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Patterns of Lifetime and Recent HIV Testing Among Men Who Have Sex with Men in New York City Who Use *Grindr*

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Abstract

Rates of HIV infection continue to rise for men who have sex with men (MSM), and may be partially due to lack of testing among groups at risk for HIV. Mobile applications have demonstrated promise to identify at-risk MSM, though more research is needed to address testing patterns among this population. We conducted an online survey of 1,351 MSM in the New York City (NYC) area recruited from *Grindr* and analyzed predictors of lifetime and past-year testing using Pearson's chi-squared statistic, Fisher's exact tests, and logistic regression. A majority (90 %) of men had been tested within their lifetimes, and most (71 %) had been tested within the prior year. Among those who had never been tested ($n = 135$), one-third had engaged in unprotected anal intercourse (UAI) in the prior 3 months and nearly one-third identified themselves as HIV-negative rather than unknown. Older age, reporting an HIV-negative (versus unknown) status, and

recent UAI were independently associated with lifetime testing. Greater proportions of men who had recently engaged in UAI reported testing within the past year compared with those who had not engaged in UAI. Overall, rates of testing among MSM in this sample exceeded those of the general population, including the general population in NYC. A greater proportion of this sample had never tested compared to a population-based sample of NYC MSM, though a higher percentage had also tested in the past year. This study demonstrated that 1 in 10 NYC men using *Grindr* and 1 in 5 who were 18–24 years of age had never received an HIV test in their lives. Using the existing infrastructure and popularity of mobile technology such as *Grindr* to identify and link men to information regarding HIV testing may be a useful strategy for prevention.

Keywords

HIV testing; Men who have sex with men; Mobile technology; Internet research

Introduction

Men who have sex with men (MSM) are 44 times more likely to contract HIV than other men [1], and rates of HIV infection continue to rise among some groups of MSM [2]. One study found that the mean incidence rate of HIV among MSM in the U.S. is 2.39 % per year, which, if sustained in a cohort of young MSM, would result in 40 % being HIV-positive by age 40 [3]. Meanwhile, frequent HIV testing and the ability to identify new HIV infections shortly after seroconversion can lead to rapid integration into care. In lowering the rates of undiagnosed HIV infections and facilitating the initiation of antiretroviral therapy, HIV testing can reduce the risk of transmission that is attributable to acute and undiagnosed infections as well as high levels of viral load [4, 5].

New York City (NYC) has one of the highest prevalence rates of HIV cases among urban areas in the nation [6]. In 2011, 1,749 MSM were diagnosed with HIV in NYC, 15 % of whom received a concurrent AIDS diagnosis suggesting long-term, undiagnosed infection [7]. MSM accounted for 39.6 % of all new HIV diagnoses, and more than half (51.7 %) of diagnoses among males in NYC [7]. The NYC Department of Health and Mental Hygiene found in their 2011 Community Health Survey that age-adjusted rates of having never tested for HIV among MSM were 2.6 % (1.4 % unadjusted) [8]. Although these rates were promising and were much lower than those among non-MSM, the survey also found that 52.1 % had not tested within the past year (47.3 % unadjusted), suggesting that testing may not be occurring frequently enough to catch new infections. These findings suggest that the testing behaviors of many MSM in NYC may not be in line with the most recent recommendations from the Centers for Disease Control and Prevention (CDC). Those recommendations were issued in 2006 and advise that people at high risk of HIV infection—including MSM with multiple sex partners—be tested at least annually [9], and more recent analyses have informally suggested even more regular screening, such as every 3–6 months [6].

Newly diagnosed HIV-positive individuals who are immediately placed on antiretroviral therapy can achieve rapid viral load suppression and, thus, have reduced chances for transmission to others. A San Francisco study found that reductions in community viral load (i.e., the sum of the viral loads of all HIV-positive individuals in a particular community) were associated with decreased rates of HIV infection [4]. Thus, for HIV prevention programs, large-scale, free HIV testing campaigns represent a key strategy to reduce HIV transmission risks by rapidly transitioning individuals onto antiretroviral therapies. Carefully designed campaigns could successfully facilitate care for people who have been infected and, in doing so, reduce their viral load as well as reduce the chances that they engage in

UAI while having an undiagnosed acute infection. In 2008, the NYC Department of Health and Mental Hygiene launched the social marketing campaign designed to increase testing called *NYC Knows* [10]. The initiative resulted in over 607,000 HIV tests conducted over 3 years [11]. Results from the *Bronx Knows* campaign demonstrated that lifetime HIV testing increased from 69 to 79 % and testing within the prior 12 months increased from 37 to 49 % [12]. Despite these efforts, large-scale and ongoing HIV testing initiatives remain a priority for MSM, particularly young MSM and MSM of color, among whom rates of new infections continue to rise [13, 14].

