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Sexual Risk Taking and the HIV Care Continuum in an Online Sample of Men Who Have Sex with Men

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Abstract

Antiretroviral Therapy (ART) suppresses HIV replication, reducing the risk of transmission. However, many people living with HIV in the US are not virally suppressed even after diagnosis and initiating ART, and may become disengaged from care at each stage of the HIV care continuum (HCC). In the current study we assessed the sexual risk behaviors of MSM by HCC stage. US MSM who completed an online survey (N=12,995) in 2015 were categorized into 6 HCC groups. Mean age was 39.2 and a majority identified as White (49.6%). At every stage of the HCC, we found higher proportions of individuals engaged in care compared to CDC estimates. A majority of the sample was HIV-positive and engaged in care, with 67.2% of HIV-positive participants reporting viral suppression with ART. Across HCC groups, participants reported high rates of past 6-month condomless anal sex (CAS) (79.2%–84.8%) and CAS with serodiscordant or unknown status partners (38.0%–84.1%). Notably, MSM with unknown HIV serostatus reported the highest proportion of CAS and serodiscordant CAS. HIV-positive MSM not on ART were more likely to report an STI diagnosis ($p < .002$) compared to those unaware of their HIV status or HIV-negative. Moreover, young Black MSM were less likely to be on ART ($p < .002$) or virally suppressed ($p < .002$) compared to older White MSM. Our findings highlight potentially problematic sexual risk behaviors among MSM by level of HCC engagement, which can impede the preventive impact of ART. Online platforms provide an avenue to assess the progress of MSM along the HCC, as well as other subpopulations in need of appropriate behavioral interventions to decrease HIV incidence.

Keywords

HIV care continuum; sexual HIV transmission; treatment as prevention; men who have sex with men

Introduction

Antiretroviral therapy (ART) is a key component in HIV prevention as it decreases the risk of sexual transmission by suppressing viral replication and reducing plasma HIV (viral load)

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(M. S. Cohen et al., 2013; Cope et al., 2015). Transmission risk is potentially greatest among those with untreated, acute HIV infections (Friedman et al., 2014; Grinsztejn et al., 2014). A study with serodiscordant couples found that early ART initiation among HIV-positive partners was associated with a 93% lower risk of infection in HIV-negative partners compared to delayed ART (M. S. Cohen et al., 2016). Moreover, using national HIV surveillance data, another study found that persons with known HIV diagnoses who were prescribed ART and achieved viral suppression were 94% less likely to transmit HIV compared to persons with undiagnosed HIV (Skarbinski et al., 2015).

While treatment efforts prioritize early diagnosis, linkage to care, and ART initiation (M. S. Cohen et al., 2011; Hoots, Finlayson, Wejnert, & Paz-Bailey, 2015), individuals prescribed ART still struggle to achieve and maintain viral suppression. Multiple studies estimate the proportion of people in the US who have reached viral suppression, with some studies reporting higher rates of viral suppression (59% - 73%) (Bradley et al., 2016; Crepaz et al., 2016; Doshi et al., 2015; Mattson et al., 2014; Singh, Mitsch, & Wu, 2017; Torian, Xia, & Wiewel, 2014; Yehia et al., 2015), and others reporting lower rates of viral suppression (25% - 48%) (S. M. Cohen, Hu, Sweeney, Johnson, & Hall, 2014; Skarbinski, et al., 2015). Recently, Bradley et al. (2016) reported an upwards trend towards ART prescription and viral suppression. While these findings are promising, a portion of individuals living with HIV continue to be disengaged in care. This suggests that viral suppression and HIV transmission risk extend beyond diagnosis and linkage to care, and is contingent upon factors such as sustained ART adherence, retention in care, and avoidance of sexually transmitted infections (STIs), high-risk sexual behaviors, and substance abuse (Gardner, McLees, Steiner, Del Rio, & Burman, 2011; Kalichman et al., 2015).

