 Years									
No	**89**	17.0	**19.6**	14.9	24.3	--	--	--	--	--

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	HIV-negative (n=524)				HIV-positive (n=195)					
	n	**%**	**RDS %**	**RDS 95% CI**	**n**	**%**	**RDS %**	**CI**		
Yes	**435**	83.0	**80.4**	75.7	85.1	--	--	--	--	--
Any previous lifetime STI diagnosis										
No	**275**	52.5	**55.8**	49.8	61.9	**30**	15.4	**21.6**	12.0	31.2
Yes	**249**	47.5	**44.2**	38.1	50.2	**165**	84.6	**78.4**	68.8	88.0
Any serodiscordant/unknown status condomless anal sex, P6M										
No	**335**	65.4	**68.7**	63.2	74.2	**106**	55.5	**55.3**	44.5	66.2
Yes	**177**	34.6	**31.3**	25.8	36.8	**85**	44.5	**44.7**	33.8	55.5
Attitudes & Beliefs										
Self-Assessed HIV Transmission Risk										
Low	**468**	89.3	**88.5**	84.2	92.9	**179**	91.8	**85.5**	75.9	95.2
High	**56**	10.7	**11.5**	7.1	15.8	**16**	8.2	**14.5**	4.8	24.1
Self-Assessed Likelihood of HIV Transmission										
Very unlikely	**447**	85.3	**84.1**	79.2	88.9	**159**	81.5	**81.2**	72.2	90.2
(Somewhat/Very) Likely	**77**	14.7	**15.9**	11.1	20.8	**36**	18.5	**18.8**	9.8	27.8
"I Always Have Condoms when Having Sex"										
Strongly Agree	**193**	36.8	**36.6**	30.7	42.5	**64**	33.0	**30.9**	20.9	40.8
Agree	**186**	35.5	**34.6**	29.0	40.3	**63**	32.5	**39.6**	28.6	50.5
(Strongly) Disagree	**145**	27.7	**28.8**	23.2	34.4	**67**	34.5	**29.6**	20.6	38.6
Psychosocial scales (continuous; mutually exclusive)										
HAART Optimism Scale (median [Q1,Q3])	**24**	21, 26				**28**	25, 32			
Sexual Altruism - Personal (median [Q1,Q3])	**3.6**	3.1, 3.9				**3.4**	2.7, 3.9			
Sexual Altruism - Communal (median [Q1,Q3])	**3.7**	3, 4				**3.3**	2.5, 4			
Sexual Sensations Score (median [Q1,Q3])	**30**	28, 33				**31**	28, 35			

RDS = Respondent-Driven Sampling; 95% CI = 95% Confidence Interval; P6M = Past 6 Months; HAART = Highly Active Antiretroviral Therapy; STI = sexually transmitted infection.

Table II

a. Descriptive statistics and univariable associations of PrEP awareness among HIV-negative and unknown status MSM

	Heard of PrEP (n=102/500)				Univariable Associations			
Demographic Variables	**n**	**RDS %**	**95%CI**		**OR**	**95%CI**		**p-value**
Age (continuous: median [Q1,Q3])	**30 [25,44]**				**1.02**	1.00	1.04	**0.1326**
Race/Ethnicity								
White	**85**	**20.2**	14.8	25.5	**1.00**			**0.0331**
Other	**17**	**12.7**	4.2	21.3	**0.56**	0.33	0.96	
Sexual Identity								
Gay	**88**	**19.5**	14.3	24.8	**1.00**			**0.0840**
Bisexual/Other	**14**	**10.8**	3.5	18.1	**0.55**	0.28	1.08	
Education								
Greater Than	**85**	**17.5**	13.2	21.8	1.00			0.5471
Some/completed high school	**16**	**17.5**	6.6	28.4	1.17	0.70	1.96	
Neighborhood								
Downtown Vancouver	**49**	**20.8**	13.0	28.6	1.00			0.2937
Other Vancouver	**37**	**14.7**	8.9	20.4	0.68	0.40	1.17	
Outside Vancouver	**16**	**16.8**	7.2	26.5	0.72	0.40	1.27	
Current Student								
No	**74**	**15.4**	10.7	20.2	**1.00**			**0.0147**
Yes	**28**	**25.3**	14.6	36.0	**1.82**	1.13	2.94	
Annual Income (Canadian dollars)								
< $30,000	**61**	**17.5**	11.7	23.3	1.00			0.7242
≥ $30,000	**41**	**18.8**	12.2	25.5	1.09	0.67	1.77	
Regular Partner Currently								
No	**58**	**18.4**	12.2	24.7	1.00			0.6953
Yes	**44**	**17.0**	11.0	23.0	0.91	0.57	1.46	
Sexual Behavior & Substance Use								
Anal Sex Preference								
Top	**43**	**21.4**	13.5	29.4	**1.00**			**0.1960**