One mechanism for reaching men who may be in need of prevention messages, as well as implementing HIV prevention campaigns, is through the use of web-based technologies, including mobile phone-based technologies. It is clear that many MSM are using smartphones to connect to the Internet, making them an emerging technology with strong potential for public health utility [15–17]. A NYC study of 660 MSM from bars/clubs and bathhouses noted that 72 % owned smart devices and an additional 20 % planned to buy one within the next 12 months [16]. *Grindr* is a geosocial networking application (‘app’) designed to connect MSM. Based on a user’s specific location, the app displays other *Grindr* users in order of their proximity. Since *Grindr* launched in 2009, many other similar apps have also become popular; however, in 2012 *Grindr* reported more than 3.5 million users in 192 countries around the world (1.4 million users in the US alone) [18]. As such, *Grindr* has the potential to reach a wide audience of MSM.

Not only does *Grindr* make a potentially convenient and practical application for HIV prevention, its large membership represents an audience for whom such messages are both crucial and welcomed, according to research. A Los Angeles study of 375 *Grindr* users between the age of 22 and 27 noted that 4.3 % had never tested for HIV [19]. The study also noted high interest in participating in clinical trials, suggesting that *Grindr* could be used for recruitment of young MSM into research. A second study compared *Grindr* users to men recruited through traditional methods (e.g., referrals, flyers, community outreach, print advertisements) and found that *Grindr* participants were younger, more white-identified, and had a greater number of sex partners in the prior 14 days [17]. As such, *Grindr* may cater to some groups who are hard to reach through traditional mechanisms and may be missed by mainstream HIV prevention efforts such regular HIV testing. Although *Grindr* was designed as a social networking app and is not explicitly designed for finding sex partners, many MSM have used it for these purposes. A 2012 study of 195 MSM aged 18–24 recruited off *Grindr* in Long Beach, California, reported that 76 % had sexual encounters with partners met on *Grindr* [20]. Notably, 15 % of MSM in this sample reported UAI with their last partner met off *Grindr*, suggesting that *Grindr* may be used not just for finding sexual partners but that it may be used by some to facilitate sexual risk behavior. As such, the app has strong potential use as an environment for facilitating sexual health research, HIV prevention, and outreach.

In contrast to developing a separate app focused on sexual health and attempting to draw attention to it, researchers and providers could consider working within existing apps like *Grindr* that may already have strong followings and existing infrastructure. Based on a user’s GPS location when logging in, he could be targeted with banner advertising or “pop up” ads within the app for services [17]. For example, if a user is near an HIV testing center, a targeted ad could be displayed to alert him of their hours of operation and advertising the free and confidential nature of their services [15]. Alternatively, as at-home testing becomes more popular, locations could be designated for picking up such packets and advertised when people are within a given distance of the site. However, because these technologies are relatively new and rapidly developing, their potential to facilitate HIV behavioral research and prevention has yet to be fully realized and more information is needed on their

feasibility for research and prevention as well as on the characteristics of the populations who use them.

Current Study

As MSM remain disproportionately at risk for HIV, major initiatives have been launched to increase HIV testing as a means of reducing exposure to HIV and increasing access to care among those newly infected. Mobile geosocial networking applications have demonstrated promise to identify at-risk MSM, yet more research is needed to address testing patterns for this population. *Grindr* represents one such app that has promise due to its large membership base who may differ in some ways from those reached in more traditional venues. More information about the rates of HIV testing among different subgroups of MSM such as those using *Grindr* will help to characterize the HIV epidemic and provide information for targeted prevention efforts. As such, the goals of this study were to: (a) identify the base rates of lifetime and recent HIV testing among NYC MSM using *Grindr*; (b) examine demographic characteristic and risk factors that are associated with lifetime and recent HIV testing; and (c) examine associations between self-reported HIV status and HIV risk behavior with the recency of HIV testing.