Prevention Along the HIV Care Continuum

The HIV Care Continuum (HCC) outlines the steps of medical care required for viral suppression and has become a framework for quantifying and assessing gaps in care (Giordano, 2015; The White House Office of National AIDS Policy, 2016). Specifically, the HCC tracks progression from diagnosis, linkage to care, retention in care, ART initiation, and reaching and maintaining viral suppression (Yehia, et al., 2015; Zandoni & Mayer, 2014). As HIV transmission rates decrease along the continuum (Giordano, 2015; Skarbinski, et al., 2015), public health efforts that increase engagement and target risk behaviors at each stage are critical for maximizing health and prevention benefits. In an effort to improve the health outcomes for people living with HIV and reduce transmission and HIV-related health disparities, the Centers for Disease Control and Prevention (CDC) monitors engagement along the HCC, in accordance with the goals of the National HIV/AIDS Strategy (The White House Office of National AIDS Policy, 2016).

HIV Infection in Men Who Have Sex With Men

Men who have sex with men (MSM) continue to be disproportionately impacted by HIV. In 2015, it is estimated that MSM accounted for 70% of all diagnosed HIV infections in the US. (Centers for Disease Control and Prevention [CDC], 2016). Much of the greater HIV disease burden carried by MSM is attributable to the higher transmission risk of receptive condomless anal sex (CAS) (Beyrer et al., 2012; Centers for Disease Control and Prevention

[CDC], 2010; Grov, Rendina, & Parsons, 2014) exacerbated by unknown serostatus (Hall, Holtgrave, & Maulsby, 2012; Marks, Crepaz, & Janssen, 2006). HIV incidence rates are even more alarming for young MSM, particularly young Black MSM (Zanoni & Mayer, 2014). According to CDC surveillance reports, young MSM, and Black and Hispanic MSM were less likely to be engaged at each step of the continuum (Singh et al., 2014), suggesting inequities in access to care.

Identifying sexual risk behavior patterns, particularly among high-risk MSM subgroups, is critical for prevention and addressing health disparities. A better understanding of the gaps in engagement along the HCC may inform treatment and prevention policies that effectively maximize care at every step. While previous studies relied primarily on surveillance data to estimate the number of people at each step of the continuum (e.g., National HIV Surveillance System [NHSS], Medical Monitoring Project [MMP]), these estimates potentially exclude vulnerable groups not captured by these systems. The current study uses eligibility survey data from an online intervention for MSM living in the US. We report on progress towards the goals of the National HIV/AIDS Strategy compared to national surveillance estimates and compare sexual risk profiles by HIV status and level of HCC engagement.

Methods

Data for the current report are from an online eligibility survey to participate in Sex Positive! [+], a video-based online intervention to improve health outcomes for HIV-positive MSM in the US (Hirshfield et al., 2016). Recruitment occurred between June 2015 and January 2016 through various US-based social networking websites, gay-oriented sexual and dating websites (e.g., POZ Personals) and geosocial networking applications, including a website catering to CAS encounters, and online bulletin boards. We used targeted recruitment to oversample Black and Hispanic MSM, and young men between 18 and 29 years old. Our targeted recruitment strategy, based on previous research findings (Hirshfield, Grov, Parsons, Anderson, & Chiasson, 2015; Sullivan et al., 2011), included study banner advertisements targeting the racial and ethnic composition of each subgroup.

Measures

Demographic Characteristics—The eligibility survey consisted of a series of questions assessing participant's age (with a pull-down menu), race and ethnicity that participant identified with most, current gender identity, sex at birth, and country of residence.

HIV Status—Participants were asked about the results of their most recent HIV test. Response options included: “positive”, “negative”, “never obtained results”, “indeterminate”, and “never been tested”. While the HIV status of participants reporting any of the last three options is unknown, it was determined by the study team that those who had never been tested were categorically distinct from those with unconfirmed test results, since the latter group at some point entered into care. Thus, those who reported “never obtained results” or “indeterminate” were collapsed into a single category.

