

Correlates of Never Testing for HIV Among Sexually Active Internet-Recruited Gay, Bisexual, and Other Men Who Have Sex with Men in the United States

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Abstract

In the United States, gay, bisexual, and other men who have sex with men (GBMSM) are disproportionately affected by the HIV/AIDS epidemic. Despite great strides in HIV prevention, including bibehavioral HIV prevention strategies such as pre-exposure prophylaxis and treatment as prevention, there has been relatively low uptake of these strategies. The success of bibehavioral prevention strategies requires HIV testing but a subset of GBMSM have never been tested. To optimize prevention efforts, we sought to understand the characteristics of GBMSM who report never testing for HIV. A sample of GBMSM was recruited online in 2012 to complete a cross-sectional survey of sexual behavior and sexual health. Bivariate and multivariable analyses were used to identify characteristics of “never testing for HIV.” Of the 1170 participants, 151 (13%) reported never testing for HIV. In multivariable analyses, younger age, less education, endorsing a non-gay sexual identity, living in rural areas, not having a primary partner, living in unstable housing, and reporting regular condom use during anal sex were independently associated with never testing. We conclude that, despite a substantial focus on HIV testing among GBMSM in the United States, a proportion of sexually active, adult GBMSM report never having tested for HIV in their lifetimes. The current study illustrates the importance of addressing individual and structural factors that serve as barriers to HIV testing among GBMSM. Addressing these barriers will improve access to HIV testing and other bibehavioral HIV prevention strategies and, ultimately, alleviate disparities in HIV/AIDS in the United States

Keywords: MSM, HIV, HIV testing, sexual health, never testers

Introduction

MORE THAN 35 YEARS into the HIV epidemic, gay, bisexual, and other men who have sex with men (GBMSM) continue to be disproportionately affected by HIV. In 2015, GBMSM accounted for 67% of all new HIV diagnoses in the United States. Young (ages 13–24 years) black/African American GBMSM are at particularly high risk for acquiring the virus.¹ HIV transmission among GBMSM is predominantly attributed to condomless anal sex (CAS).² Despite

notable progress in curbing the epidemic, GBMSM remain a key population evidencing significant health disparities compared to other groups.

Since 2006, opt-out HIV testing in healthcare settings and annual screening for HIV among sexually active GBMSM has been recommended in the United States.^{3,4} Nonetheless, the Centers for Disease Control and Prevention (CDC) estimate that 15% of HIV-seropositive GBMSM in the United States are unaware of their HIV status because of never having undergone an HIV test.⁵

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The promise of biobehavioral HIV prevention strategies, such as pre-exposure prophylaxis (PrEP) and treatment as prevention (TaSP), are predicated upon knowledge of HIV serostatus. HIV testing identifies new infections, facilitates treatment planning, and clarifies prevention priorities. Together, treatment and prevention enable greater control of the epidemic and eradication of health disparities as a result of systemic injustices.^{6,7}

Without testing, undiagnosed HIV-seropositive individuals will not receive the treatment they need to slow disease progression and prevent transmission. Indeed, individuals who are diagnosed and who achieve and maintain viral suppression are 94% less likely to transmit HIV than undiagnosed HIV-seropositive individuals. Even individuals who are diagnosed but not retained in care are 19% less likely to transmit HIV than those who are unaware of their status,⁸ perhaps because awareness of HIV serostatus alone may lead to self-initiated prevention strategies.⁹ Research also shows that undiagnosed HIV-seropositive GBMSM are more likely to engage in CAS,¹⁰ which may place themselves and others at risk for acquiring sexually transmitted infections (STIs), and weaken an already compromised immune systems.¹¹ For these reasons, HIV testing continues to be central to both primary and secondary HIV prevention efforts, and it is an essential first step in improving the success of the HIV treatment cascade.¹²

A recent systematic review of HIV testing patterns among Internet-using GBMSM found that 15% reported never testing for HIV.¹³ Although there is a substantial literature on the characteristics of individuals who delay testing for HIV, to our knowledge, only two studies have focused on the characteristics of GBMSM in the United States who have *never* tested for HIV.^{14,15} These two studies, using data from 2007 and 2008, found that younger age, being non-gay identified, living outside of urban areas, and not having a healthcare provider were associated with never testing for HIV among GBMSM.^{14,15} Studies among GBMSM in other industrialized countries found that never testing (vs. ever testing) for HIV was independently associated with having a lower education level, lower sexual risk (i.e., not engaging in CAS), being closeted about same-sex attractions, and having never been tested for STIs.^{16–19}