Methods

Participants and Procedures

As a recruitment technique for several large research projects focused on MSM, we utilized a brief, preliminary screening survey advertised on *Grindr*. During a 2-day period in December of 2012, we advertised on *Grindr*, providing two methods for users to access our survey: (1) a pop-up ad with text encouraging users to click through to take our survey; and (2) a banner ad shown to users while they were logged on to the application. The pop-up ad was shown the first time users logged on to the application within a 24-h period, which was displayed twice during two consecutive 24-h periods. The banner ad was shown during a 24-h period coinciding with the second 24-h period of recruitment. Both the pop-up ads and banner were only shown to *Grindr* users who logged on to their account in the NYC area. Although there was no incentive for participants to take our survey, they were informed that the survey would screen them for other studies for which they would be compensated if they were eligible and joined. The survey took approximately 4 min to complete. All men were at least 18 years of age and all procedures were approved by the City University of New York Institutional Review Board.

In total, 5,026 men clicked through and reached the survey and 2,209 (44.0 %) continued to the consent page. Of those, 2,175 (98.5 %) provided informed consent and began the survey and 1,605 (72.7 %) men provided sufficient data for analyses. From these, we excluded from further analyses 34 men (2.1 %) who did not live in the NYC area, 13 (1.0 %) who responded “No” to the question “Do you have sex with men?”, and 207 men (13.0 %) who reported they were HIV-positive. This resulted in a final analytic sample of 1,351 HIV-negative and status unknown MSM.

Measures

Demographics and Behavior—Participants indicated their age, relationship status, sexual identity, race/ethnicity, and HIV status. Participants were asked to check off which drugs they had used, if any, within the prior 90 days from a list of nine. For the purposes of these analyses, we created a dichotomous indicator of whether or not they had used any cocaine, methamphetamine, ecstasy, GHB, ketamine, crack, or heroin in the prior 90 days, excluding the use of marijuana and poppers from this variable. Participants also reported the total number of male sexual partners they had within the prior 90 days and indicated with

how many of those partners they had engaged in anal sex. Those reporting anal sex indicated the number of times they had anal sex without a condom (i.e., UAI) with a male partner in the prior 90 days. The number of times participants had engaged in UAI was recoded into a dichotomous indicator of whether they had any UAI in the prior 90 days (i.e., recent UAI).

HIV Testing—Participants were asked how long ago they received their last HIV test, categorized into five options; (1) fewer than 3 months, (2) 3–6 months, (3) 6–12 months, (4) more than 12 months, and (5) never been tested. For the purposes of our analyses, we created two additional dichotomous variables: whether they had received an HIV test in their lifetime and whether they had received an HIV test in the past 12 months to easily compare with other studies as well as the CDC guidelines of annual HIV testing [9].

Data Analysis Plan

All analyses were conducted using SPSS version 20 for Windows. We first examined descriptive statistics regarding demographic characteristics (race/ethnicity, relationship status, sexual orientation, self-reported HIV status, age) and behavioral characteristics (recent drug use, recent UAI, and number of recent male partners) for the full sample. Next, we examined differences in these characteristics by whether or not participants had ever in their lifetimes received a HIV test using Pearson's chi-squared analyses for categorical variables, a *t*-test for age, and a Mann–Whitney U comparison for number of male partners.

We then conducted two logistic regressions to examine independent associations between demographic and behavioral variables (i.e., sexual orientation, race/ethnicity, age, recent drug use, recent UAI) and lifetime and recent (i.e., past year) HIV testing. Both regressions contained a smaller sample of men ($n = 1,326$) as a result of excluding those who identified their sexual orientation as “other” or straight due to their low frequencies. Within the logistic regressions, we used deviation coding for race—specifically, this compares each group to the mean of the means for the other groups, such that each group is tested for being significantly different from all other groups combined (it is worth noting that this method still gives only $k - 1$ group comparisons, where k is the number of groups—as such, we omitted the estimate for the comparison of “other” race, the smallest group).

Finally, we conducted analyses in order to better understand the association between self-reported HIV status, recent engagement in UAI, and number of recent male partners with the recency of participants' last HIV test. For the two dichotomous variables—HIV status and UAI—we conducted Pearson's chi-squared analyses examining their associations with recency of HIV testing. In the case of a significant main effect (i.e., chi-squared statistic), we followed these with Fisher's exact tests for each possible 2×2 pairwise comparison within the five categories of testing recency to determine specifically which groups differed. When analyzing the count outcome—number of male partners—we conducted a Kruskal–Wallis test with post hoc pairwise comparisons.