Sexual Transmitted Infection (STI) Diagnosis—An STI diagnosis other than HIV occurring within the past 3 months was assessed with a single item (Yes/No).

Retention in Care—HIV-positive participants were asked if they had a VL test in the past year (Yes/No), which was used as a proxy measure for retention in HIV care.

Viral Suppression Status—All HIV-positive participants were asked: “At any time in the past 12 months, did you have a Detectable HIV viral load?”, which we grouped into two categories: (1) virally suppressed (“No, undetectable or < 200 copies/mL” and “I don’t know, but I think undetectable”) or (2) virally unsuppressed (“Yes, detectable or > 200 copies/mL” and “I don’t know, but I think detectable”). Some misclassification may have occurred by collapsing unknown viral status responses, however these represented a small proportion (6%) of total responses.

Serodiscordant CAS—To determine serodiscordant CAS events, participants were asked about their number of male CAS partners (0, 1, 2, 3, 4, 5 or more) in the past 6 months, and of those partners, how many were HIV-positive. CAS events were deemed as either seroconcordant (e.g., HIV-positive status and reporting only HIV-positive partners) or confirmed/unknown serodiscordant (e.g., HIV-positive status and reporting no, or some, HIV-positive CAS partners; Never been tested or never obtained results/indeterminate and reporting any CAS partners). CAS events for HIV-positive individuals reporting a single CAS partner and “some” HIV-positive partners (n = 118) were categorized as seroconcordant.

HIV Care Continuum (HCC) Engagement Category—Using HIV status, current use of ART, and HIV viral suppression status, participants were categorized into one of six mutually exclusive HCC groups: (1) Never been tested; (2) Never obtained results/indeterminate; (3) HIV negative; (4) On ART and undetectable; (5) On ART and detectable; and (6) Not on ART.

Data Analysis

IBM SPSS version 23 was used for all data cleaning and analysis. Descriptive analysis was performed on all key variables to evaluate the frequency and distribution of the data and to examine missing data. Response items “Prefer not to answer” or “I don’t know” were coded as missing and excluded from the analysis on a pairwise basis.

We compared the six HCC groups on demographic characteristics and sexual risk behaviors. Chi-square tests were used to assess group differences for dichotomous and categorical variables, with partial chi-square tests performed for post hoc analyses. One-way analysis of variance (ANOVA) was used to test group differences for normally distributed continuous dependent variables, with post hoc comparisons made using the Tukey HSD test. Statistically significant associations were reported at the $p < 0.05$ level and Bonferroni corrections were applied to the alpha values in post hoc comparisons.

Results

There were a total of 55,722 clicks on the study banner advertisements to the eligibility survey, of which 35,532 (63.8%) broke-off immediately. Of the 17,690 completed surveys, 1,225 were excluded based on identical IP match (6.9%), and disqualifying or inconsistent data (<1.0%), which was determined on a case-by-case basis by the study team. Further, non-US residents (n = 571), those younger than 18 years (n = 92), those who did not indicate their birth sex as male (n = 166), and those who did not identify their current gender as male or genderqueer (n = 440) were excluded. Of the remaining 15,410 participants, those who provided incomplete data on HIV status (n = 235) or who reported no male anal sex partners in the past 6 months (n = 2,239) were excluded, leaving 12,995 surveys in our analytic sample.

Table 1 presents demographic and behavioral characteristics of the study sample. Mean age for this sample of 12,995 MSM was 39.2 years (SD = 11.9), with a majority identifying their current gender as male and less than 1% identifying as genderqueer (n = 50). A majority identified as White (49.6%), followed by Black (30.1%), Hispanic (14.8%), and Other (4.8%). While the study specifically recruited for HIV-positive men, 9.8% of those taking the eligibility survey self-reported their status as HIV-negative (n = 1,272), 2.1% never obtained an HIV test result or results were indeterminate (n = 270), and 1.3% had never been tested (n = 164). Of the 11,289 men who were HIV-positive (86.9%), 19.8% received their diagnosis in the past year, 94.7% were retained in care (had a viral load test in the past 12 months), 90.9% were currently taking ART medication, and 67.2% were on ART and virally suppressed.