In this study, we sought to add to this nascent literature by assessing the characteristics of sexually active, Internet-using GBMSM who report never having tested for HIV. Focusing on this group allowed us to better understand the characteristics of at-risk GBMSM who could potentially be reached by online interventions. To extend prior research,^{13–19} we focused our analyses on investigating the relations between never testing for HIV and sociodemographic, STI testing, sexual behavior, and substance use characteristics. For the United States to reach the 2020 goals of 90-90-90 (90% of all people living with HIV to know their HIV status; 90% of all people with diagnosed HIV infection to receive antiretroviral therapy; 90% of all people receiving antiretroviral therapy to achieve viral suppression),²⁰ it is essential to understand and engage GBMSM who have never tested for HIV.

Materials and Methods

Recruitment

Participants were recruited online for a cross-sectional, Internet-based survey of sexually explicit media use and sexual

behaviors. Recruitment and screening procedures are described in detail elsewhere.²¹ Participants were recruited via banner advertisements on men-seeking-men websites and Facebook during August and September of 2012. Eligible participants reported (1) age ≥ 18 years; (2) cisgender male (i.e., assigned a male sex at birth and self-identified male gender identity); (3) having anal or oral sex or engaging in mutual masturbation with ≥ 1 man in the prior year; (4) accessing men who have sex with men-oriented website ≥ 1 time in the prior year; (5) using sexually explicit online media in the past year; and (6) living in the United States. Participants were recruited from each state except South Dakota. The survey was administered through the University of Washington Catalyst program, a proprietary web-based survey platform. Participants could enter a drawing to win one of fifteen \$50 gift certificates upon completion of the 30-min survey. Informed consent was obtained from all participants. Ethics Committee oversight was provided by the University of Washington Institutional Review Board.

Measures

Sociodemographics. Sociodemographic characteristics were assessed with standard formats and coded as follows: recruitment source (men-seeking-men websites, Facebook/other); age (continuous); race/ethnicity (white, black/African American, Other); education (<associate degree, associate degree or higher); living situation (nonpermanent housing, permanent housing); rural residence (yes, no); self-identified sexual orientation (bisexual/heterosexual/other, gay); “outness” (not fully “out,” “out” to everyone or almost everyone); and have a primary partner (yes, no). Nonpermanent housing was defined as living in a shelter, dormitory, drug/health treatment facility, or someone else’s house, apartment, or condo where the participant does not pay rent. Permanent housing was defined as living in a residence that is owned or rented by the participant. Rural residence was specified by applying the ZIP code Rural-Urban Commuting Area Codes Approximation (Version 2.0) to self-reported data.²²

STI testing. Participants were asked whether they had been diagnosed with gonorrhea, chlamydia, or syphilis in the past 3 months; whether they had ever been diagnosed with genital or anal herpes (herpes simplex virus) or warts (human papillomavirus); and whether they had been told by a healthcare provider in the past 3 months that they had any STI that they could not recall the name of, or that they had not already been asked about in the survey. If participants reported having been diagnosed with any STI in the prior 3 months, including lifetime viral STIs, they were considered to have had an STI (yes, no).

Sexual behavior. Participants were asked to report on sexual behavior in the past 3 months that was voluntary (i.e., “not forced”), including number of male partners (continuous), and whether condoms were used during insertive and receptive anal intercourse with male partners; the latter data were used to create a composite variable for any CAS (yes, no).

Substance use. We assessed the impact of alcohol and other drug use with the CAGE-Adapted to Include Drugs (CAGE-AID).²³ Per the CAGE-AID protocol, the questionnaire was only given to participants who reported current alcohol use (yes, no) or having ever experimented with drugs

(yes, no). A score ≥ 2 indicates probable substance abuse. We also asked participants which drugs they used recreationally in the past 3 months: marijuana; poppers; erectile dysfunction medications (Viagra, Cialis, or Levitra); amphetamines; cocaine; heroin; other opiates; hallucinogens; crack; ecstasy (methylenedioxy-methamphetamine); GHB (gamma hydroxyl butyrate); ketamine; PCP (phencyclidine); or sedatives. A composite variable was created to indicate any recent recreational drug use (yes, no).