Results

As can be seen in Table 1, the sample was highly diverse with regards to race/ethnicity, with more than half being men of color. The average age was 30 and ranged from 18 to 67. Approximately one-fifth were in a relationship, most were gay-identified, most reported being HIV-negative (as opposed to unknown), and most had not used drugs recently. Nearly half of the sample reported engaging in UAI within the prior 3 months and the median number of male partners reported from the prior 3 months was four. Table 1 also reports on behavioral and demographic differences in lifetime HIV testing. Overall, we found that 1 in 10 of the men had never received an HIV test in their lives. Among those men who had never tested, nearly one-third (30.4 %, $n = 41$) reported that they were HIV-negative. These

findings indicate that 3 % or 1 in 33 men reported that they were HIV-negative without ever having received an HIV test. Moreover, 1 in 3 (34.1 %, $n = 46$) of the men who had never had an HIV test reported having had UAI within the prior 3 months and 10 % ($n = 13$) had recently engaged in UAI and identified as HIV-negative.

There were several demographic factors that significantly differentiated men who had and had not received an HIV test in their lifetimes. As mentioned previously, a substantially higher proportion of men who had never tested identified themselves as being HIV status-unknown. A higher proportion of gay men (90.8 %, $n = 1,055$) than bisexual men (84.1 %, $n = 138$) had been tested, Fisher's exact two-sided $p = 0.01$. Results suggested that the proportions of black and multiracial men who had tested were higher than those of other groups. Further, having recently used drugs and having recently had UAI was associated with having been tested. Nearly one-fifth (18.4 %) of men aged 18–24 had never tested compared with only 6 % of men 25 and older, with the average ages of those who had and had not tested differing significantly by nearly 5 years. Men who had never tested had significantly fewer male partners in the prior 3 months than those who had tested.

Table 2 presents the results of two logistic regression models in which we investigated which variables were independently associated with lifetime and recent testing. In the model predicting lifetime testing, older age, identifying as gay (versus bisexual), reporting an HIV-negative (versus unknown) status, and having had recent UAI (past 3 months) were all associated with an increased odds of having ever tested. Neither race nor drug use emerged as significant predictors in the model. In the model predicting past-year testing, only reporting an HIV-negative (versus unknown) status and having had recent UAI (past 3 months) were significantly associated with an increased odds of having had an HIV test in the past year.

The final set of analyses presented in Table 3 was conducted to better understand associations between self-reported HIV status and HIV risk with recency of HIV testing. Although 1 in 10 men had never tested in their lives, more than two-thirds (71 %, $n = 961$) had been tested within the past year. As can be seen in Table 3, among those who had tested more recently, the proportion of men who reported being HIV-negative was higher and the proportion of men who reported being HIV-unknown was lower. However, this trend became less prominent among those who had not tested in the past year and actually reversed among those who had never tested, $\chi^2(4) = 486.81$, $p < 0.001$. Using Fisher's exact tests as post hoc analyses for all possible 2×2 comparisons, we confirmed that each group differed significantly from each other with the exception of the fewer than 3 months and 3–6 months groups, which did not differ from each other with regard to the proportions indicating they were HIV-negative versus unknown (groups differing significantly from each other in the Fisher's exact tests have differing superscripts in Table 3). Somewhat similarly, the proportion of men who had recently engaged in UAI was highest among men who had tested within the prior 3 months (55.4 %) and lowest among those who had never tested (34.1 %), $\chi^2(4) = 22.95$, $p < 0.001$. In addition to the significant main effect, Fisher's exact 2×2 comparisons revealed that both the fewer than 3 months and the never tested groups differed significantly from each other and all three other groups with regard to the proportion reporting UAI. The 3–6 months (42.9 %), 6–12 months (45.6 %), and more than 12 months (44.3 %) groups had similar proportions of men who had engaged in recent UAI and did not differ significantly from each other. The bottom of the groups. Results suggested that the number of male partners was also higher among those more recently tested, with those who had never been tested reporting the fewest partners ($Mdn = 3.0$; See Table 3), $H(4) = 50.24$, $p < 0.001$.