Figure 1 illustrates sexual risk behaviors by HIV status and HCC stage. Overall, most participants (80.5%) reported at least one male CAS partner in the past 6 months, with 28% reporting 5 or more. Among participants reporting CAS, 63.5% had a serodiscordant or unknown status partner. MSM who had never been tested for HIV had the highest proportion of CAS (84.8%) and serodiscordant CAS (84.1%). HIV-positive MSM on ART and detectable accounted for the lowest proportion of CAS (79.2%) while HIV-negative MSM reported the lowest proportion of serodiscordant CAS (38.0%).

Comparisons of Demographic Characteristics and Sexual Risk Behaviors by HCC Stage

Table 2 presents demographics and sexual risk behaviors by HCC engagement group. Analyses revealed significant group differences by age, race/ethnicity, STI diagnosis in the past 3 months, HIV diagnosis in the past year, number of CAS partners in the past 6 months, and serodiscordant CAS with men in the past 6 months. MSM not on ART following their HIV diagnosis were younger compared to those on ART. Similarly, HIV-positive individuals on ART and virally suppressed were significantly older compared to all other HCC groups. These men were also significantly more likely to be White and less likely to be Black compared to all other HCC groups.

HIV-positive men who were not on ART or who were on ART and detectable were significantly more likely to have been diagnosed in the past year compared to those on ART and virally suppressed. Participants who had never been tested for HIV were less likely than

all other HCC groups to report an STI diagnosis in the past 3 months. On the other hand, MSM not on ART were significantly more likely to report an STI diagnosis compared to those unaware of their HIV status, HIV-negative men, and virally suppressed HIV-positive men on ART. Furthermore, HIV-positive men, regardless of whether or not they received ART, were significantly more likely to report an STI diagnosis in the past 3 months compared to HIV negative men.

HIV-negative men were significantly less likely than HIV-positive men to report serodiscordant CAS with men in the past 6 months. They were also less likely to report 5 or more male CAS partners. Finally, HIV-positive men not on ART were more likely to report 5 or more male CAS partners compared to HIV-positive individuals on ART and men who had never been tested.

Discussion

We classified a large national sample of high-risk MSM recruited online into HCC stages to highlight differences in demographic and sexual risk behaviors. Approximately 67% of HIV-positive participants were engaged in care, on ART, and virally suppressed, though about 22% were engaged in care and on ART but were not virally suppressed. Similar to national estimates, a lower proportion of individuals prescribed ART reached the viral suppression stage of the HCC (Singh, et al., 2014). Within each HCC category, a majority (range: 79.2% – 84.8%) of participants engaged in CAS with men in the past 6 months. Among HIV-positive MSM, almost two-thirds of men who reported CAS in the past 6 months also reported CAS with an HIV-negative or unknown status partner. Almost half (47.8%) of HIV-negative men who reported CAS in the past 6 months also had CAS with a serodiscordant partner. Among individuals who had never had an HIV test or never obtained their HIV test results, nearly all (99%) participants who had CAS in the past 6 months reported CAS with an HIV-positive or unknown serostatus partner.

Results from this study describe a similar proportion of individuals reporting viral suppression compared to Yehia et al (2015). We found a higher proportion of individuals living with HIV retained in care compared to CDC reports (94.7 vs. 50.9%), as well as those currently prescribed ART medication (90.9 vs 49.5%), and achieving viral suppression (67.2 vs. 42.0%) (Singh, et al., 2014). Our findings within each HCC stage are likely driven by the nature of the study sample, as men in the current study had to have internet access through a computer or mobile device and be able to answer questions independently about their sexual behavior and HIV care. These characteristics may not be representative of MSM in the US who do not have internet access, who do not use the websites or apps reported in this study, or those captured by the surveillance systems used by the CDC. Furthermore, because our sample was largely White, older, and living with HIV for more than a year, the higher proportion of individuals we observed at each stage of the HCC is consistent with previous research which has found that White, older MSM are more likely to be engaged in care and achieve viral suppression (Hoots, Finlayson, Wejnert, & Paz-Bailey, 2017; Singh, et al., 2014). Moreover, men in our study were categorized into HCC stages based on self-reported HIV diagnosis, HIV care engagement, and viral suppression and not based on clinical or surveillance data. A recent report from the CDC's National HIV Behavioral Surveillance