a. Descriptive statistics and univariable associations of PrEP awareness among HIV-negative and unknown status MSM

	Heard of PrEP (n=102/500)				Univariable Associations			
Bottom	**27**	**12.4**	5.8	19.1	**0.54**	0.31	0.94	
Versatile	**26**	**19.1**	9.5	28.7	**0.78**	0.44	1.39	
No anal	**6**	**19.8**	0.0	39.6	**0.85**	0.31	2.37	
Number of Male Anal Sex Partners, P6M								
0	**12**	**19.1**	4.3	33.9	**1.29**	0.56	2.95	**0.0008**
1	**17**	**15.7**	4.9	26.5	**1.00**			
2–5	**37**	**15.1**	9.6	20.6	**0.95**	0.49	1.84	
6–19	**22**	**14.2**	6.8	21.6	**0.77**	0.35	1.68	
20+	**14**	**44.3**	18.8	69.8	**3.96**	1.74	9.02	
Number of Lifetime Insertive Anal Sex Partners								
< 10	**48**	**15.6**	9.6	21.5	1.00			0.2364
≥ 10	**54**	**20.4**	13.5	27.2	1.32	0.84	2.07	
Number of Lifetime Receptive Anal Sex Partners								
< 10	**44**	**14.4**	8.8	20.1	**1.00**			**0.0478**
≥ 10	**58**	**22.0**	14.8	29.2	**1.58**	1.00	2.50	
Attended Group Sex Event, P6M								
No	**65**	**14.3**	9.9	18.8	**1.00**			**0.0002**
Yes	**37**	**32.6**	19.2	46.0	**2.58**	1.56	4.27	
Received Drugs in Exchange for Sex, P6M								
No	**88**	**16.7**	12.1	21.2	1.00			0.0255
Yes	**14**	**27.2**	9.2	45.2	2.07	1.11	3.87	
Substances Used, P6M (mutually exclusive variables):								
Alcohol	**89**	**17.0**	12.6	21.5	**0.65**	0.35	1.21	**0.1716**
Crystal Methamphetamine	**10**	**18.8**	2.9	34.7	1.25	0.63	2.46	0.5214
Cocaine	**25**	**15.6**	7.2	24.0	0.86	0.52	1.44	0.5747
Ecstasy	**30**	**19.9**	11.5	28.3	1.16	0.69	1.95	0.5832
Ketamine	**12**	**15.6**	4.4	26.7	0.87	0.42	1.83	0.7209
GHB	**17**	**19.9**	8.1	31.7	1.23	0.66	2.29	0.5116
Prevention Practices								

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a. Descriptive statistics and univariable associations of PrEP awareness among HIV-negative and unknown status MSM