HIV testing history. To assess HIV serostatus, we asked participants, "What is your HIV status?" Participants were given four response options: (1) "I have never been tested for HIV," (2) "I have been tested for HIV, but I have never received any result," (3) "Last time I got tested, I was HIV-negative," and (4) "I am HIV-positive." Participants who reported "I have never been tested for HIV" were coded as "never testers" for this study.

Analyses

We tested associations between never testing and sociodemographics, STI testing, sexual behaviors, and substance use using Fisher Exact and *t*-tests. Sociodemographic and behavioral variables that were significant in bivariate analyses ($p < 0.05$) were entered into a multivariable logistic regression model to determine which were independently associated with having never tested for HIV. Of the 1170 GBMSM in the sample, 40 (3%) had missing data on one or more key variables (i.e.,

statistically significant variables in bivariate analyses). To assess differences between participants with missing data versus those with complete data, we conducted Fisher Exact tests to compare sociodemographic characteristics. Participants with missing data were more likely to have been recruited from men-seeking-men websites (70% vs. 30%, $p = 0.02$) and less likely to be "out" with respect to their sexual orientation (63% vs. 37%, $p = 0.04$).

Given the small amount of missing data, listwise deletion was used for all analyses. As only one participant reported never testing for HIV and having had an STI test, we did not include this variable in our multivariable model (Table 1). The final multivariable logistic model was established using backward elimination to include only those variables that were independently associated ($p < 0.05$) with never testing for HIV. All analyses were conducted using Stata 12.1.

Results

In total, 1981 potential participants responded to eligibility questions and 1201 (61%) were eligible and agreed to participate. Thirty-one (3%) of those who were eligible and agreed to participate were excluded due to discrepancies between eligibility and survey answers ($n = 24$), not answering the HIV serostatus question ($n = 2$), not answering the final survey question ($n = 2$), or being a potential duplicate ($n = 2$). This left a final analytic sample of 1170 GBMSM.

The average age of participants in the overall sample was 37 years (standard deviation = 15). The majority of the sample was

TABLE 1. SOCIODEMOGRAPHIC, SEXUALLY TRANSMITTED INFECTION, SEXUAL BEHAVIOR, AND SUBSTANCE USE AMONG 1170 MEN WHO HAVE SEX WITH MEN IN THE UNITED STATES BY HIV TESTING STATUS

	Total (N = 1170), n (%)	HIV testing history		p ^a
		Tested (n = 1019), n (%)	Never tested (n = 151), n (%)	
Sociodemographics				
Recruitment source				<0.001
Men-seeking-men websites	596 (51)	545 (54)	51 (34)	
Facebook/other	574 (49)	474 (46)	100 (66)	
Age (m, SD)	37 (15)	38 (15)	27 (13)	<0.001
Race/ethnicity				0.21
White	821 (70)	714 (70)	107 (71)	
Black/African American	146 (13)	133 (13)	13 (9)	
Other	203 (17)	173 (17)	31 (21)	
<Associate degree	437 (38)	346 (34)	91 (61)	<0.001
Nonpermanent housing	272 (23)	197 (19)	75 (50)	<0.001
Rural residence	120 (10)	93 (9)	27 (18)	<0.01
Bisexual/heterosexual/other sexual orientation	122 (11)	99 (10)	23 (15)	0.04
Not fully "out"	525 (45)	442 (44)	83 (55)	<0.01
No primary partner	663 (57)	552 (55)	111 (74)	<0.001
Any STI (past 3 months)	230 (21)	229 (24)	1 (1)	<0.001
Sexual behaviors (past 3 months)				
No. of partners (m, SD)	4 (9)	5 (10)	2 (5)	0.01
Condomless anal sex	650 (56)	586 (58)	64 (42)	<0.001
Substance use (past 3 months)				
Probable substance abuse (CAGE-AID ≥ 2)	150 (13)	131 (13)	19 (13)	0.93
Alcohol use	905 (78)	791 (78)	114 (77)	0.66
Any drug use	569 (51)	505 (52)	64 (45)	0.11