System (NHBS) also reported higher proportions of linkage to care (87%) and current ART treatment (88%) (Hoots, et al., 2017). Data from NHBS is collected using venue-based sampling in urban areas. However, our data is consistent with previous HCC studies and illustrates an appreciable decline in the proportion of individuals who ultimately become virally suppressed.

Increasing the proportion of HIV-positive individuals reaching and maintaining viral suppression is a public health priority as an undetectable viral load decreases the likelihood of transmission (M. S. Cohen, et al., 2011; Rodger et al., 2016). Ensuring individuals reach viral suppression is contingent on them knowing their HIV status. Among our analytic sample, 3.4% of individuals were unaware of their HIV serostatus either because they had never been tested for HIV, or had been tested, but never received their results. Cases of undiagnosed HIV among this fraction of participants is of concern due to the potential of continued HIV infection. Even more disconcerting is the fact that among our study participants, men unaware of their HIV serostatus reported more CAS events compared to men aware of their HIV serostatus. Previous research has found that 30.2% of HIV transmissions per year are attributable to undiagnosed individuals living with HIV (Skarbinski, et al., 2015). Importantly, among a community-based sample of MSM, a recent study found that an increased belief that HIV treatment reduces transmission risk coincided with increased rates of CAS (Kalichman et al., 2017). In an age when ART is at the center of HIV prevention, such findings suggest a potentially problematic belief in treatment optimism and perceived lower infectivity among those who may not be virally suppressed. In the current study, we found that men who were not on ART were more likely to report an STI diagnosis compared to those who were HIV negative or had an unknown serostatus. Genital tract inflammation caused by STIs increases HIV infectivity and transmission risk regardless of ART adherence (M. S. Cohen, Muessig, Smith, Powers, & Kashuba, 2012; Kalichman et al., 2013), making this finding of particular concern.

Findings from the study also highlight stark demographic differences among individuals who reach the latter stages of the HCC. Younger and Black MSM were less likely to be on ART and reach viral suppression compared to older White MSM. Our results are consistent with surveillance reports and observational research which identify racial and age disparities at each stage of the HCC (Hoots, et al., 2017; Millett et al., 2012; Rosenberg, Millett, Sullivan, del Rio, & Curran, 2014; Singh, et al., 2014). Research has found that that young MSM (YMSM) with detectable viremia are more likely to report any CAS and serodiscordant CAS compared to YMSM with an undetectable viral load (Wilson et al., 2016). Further, it is imperative to note that black YMSM made up 61% of new HIV infections in the United States in 2009 and only 16% of black MSM living with HIV are estimated to reach viral suppression (Prejean et al., 2011; Rosenberg, et al., 2014); the current study found that 25% of black MSM achieved viral suppression, which is in line with national estimates. Our findings suggest that YMSM and MSM of color recruited online also experience disparities along each stage of the HCC and future research should target these subpopulations to increase their participation in online studies and increase the proportion of men reaching viral suppression (Hirshfield, et al., 2015).