	Heard of PrEP (n=102/500)				Univariable Associations			
Behavioral Strategies, P6M (mutually exclusive variables):								
Always use condoms	**56**	**14.8**	9.7	19.9	**0.58**	0.37	0.93	**0.0223**
Strategic positioning	**26**	**19.3**	9.8	28.8	1.06	0.63	1.80	0.8320
Anal sex avoidance	**55**	**20.2**	13.7	26.7	1.21	0.76	1.91	0.4225
Sero-sorting for condomless anal sex	**38**	**18.8**	11.8	25.9	1.03	0.63	1.68	0.9071
No condoms with partners who have low viral load or are on treatment	**20**	**52.8**	32.2	73.4	**6.20**	3.06	12.54	**0.0000**
Withdrawal	**34**	**21.1**	11.6	30.7	1.29	0.77	2.15	0.3307
Ask HIV status	**65**	**16.9**	11.7	22.1	0.86	0.54	1.37	0.5137
Ask Status Frequency								
Always	**22**	**15.4**	8.0	22.8	1.00			0.7998
Almost every time	**20**	**15.6**	7.1	24.2	1.03	0.49	2.19	
A lot of the time/Sometimes	**36**	**21.7**	12.2	31.1	1.32	0.70	2.52	
Rarely/Never	**24**	**16.8**	8.2	25.5	1.10	0.56	2.17	
Tell Status Frequency								
Always	**24**	**15.6**	8.3	22.8	**1.00**			**0.0092**
Almost every time	**18**	**21.1**	8.7	33.6	**1.39**	0.61	3.16	
A lot of the time/Sometimes	**15**	**27.9**	10.9	44.8	**1.73**	0.83	3.58	
Rarely/Never	**11**	**35.4**	6.6	64.1	**3.14**	1.28	7.73	
Told only when asked	**34**	**13.3**	7.6	19.0	**0.80**	0.43	1.50	
Sexual Health & Risk								
Any previous lifetime STI diagnosis								
No	46	**13.5**	8.5	18.5	**1.00**			**0.0076**
Yes	**56**	**23.7**	15.7	31.6	**1.86**	1.18	2.93	
Any serodiscordant/unknown status condomless anal sex, P6M								
No	57	**13.9**	9.4	18.5	**1.00**			**0.0023**
Yes	**42**	**26.6**	16.4	36.7	**2.08**	1.30	3.32	
Attitudes & Beliefs								

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a. Descriptive statistics and univariable associations of PrEP awareness among HIV-negative and unknown status MSM

	Heard of PrEP (n=102/500)				Univariable Associations			
Self-Assessed HIV Transmission Risk								
Low	**88**	**18.2**	13.3	23.1	1.00			0.6976
High	**14**	**15.6**	4.3	27.0	0.86	0.41	1.81	
Self-Assessed Likelihood of HIV Transmission								
Very unlikely	**83**	**17.6**	12.8	22.4	1.00			0.6262
(Somewhat/Very) Likely	**19**	**19.5**	6.4	32.6	1.16	0.63	2.13	
"**I Always Have Condoms when Having Sex**"								
Strongly Agree	**40**	**17.3**	10.4	24.3	**1.00**			**0.0024**
Agree	**27**	**11.5**	6.1	17.0	**0.57**	0.32	1.03	
(Strongly) Disagree	**35**	**26.7**	15.6	37.7	**1.61**	0.95	2.72	
Psychosocial scales (continuous; mutually exclusive)								
HAART Optimism Scale (median [Q1,Q3])	**24 [21,29]**				**1.08**	1.03	1.13	**0.0017**
Sexual Altruism - Personal (median [Q1,Q3])	**3.4 [3.0,3.9]**				**0.61**	0.42	0.89	**0.0092**
Sexual Altruism - Communal (median [Q1,Q3])	**3.5 [2.8,3.9]**				**0.78**	0.54	1.12	**0.1719**
Sexual Sensations Score (median [Q1,Q3])	**32 [29,35]**				**1.11**	1.05	1.18	**0.0003**

b. Descriptive statistics and univariable associations of PrEP awareness among HIV-positive MSM