^aFisher Exact and *t*-tests were used to assess differences in categorical and continuous variables, respectively. CAGE-AID, CAGE-Adapted to Include Drugs; m, mean; SD, standard deviation; STI, sexually transmitted infection.

white (70%), well-educated (62% had an associated degree or higher), lived in an urban area (90%), and identified their sexual orientation as gay (89%). Approximately half (51%) were recruited from men-seeking-men websites. The remaining were recruited through Facebook (48%) or heard about the study from a friend or other source (1%).

Of the 1170 participants, 151 (13%) reported never testing for HIV. In bivariate analyses (Table 1), never testing for HIV was significantly associated with being recruited through Facebook or other sources, younger age, having less formal education (< an associates degree), living in nonpermanent housing, living in a rural area, self-identifying as bisexual/heterosexual/having another sexual orientation, not being “out” about their sexual orientation, and not having a primary partner. Almost all participants who reported having an STI in the past 3 months also reported having taken an HIV test in their lifetime. Lastly, participants who reported sexual risk behaviors (i.e., a greater number of sexual partners or who engaged in CAS in the past 3 months) were more likely to have tested for HIV.

In the multivariable analysis (Table 2), being recruited on Facebook or another non-men-seeking-men source [adjusted odds ratio (AOR)=1.70, 95% confidence interval (CI): 1.07–2.68], being younger (age: AOR=0.95, 95% CI: 0.93–0.97), having less formal education (< associated degree: AOR=1.56, 95% CI: 1.03–2.34), living in nonpermanent housing (AOR=1.96, 95% CI: 1.29–2.96), living in a rural area (AOR=2.34, 95% CI: 1.37–4.02), not identifying as gay (AOR=2.75, 95% CI: 1.51–5.02), not having a primary partner (AOR=1.70, 95% CI: 1.10–2.60), and having used condoms during anal intercourse (CAS: AOR=0.56, 95% CI: 0.38–0.82) were each independently associated with never testing for HIV.

TABLE 2. MULTIVARIABLE ANALYSIS OF FACTORS ASSOCIATED WITH NEVER TESTING FOR HIV AMONG 1170 MEN WHO HAVE SEX WITH MEN IN THE UNITED STATES

	<i>Never tested for HIV</i>	
	<i>Crude OR (95% CI)</i>	<i>AOR (95% CI)</i>
Sociodemographics		
Recruitment source		
Men-seeking-men websites	Ref	Ref
Facebook/other	2.25 (1.57–3.22)	1.70 (1.07–2.68)
Age ^a	0.93 (0.91–0.94)	0.95 (0.93–0.97)
<Associates degree	2.98 (2.10–4.24)	1.56 (1.03–2.34)
Nonpermanent housing	4.11 (2.88–5.86)	1.96 (1.29–2.96)
Rural residence	2.16 (1.36–3.46)	2.34 (1.37–4.02)
Non-gay sexual orientation	1.66 (1.02–2.71)	2.75 (1.51–5.02)
Not fully “out”	1.58 (1.12–2.23)	—
No primary partner	2.41 (1.64–3.56)	1.70 (1.10–2.60)
Sexual behaviors (past 3 months)		
No. of partners ^a	0.91 (0.85–0.96)	—
Condomless anal sex	0.53 (0.38–0.75)	0.56 (0.38–0.82)

^aAge and no. of partners are continuous variables. AOR, adjusted odds ratio; CI, confidence interval; OR, odds ratio.

Discussion

In this study, we sought to identify characteristics of sexually active, Internet-using US GBMSM who reported never having tested for HIV. Despite robust public health campaigns promoting HIV testing among at-risk GBMSM in the United States, 13% of our sample reporting that they had never tested for HIV in their lifetime. Consistent with findings from previous United States and international research,^{14–19} GBMSM who were younger (vs. older), less educated (vs. more educated), or non-gay identified (vs. gay-identified) were more likely to report having never tested for HIV. Notably, rural GBMSM had an increased odds of never testing for HIV compared to urban-dwelling GBMSM. As HIV prevalence among GBMSM in rural communities is generally high, with some rural counties exceeding a 15% prevalence,²⁴ this finding is particularly concerning.