Discussion

In a diverse sample of MSM in NYC using *Grindr*, we found relatively high rates of lifetime HIV testing, with more than half having received a test in the prior 6 months, more than two-thirds having tested within the past year, and 90 % of men having been tested in their lifetimes. However, these data also suggest that as many as one in ten men who use *Grindr* in NYC have never had an HIV test and that, more importantly, one-third of these men report their status as being HIV-negative rather than “unknown.” Many men who never had an HIV test were at high risk for infection. In fact, one-third of those who had never been tested and nearly half of those who had not been tested within the prior year had engaged in UAI within the prior 3 months. We also found that the greatest number of those who had engaged in UAI were those who had also tested most recently, suggesting that people at risk may receive testing after periods of risk.

It is important to consider these findings in light of other data on testing behavior. This and other samples of MSM find that they test at much higher rates than the U.S. population as a whole, whose lifetime testing rates have remained stable at less than 50 % [21]. Compared to the NYC data on MSM in the 2011 Community Health Survey [8], we found a substantially higher proportion of men who had *never* been tested (10.0 vs. 2.6 %), but also a higher proportion of men who *had* tested within the past year (71.1 vs. 52.1 %). These findings suggest that, although a somewhat larger percentage of *Grindr* users report never being tested for HIV, among those who have tested, testing may occur more frequently. Many MSM in this sample appear to meet the minimum CDC recommendations of annual HIV testing [9]. In fact, annual testing was the norm—fewer than one-fifth of the men who had tested in their lifetime had not done so in the past year. Similarly, more than twice as many men had tested within the prior 3 months as had never tested, suggesting that highly frequent testing is more common than not testing at all. Though conducted among a younger sample, another study of *Grindr* users in Los Angeles found that 4.3 % had never tested for HIV [19]. This suggests that there may be different trends of testing within various national urban centers. Given *Grindr*’s global reach, this is perhaps a question that deserves further consideration and one that is feasible to answer in future research.

The association between HIV risk (i.e., recent UAI) and how recently participants had been tested for HIV is also noteworthy. We found that, among the men who had been tested most recently, the proportion who had recently engaged in UAI was also highest. These findings are not causal in nature, and two potential explanations are equally appropriate. One possibility is that risk leads to HIV testing. More specifically, men who have recently engaged in UAI may recognize they were at risk of contracting HIV and thus pursued an HIV test. Alternatively, it could be that HIV testing leads to risk. In this case, one might hypothesize that men feel bolstered by a sense of confidence that comes with an HIV-negative test result and may begin to feel invulnerable to HIV infection. Subsequently, they may engage in UAI as a result of feeling it carries little risk for HIV infection for them. This is an area for further research. Given that UAI also occurred relatively frequently even among those who had never tested, it is likely that both of these phenomena exist simultaneously and that several additional processes may operate to influence the association between UAI and HIV testing.

We found that a greater number of Black and multiracial men had been tested than other racial groups, which contrasts with findings that MSM of color are less likely to be aware of their HIV infections [22, 23]. Given that race was no longer associated with HIV testing in the multivariable model, it is possible that its effects were confounded or mediated by age, sexual identity, or risk behavior, all of which remained significant. We also found that fewer young men had been tested than older men. Taken in light of other findings that young

MSM and MSM of color have growing rates of HIV infection, the present study provides evidence that the mechanisms through which age and race are associated with HIV infection may differ. Although younger men were tested less regularly than older men, independent of their levels of risk, this was not the case for men of color (particularly when adjusting for age). This suggests that for young men of color—one of the groups most affected by HIV and experiencing growing incidence rates—understanding risk for HIV infection may be a complex interplay of psychological, social, behavioral, and structural factors. It may be that age's impact on testing interacts with the social and sexual network characteristics of men of color [24, 25] to influence the disproportionate risk of infection for young MSM of color.

Limitations

The results of this study should be considered in light of their limitations. First, as is common with such sampling techniques, a substantial portion of those who saw the ad and clicked on it did not complete the survey. As such, the sample is likely to be biased by some degree of self-selection and may not be representative of the population of NYC *Grindr* users. Yet, we were able to successfully survey a large number of participants in a short period of time, which is promising for future research and prevention outreach. Evaluative research on the most effective recruitment approaches within app environments is warranted. *Grindr* is one of several geosocial networking apps currently available for use. Some other apps cater to targeted MSM populations (e.g., “Mister” for older men, “Scruff” for hairier men, “Recon” for leather and fetish). Notably, these apps all function similarly with regard to showing users based on their location, user-to-user in-app messaging, and ads. Thus, perhaps the approach taken for this study could be readily adapted in other geosocial networking apps in future research for comparison.