	Heard of PrEP (n=63/173)				Univariable Associations			
Demographic Variables	**n**	**RDS %**	**95%CI**		**OR**	**95%CI**		**p-value**
Age (continuous: median [Q1,Q3])	**48 [41,53]**				1.00	0.95	1.05	0.9962
Race/Ethnicity								
White	**53**	**25.2**	15.3	35.0	**1.00**			**0.0109**
Other	**10**	**7.5**	1.4	13.6	**0.22**	0.07	0.70	
Sexual Identity								
Gay	**59**	**21.5**	13.3	29.7	**1.00**			**0.0624**
Bisexual/Other	**4**	**6.7**	0.0	14.7	**0.21**	0.04	1.08	
Education								
Greater Than	**51**	**23.0**	13.7	32.4	**1.00**			**0.0931**
Some/completed high school	**10**	**10.1**	1.0	19.1	**0.39**	0.13	1.17	
Neighborhood								

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b. Descriptive statistics and univariable associations of PrEP awareness among HIV-positive MSM

	Heard of PrEP (n=63/173)				Univariable Associations			
Downtown Vancouver	**40**	**16.3**	8.6	23.9	1.00			0.3777
Other Vancouver	**14**	**25.7**	6.0	45.5	2.13	0.71	6.35	
Outside Vancouver	**9**	**21.1**	1.7	40.6	1.56	0.43	5.59	
Current Student								
No	**57**	**19.2**	11.8	26.6	1.00			0.7149
Yes	**6**	**14.6**	0.0	30.2	0.75	0.16	3.52	
Annual Income (Canadian dollars)								
< $30,000	**42**	**16.1**	9.0	23.1	**1.00**			**0.1201**
≥ $30,000	**21**	**30.7**	12.2	49.2	**2.23**	0.81	6.12	
Regular Partner Currently								
No	**43**	**15.3**	7.8	22.7	**1.00**			**0.0754**
Yes	**29**	**25.8**	12.1	39.4	**2.27**	0.92	5.63	
Sexual Behavior & Substance Use								
Anal Sex Preference								
Top	**16**	**23.2**	8.1	38.3	1.00			0.5477
Bottom	**22**	**20.2**	8.4	32.0	0.92	0.30	2.75	
Versatile	**24**	**18.9**	6.6	31.3	0.89	0.27	2.94	
No anal	**1**	**2.8**	0.0	11.6	0.09	0.00	2.33	
Number of Male Anal Sex Partners, P6M								
0	**6**	**13.5**	0.0	28.6	0.93	0.17	5.03	0.5908
1	**6**	**14.3**	0.0	29.5	1.00			
2–5	**17**	**22.6**	8.4	36.9	1.76	0.48	6.42	
6–19	**14**	**29.7**	8.5	50.9	2.12	0.53	8.50	
20+	**20**	**13.5**	2.6	24.4	0.81	0.18	3.71	
Number of Lifetime Insertive Anal Sex Partners								
< 10	**6**	**7.7**	0.0	15.9	**1.00**			**0.0151**
≥ 10	**57**	**24.8**	15.4	34.2	**4.32**	1.33	14.03	
Number of Lifetime Receptive Anal Sex Partners								
< 10	**9**	**11.5**	0.0	23.2	1.00			0.2177
≥ 10	**54**	**21.6**	13.4	29.8	2.00	0.67	6.00	

b. Descriptive statistics and univariable associations of PrEP awareness among HIV-positive MSM