A few limitations should be acknowledged about our study and analyses. First, the study population was a non-probability sample of MSM recruited from social and sexual networking websites and apps, who tended to be older, White, aware of their HIV diagnosis longer, and have access to the internet through a computer or mobile device. Furthermore, recruitment specifically targeted MSM living with HIV, therefore our results may not be generalizable to all MSM in the US. Demographic differences found between the current study and surveillance data likely stem from the data sources normally used to assess progress towards meeting the National HIV/AIDS Strategy targets. CDC estimated linkage and retention in care using data from the NHSS and estimated ART prescription and viral suppression using data from the MMP. Furthermore, HIV-negative or untested participants completing an eligibility survey for a study that targeted HIV-positive MSM may be different from the general population of HIV-negative or untested MSM. Moreover, a considerable proportion of men were recruited from a high-risk website that facilitates CAS encounters, thus our findings may overestimate the true proportion of men who engage in CAS and CAS with serodiscordant partners. Second, the measures we used to classify MSM into the different HCC stages were based on self-reported data and may overestimate or underestimate the proportion of MSM engaged in the latter stages of the HCC. Potential misclassification occurred for a small proportion of MSM who were unsure of, but estimated their viral suppression status. Finally, not all behavioral risk factors that are associated with viral suppression and engagement in HIV care (e.g., drug and alcohol use) were assessed as we were limited to variables collected in the eligibility screener. We also did not assess biomedical risk reduction methods (e.g., Pre- or Post-Exposure Prophylaxis) of participants' sexual partners, making it difficult to fully assess HIV risk.

Conclusion

Findings from this study highlight similar decreases in the proportion of MSM who reach the latter stages of the HCC. We also report on specific sexual risk behaviors and demographic differences among groups most likely to further HIV transmission—men living with potentially undiagnosed HIV and men aware of their HIV infection but who are not on ART or not virally suppressed. Online or mobile platforms provide a possible avenue to assess MSM and their progress along the HCC, as well as other subpopulations in need of appropriate interventions to decrease HIV incidence.

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Figure 1.
Sexual Risk Behaviors by Level of Engagement in the HCC

Table 1.**Demographic and Behavioral Characteristics of Study Sample**

Characteristic	Total Sample (N = 12995) n (%)
Age (M, SD)	39.22 (11.91)
Race	
Black	3916 (30.1)
Hispanic	1928 (14.8)
White	6441 (49.6)
Other	628 (4.8)
Past 3 month STI diagnosis other than HIV	
Yes	2124 (16.3)
No	10563 (81.3)
CAS with how many men in past 6 months	
None	2022 (15.6)
1	2656 (20.4)
2	1983 (15.3)
3	1404 (10.8)
4	796 (6.1)
5 or more	3623 (27.9)
Serodiscordant CAS with men in the past 6 months ^a	
Confirmed / Unknown	6642 (63.5)
No	3737 (35.7)
Diagnosed in the past year ^b	
Yes	2235 (19.8)
No	8998 (79.7)
Currently on ART ^b	
Yes	10262 (90.9)
No	1027 (9.1)
Retained in care ^{bc}	
Yes	10686 (94.7)
No	503 (4.5)
HIV Care Continuum Category ^d	
Never been tested	164 (1.3)
Never obtained results/indeterminate	270 (2.1)
HIV negative	1272 (9.8)
On ART and undetectable ^e	7585 (58.4)
On ART and detectable ^{xs} ^e	2454 (18.9)
Not on ART ^e	1027 (7.9)

Note: n (column %) presented except for age where M, mean (SD, Standard deviation) are presented; Column percentages do not add up to 100% due to missing cases.

^aDenominator includes only those who reported CAS with men in the past 6 months (n = 10462)

^bDenominator includes only HIV-positive participants (n = 11289).

^cRetained in care includes those who had a viral load test in the past 12 months.

^dDenominator includes the entire sample (n = 12995).

^eOut of HIV-positive men only (n = 11289), the proportion of men on ART and undetectable is 67.2%, the proportion of men on ART and detectable is 21.7%, and the proportion of men not on ART is 9.1%.