We relied on self-report measures of HIV testing, and this is likely to result in some degree of error. However, it is reasonable to expect that peoples' ability to report whether or not they have ever had an HIV test and even whether or not they received their most recent test more or less than a year ago is highly accurate. Although we also relied on self-reported HIV status, we saw this as a benefit in that we were able to examine individuals' perceptions of their own HIV status and how this was associated with recency of HIV testing. Finally, all behaviors were assessed with self-report and were done in an aggregated fashion. Though whether or not an individual had recent drug use and UAI are relatively crude measures, we nonetheless believe they provide one meaningful way of examining behavior and provided important information about the role of other risk behaviors related to HIV testing behavior. Future research should consider the role of unique substances rather than any drug use as well as incorporate information about frequency and severity of use to examine their associations with HIV testing. Longitudinal studies should be conducted to better understand the association between engaging in risk behavior (i.e., UAI) and being tested for HIV, with a focus on contextual variables such as partner type (i.e., new partner, main partner) and partner HIV status.

Conclusions

Overall, rates of testing among MSM in this sample exceed those of the general population, including the general NYC population. However, there is a significant minority of men who have never been tested, one-third of whom had recently engaged in behaviors that put them at high risk for HIV infection and 10 % of whom recently engaged in UAI and identified as HIV-negative. Black and multiracial men in this sample appear to test in greater numbers than other men, which may be a result of testing campaigns targeted at high-risk neighborhoods and boroughs of NYC such as *Bronx Knows* and *Brooklyn Knows*, and which featured people of color in their ads. Men who had tested were older on average than men who had not, perhaps partially as a result of having a greater number of lifetime

opportunities. However, at a time when recommendations suggest at least annual testing, the finding that one in five men aged 18–24 on *Grindr* have never received an HIV test suggests the need for a bolstered focus on getting young MSM to test. With national usage exceeding one million men, using *Grindr* to identify and refer men for HIV testing may be a useful strategy for prevention with the potential to reach tens of thousands of men who have never received an HIV test or to provide reminders about testing regularly.

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Table 1

Demographic and behavioral characteristics of the sample and comparisons by lifetime HIV testing

	Total (N = 1,351) n (%)	Lifetime testing		
		Never tested (n = 135) n (%)	Tested (n = 1,216) n (%)	
Race/ethnicity				$\chi^2(5) = 11.42, p = 0.04$
Black	155 (11.5)	10 (7.4)	145 (11.9)	
Hispanic/Latino	279 (20.7)	29 (21.5)	250 (20.6)	
White	666 (49.3)	68 (50.4)	598 (49.2)	
Asian/Pac. Islander	86 (6.4)	10 (7.4)	76 (6.2)	
Multiracial	133 (9.8)	10 (7.4)	123 (10.1)	
Other	32 (2.4)	8 (5.9)	24 (2.0)	
In a relationship				$\chi^2(1) = 0.93, n. s.$
No	1,057 (78.2)	110 (81.5)	947 (77.9)	
Yes	294 (21.8)	25 (18.5)	269 (22.1)	
Sexual orientation				^a
Gay	1,162 (86.0)	107 (79.3)	1,055 (86.8)	
Bisexual	164 (12.1)	26 (19.3)	138 (11.3)	
Straight	6 (0.4)	1 (0.7)	5 (0.4)	
Other	19 (1.4)	1 (0.7)	18 (1.5)	
Reported HIV status				$\chi^2(1) = 437.04, p = 0.000$
Negative	1,179 (87.3)	41 (30.4)	1,138 (93.6)	
Unknown	172 (12.7)	94 (69.6)	78 (6.4)	
Recent drug use (3 months)				$\chi^2(1) = 4.53, p = 0.02$
No	1,123 (83.1)	121 (89.6)	1,002 (82.4)	
Yes	228 (16.9)	14 (10.4)	214 (17.6)	
Recent UAI (3 months)				$\chi^2(1) = 9.18, p = 0.002$
No	724 (53.6)	89 (65.9)	635 (52.2)	
Yes	627 (46.4)	46 (34.1)	581 (47.8)	
	M (SD)	M (SD)	M (SD)	
Age	30.1 (9.1)	25.6 (8.9)	30.65 (9.0)	$t(1,349) = -6.21, p < 0.001$
	Mdn (IQR)	Mdn (IQR)	Mdn (IQR)	
Number of male partners	4.0 (2, 8)	3.0 (1, 5)	4.0 (2, 8)	$U(1) = 105,035.5, p < 0.001$