	Heard of PrEP (n=63/173)				Univariable Associations			
Attended Group Sex Event, P6M								
No	**36**	**18.2**	9.9	26.5	1.00			0.8206
Yes	**27**	**20.2**	8.7	31.7	1.12	0.43	2.92	
Received Drugs in Exchange for Sex, P6M								
No	**47**	**22.3**	13.4	31.2	**1.00**			**0.1180**
Yes	**16**	**10.6**	2.7	18.5	**0.42**	0.14	1.25	
Substances Used, P6M (mutually exclusive variables):								
Alcohol	**48**	**20.0**	11.9	28.2	1.32	0.46	3.76	0.6036
Crystal Methamphetamine	**23**	**13.5**	4.4	22.6	**0.49**	0.18	1.35	**0.1679**
Cocaine	**11**	**6.1**	0.9	11.4	**0.13**	0.03	0.53	**0.0043**
Ecstasy	**14**	**22.8**	5.5	40.1	1.54	0.45	5.24	0.4872
Ketamine	**12**	**14.3**	1.5	27.2	0.85	0.22	3.29	0.8114
GHB	**16**	**13.6**	2.7	24.4	0.49	0.17	1.46	0.2029
Prevention Practices								
Behavioral Strategies, P6M (mutually exclusive variables):								
Always use condoms	**20**	**13.7**	5.5	22.0	0.56	0.21	1.47	0.2379
Strategic positioning	**24**	**27.4**	12.2	42.6	**1.90**	0.77	4.65	**0.1613**
Anal sex avoidance	**22**	**16.3**	6.1	26.6	0.72	0.29	1.81	0.4901
Sero-sorting for condomless anal sex	**40**	**27.5**	15.5	39.4	**2.85**	1.15	7.10	**0.0243**
No condoms with partners who have low viral load or are on treatment	**32**	**32.9**	16.0	49.8	**3.26**	1.33	7.98	**0.0097**
Withdrawal	**20**	**21.4**	7.2	35.5	1.22	0.46	3.24	0.6835
Ask HIV status	**35**	**30.4**	17.3	43.5	**2.86**	1.17	6.97	**0.0208**
Ask Status Frequency								
Always	**13**	**12.9**	1.7	24.1	**1.00**			**0.1796**
Almost every time	**13**	**28.7**	9.8	47.5	**3.55**	0.72	17.61	
A lot of the time/Sometimes	**19**	**29.8**	11.0	48.7	**2.72**	0.80	9.20	
Rarely/Never	**18**	**12.7**	3.7	21.7	**1.13**	0.31	4.09	
Tell Status Frequency								
Always	**17**	**17.7**	4.5	31.0	**1.00**			**0.0220**

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b. Descriptive statistics and univariable associations of PrEP awareness among HIV-positive MSM

	Heard of PrEP (n=63/173)				Univariable Associations			
Almost every time	**19**	**44.0**	20.8	67.1	**4.88**	1.24	19.24	
A lot of the time/Sometimes	**11**	**25.1**	4.9	45.2	**2.05**	0.57	7.42	
Rarely/Never	**7**	**7.4**	0.0	15.8	**0.32**	0.05	1.90	
Told only when asked	**9**	**10.7**	1.2	20.2	**0.66**	0.16	2.66	
Sexual Health & Risk								
Any previous lifetime STI diagnosis								
No	**8**	**13.5**	0.0	27.9	1.00			0.3579
Yes	**55**	**20.2**	12.4	27.9	1.75	0.53	5.76	
Any serodiscordant/unknown status condomless anal sex, P6M								
No	**36**	**26.4**	14.7	38.1	**1.00**			
Yes	**27**	**13.9**	6.1	21.7	**0.43**	0.17	1.11	**0.0822**
Attitudes & Beliefs								
Self-Assessed HIV Transmission Risk								
Low	**60**	**21.7**	13.9	29.5	**1.00**			**0.0239**
High	**3**	**3.6**	0.0	9.5	**0.07**	0.01	0.70	
Self-Assessed Likelihood of HIV Transmission								
Very unlikely	**55**	**21.6**	13.5	29.8	**1.00**			**0.0851**
(Somewhat/Very) Likely	**8**	**6.7**	0.0	14.0	**0.25**	0.05	1.21	
"**I Always Have Condoms when Having Sex**"								
Strongly Agree	**18**	**12.0**	4.3	19.8	**1.00**			**0.0175**
Agree	**16**	**11.5**	3.6	19.4	**1.09**	0.31	3.83	
(Strongly) Disagree	**29**	**36.9**	19.8	54.1	**4.04**	1.26	12.97	
Psychosocial scales (continuous; mutually exclusive)								
HAART Optimism Scale (median [Q1,Q3])	**29[25,32]**				1.03	0.95	1.11	0.4785
Sexual Altruism - Personal (median [Q1,Q3])	**3.2 [2.7,3.7]**				**0.57**	0.31	1.05	**0.0724**
Sexual Altruism - Communal (median [Q1,Q3])	**3 [2.3,4.0]**				**0.65**	0.40	1.04	**0.0743**
Sexual Sensations Score (median [Q1,Q3])	32[29,36]				0.98	0.89	1.08	0.6929