Table 2.
Comparisons of Demographic Characteristics and Sexual Risk Behaviors by HCC Group

Characteristic	(A) Never been tested n = 164	(B) Never obtained results/ Indeterminate n = 270	(C) HIV Negative n = 1272	HIV-Positive			Test Statistic	Effect Size	post-hoc (sig level < 0.003)
				(D) On ART & Undetectable n = 7585	(E) On ART & Detectable n = 2454	(F) Not on ART n = 1027			
Age (M, SD)	32.4 (12.8)	36.0 (11.7)	34.2 (12.3)	41.7 (11.6)	37.5 (11.3)	34.1 (10.3)	186.660 [*]	0.068	D > All other groups; A, C, F < E
Race									
Black	69 (42.1)	101 (37.4)	577 (45.4)	1912 (25.2)	802 (32.7)	381 (37.1)	365.796 [*]	0.098	D < All other groups; C > E, F
Hispanic	27 (16.5)	50 (18.5)	170 (13.4)	1146 (15.1)	336 (13.7)	150 (14.6)		--	--
White	55 (33.5)	93 (34.4)	434 (34.1)	4169 (55.0)	1178 (48.0)	428 (41.7)			D > All other groups; E > A, B, C, F; C < F
Other	13 (7.9)	23 (8.5)	79 (6.2)	320 (4.2)	120 (4.9)	61 (5.9)			D < B, C
Past 3 month STI diagnosis other than HIV									
Yes	2 (1.2)	36 (13.3)	118 (9.3)	1118 (14.7)	558 (22.7)	242 (23.6)	199.190 [*]	0.126	A < All other groups; F > B, C, D; C < D < E
No	126 (76.8)	205 (75.9)	1105 (86.9)	6368 (84.0)	1852 (75.5)	741 (72.2)			
Diagnosed in the past year									
Yes	--	--	--	930 (12.3)	850 (34.6)	395 (38.5)	850.909 [*]	0.278	D < E, F
No	--	--	--	6630 (87.4)	1596 (65.0)	615 (59.9)			
CAS with how many men in past 6 months									
None	21 (12.8)	39 (14.4)	235 (18.5)	1148 (15.1)	406 (16.5)	128 (12.5)	150.964 [*]	0.050	C > F
1	40 (24.4)	40 (14.8)	360 (28.3)	1538 (20.3)	472 (19.2)	172 (16.7)			C > B, D, E, F
2	21 (12.8)	54 (20.0)	214 (16.8)	1139 (15.0)	366 (14.9)	157 (15.3)		--	--
3	30 (18.3)	38 (14.1)	136 (10.7)	805 (10.6)	262 (10.7)	113 (11.0)			A > D
4	11 (6.7)	21 (7.8)	70 (5.5)	491 (6.5)	137 (5.6)	51 (5.0)		--	--
5 or more	37 (22.6)	69 (25.6)	230 (18.1)	2186 (28.8)	706 (28.8)	339 (33.0)			C < B, D, E, F; F > A, D, E
Serodiscordant CAS with men in the past 6 months ^a									
Confirmed / Unknown	138 (99.3)	220 (99.1)	483 (47.8)	3937 (63.9)	1224 (63.0)	540 (64.9)	312.833 [*]	0.175	C < D, E, F

Characteristic	HIV-Positive						Test Statistic	Effect Size	post-hoc (sig level < 0.003)
	(A)	(B)	(C)	(D)	(E)	(F)			
	Never been tested n = 164	Never obtained results/ Indeterminate n = 270	HIV Negative n = 1272	On ART & Undetectable n = 7585	On ART & Detectable n = 2454	Not on ART n = 1027			
No	0 (0.0)	0 (0.0)	521 (51.6)	2171 (35.2)	703 (36.2)	286 (34.4)			

NOTE: n (column %) presented except for age where M, mean (SD, Standard deviation) are presented; Column percentages do not add up to 100% due to missing cases. Test statistics are derived from chi-square omnibus tests and effect sizes are reported using Cramer's V, except for age where we report F-values derived from a one-way ANOVA and η^2 for effect sizes. Post hoc comparisons were made using partial χ^2 except for age where we used Tukey's HSD. Bonferroni corrections were applied to post hoc comparisons at the $p < .003$ significance level. Missing cases were excluded from the analyses.

^aDenominator includes only those who reported CAS with men in the past 6 months

*
p < .001