^a Because expected cell counts fell below 5, a Fisher's exact test comparing gay and bisexual men is reported in text

Table 2

Logistic regressions predicting lifetime and past-year HIV testing

	Lifetime testing			Past-year testing		
	B	AOR	95 % CI	B	AOR	95 % CI
Race/ethnicity ^a						
Black versus mean	0.63	1.87 [†]	[0.92, 3.81]	0.38	1.46 [†]	[0.97, 2.18]
Latino versus mean	-0.01	0.99	[0.59, 1.67]	0.06	1.06	[0.77, 1.46]
White versus mean	-0.38	0.69	[0.45, 1.06]	-0.07	0.94	[0.72, 1.21]
Asian/Pac. Islander versus mean	0.18	1.20	[0.53, 2.68]	-0.10	0.91	[0.57, 1.45]
Multiracial versus mean	0.60	1.82	[0.86, 3.88]	0.15	1.16	[0.77, 1.77]
Gay (versus bisexual)	1.12	3.06 ^{***}	[1.66, 5.65]	-0.04	0.96	[0.63, 1.47]
HIV-negative (versus unknown)	3.79	44.15 ^{***}	[26.64, 73.17]	3.02	20.52 ^{***}	[13.24, 31.80]
Recent drug use	0.38	1.47	[0.71, 3.02]	-0.15	0.86	[0.60, 1.25]
Recent UAI	0.76	2.13 ^{**}	[1.26, 3.59]	0.46	1.58 ^{***}	[1.19, 2.10]
Age	0.09	1.09 ^{***}	[1.06, 1.13]	-0.01	0.99 [†]	[0.97, 1.00]
Model $\chi^2(df)$	350.99(10) ^{***}			273.76(10) ^{***}		
% correctly classified	92.7 %			79.3 %		
Hosmer-Lemeshow $\chi^2(df)$	3.66(8)			6.97(8)		
Hosmer-Lemeshow <i>p</i> -value	0.89			0.54		
Nagelkerke <i>R</i> ²	0.49			0.27		
-2 Log likelihood	512.88			1,327.34		

n = 1,326, *CI* confidence interval, *AOR* adjusted odds ratio[†] *p* 0.08;* *p* 0.05;** *p* 0.01;*** *p* 0.001^a Deviation coding was used as described in the data analysis plan section—comparisons for “Other race” are omitted by necessity

Table 3
Reported HIV status, sexual risk, and number of male partners and their associations with recency of HIV testing

	Time since last HIV test					
	Total (n = 1,351)	Fewer than 3 months (n = 390)	3–6 months (n = 301)	6–12 months (n = 270)	More than 12 months (n = 255)	Never been tested (n = 135)
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Reported HIV status		a	a	b	c	d
Negative	1,179 (87.3)	382 (97.9)	295 (98.0)	255 (94.4)	206 (80.8)	41 (30.4)
Unknown	172 (12.7)	8 (2.1)	6 (2.0)	15 (5.6)	49 (19.2)	94 (69.6)
Recent UAI		a	b	b	b	c
No	724 (53.6)	174 (44.6)	172 (57.1)	147 (54.4)	142 (55.7)	89 (65.9)
Yes	627 (46.4)	216 (55.4)	129 (42.9)	123 (45.6)	113 (44.3)	46 (34.1)
	<i>Mdn</i> (IQR)	<i>Mdn</i> (IQR)	<i>Mdn</i> (IQR)	<i>Mdn</i> (IQR)	<i>Mdn</i> (IQR)	<i>Mdn</i> (IQR)
Number of male partners	4.0 (2.8)	5.0 ^{ab} (3, 10)	5.0 ^c (3, 8)	4.0 ^a (2, 7)	4.0 ^b (2, 7)	3.0 ^{abc} (1, 5)

N = 1,351. Columns with different superscripts differ significantly at $p < 0.05$ or lower—differences were obtained using Fisher’s exact 2×2 pairwise comparisons (for HIV status and UAI) or Kruskal-Wallis post hoc comparisons (number of male partners). Chi square and Kruskal-Wallis statistics for the main effects of group on HIV status, UAI, and number of partners are presented in the text