RDS = Respondent-Driven Sampling; 95% CI = 95% Confidence Interval; OR = odds ratio; Q1,Q3 = first and third quartile values; P6M = Past 6 Months; HAART = Highly Active Antiretroviral Therapy; STI = sexually transmitted infection.

Table III

a. Multivariable Model of Factors Associated with PrEP Awareness Among HIV negative and unknown status MSM

	AOR	95% CI	
Age (continuous: median [Q1,Q3])	**1.02**	**1.00**	**1.05**
Race/Ethnicity			
White	1.00		
Other	**0.40**	**0.21**	**0.77**
Current Student			
No	1.00		
Yes	**5.03**	**2.61**	**9.70**
Anal Sexual Position Preference			
Top	1.00		
Bottom	**0.37**	**0.18**	**0.74**
Versatile	0.49	0.24	1.00
No anal sex	1.02	0.27	3.94
Received Drugs in Exchange for Sex, P6M			
No	1.00		
Yes	**1.92**	**0.88**	**4.16**
Number of Male Anal Sex Partners, P6M			
0	1.07	0.37	3.10
1	1.00		
2–5	0.67	0.29	1.54
6–19	0.32	0.11	0.94
≥ 20	1.36	0.37	3.10
Number of Lifetime Insertive Anal Sex Partners			
< 10	1.00		
≥ 10	**2.13**	**1.10**	**4.11**
Attended Group Sex Event, P6M			
No	1.00		
Yes	**2.88**	**1.42**	**5.84**
Prevention strategy: "only have condomless sex with partners who are on treatment or have low viral loads"			
No	1.00		
Yes	**2.54**	**1.04**	**6.20**
"**I Always Have Condoms When Having Sex**"			
Strongly Agree	1.00		
Agree	**0.35**	**0.17**	**0.70**
(Strongly) Disagree	0.96	0.51	1.82
Attitude:			
HAART Optimism	**1.08**	1.01	1.14

b. Multivariable Model of Factors Associated with PrEP Awareness Among HIV-positive MSM

	AOR	95% CI	
Race/Ethnicity			
White	1.00		
Other	**0.21**	**0.05**	**0.83**
Used Cocaine, P6M			
No	1.00		
Yes	**0.18**	**0.04**	**0.84**
Number of Lifetime Receptive Anal Sex Partners			
< 10	1.00		
≥ 10	**5.32**	**1.23**	**22.98**
Any serodiscordant/unknown status condomless anal sex, P6M			
No	1.00		
Yes	0.30	0.08	1.10
Prevention strategy: "only have condomless sex with partners who are on treatment or have low viral loads"			
No	1.00		
Yes	**4.64**	**1.29**	**16.73**
Prevention strategy: "asking sex partners about their HIV status before sex"			
No	1.00		
Yes	**2.59**	**0.83**	**8.07**
"**I Always Have Condoms When Having Sex**"			
Strongly Agree	1.00		
Agree	1.92	0.41	9.01
(Strongly) Disagree	4.01	0.95	16.91

AOR = adjusted odds ratio; 95% CI = 95% Confidence Interval; Q1,Q3 = first and third quartile values; P6M = Past 6 Months; HAART = Highly Active Antiretroviral Therapy.

AOR = adjusted odds ratio; 95% CI = 95% Confidence Interval; P6M = Past 6 Months.