Associations between never testing for HIV and these sociodemographic factors may be due to the multiple intersecting personal and contextual barriers to seeking HIV testing services, including not having access to testing options or not knowing where to receive testing, being unaware of personal HIV risk, experiencing a lack of social support for testing, or having privacy concerns about settings or providers of healthcare services.^{15,25,26} Young GBMSM, especially those who are not “out” to family and friends about their male–male sexual behaviors, are less likely to disclose these sexual behaviors to healthcare providers which, in turn, makes them less likely to be offered relevant care, such as HIV testing, even if they do have a primary care provider.²⁷ Additionally, GBMSM living in rural areas may be more likely to encounter stigma in their local communities with regard to same-sex sexual behaviors or HIV testing. Having to travel to urban settings to receive testing in a more private manner is an option that brings with it transportation, financial, and other barriers.²⁶ Making testing more accessible and less socially risky for young, non-gay identified, and rural GBMSM will require addressing multiple levels of personal and contextual barriers.

Also consistent with the findings of prior international research,¹⁹ our findings indicate that participants who report never having tested for HIV were more likely to report having used condoms for anal intercourse during the assessment period. It is possible that GBMSM who engage in relatively low risk sexual behaviors may not perceive a need to test for HIV, given the perception of a limited benefit and a high potential cost (i.e., inconvenience and stigma-related stress associated with testing).¹⁵ Although these men may have been low risk at the time of the assessment, it is likely that their risk status will change—as sexual behaviors and condom use are often driven by context (vs. a stable individual trait) and vary among GBMSM by partnership type and age.²⁸ Further, the CDC recommends at least annual screening for sexually active GBMSM.⁴ Thus, despite self-reports of lower sexual risk recently, these men remain important targets for HIV testing interventions.

Contrary to previous research conducted in Spain,¹⁸ GBMSM in our sample who reported never having testing for HIV were more likely to be single (vs. in a primary partnership). Although GBMSM in primary partnerships may be less likely to test during the course of relationship, the majority of GBMSM in primary partnerships report testing for HIV in their lifetimes.²⁹ The finding that many GBMSM in relationships do test for HIV may result from a sense of

responsibility to minimize the risk of HIV or STI infection for their partners. Single GBMSM may not experience those motivations as strongly with their casual dating and sexual partners and, thus, remain an important target of HIV testing engagement efforts.

Unique to this study, GBMSM in our sample who reported never having testing for HIV were more likely to live in unstable housing (vs. those who reported being stably housed). Evidence has shown that individuals who are homeless or unstably housed are at high risk for HIV acquisition, due to the prevalence of street-associated behaviors, including substance use and survival behaviors, such as trading sex for shelter.³⁰ Structural interventions focused on creating greater stability, including access to affordable and stable housing, and increasing HIV testing specifically, or engagement with healthcare more generally—should be tested with respect to reducing HIV incidence.³¹

GBMSM who reported never having testing for HIV were also more likely to have been recruited via Facebook or other social means (vs. men-seeking-men websites). Although men-seeking-men websites have proven to be a fertile ground for recruiting GBMSM into HIV prevention research, outreach targeting GBMSM who have never tested for HIV may need to consider using less GBMSM-specific social networking approaches. This may be particularly helpful for reaching GBMSM who do not identify as gay or are not “out” about their sexuality.

This study has several limitations. First, the data were collected in 2012, in the early years of biobehavioral prevention strategies (i.e., PrEP and TaSP). Future research will need to determine whether HIV testing has increased as a result of individuals’ desire to access these highly publicized and effective HIV prevention strategies. Second, all data were collected through self-report and, therefore, are subject to recall error and social desirability biases. However, the latter bias was mitigated because the survey was Internet-based and anonymous. Third, although it is theoretically possible that some individuals participated more than once, this is unlikely because we followed a careful de-duplication protocol²¹ and compensation was done via lottery versus providing remuneration for each respondent. Finally, the survey was brief (to minimize participant burden), so we did not assess the full range of potentially important factors that might be associated with never testing (e.g., risk perception, anticipated HIV stigma, and life stressors). Of specific note, we did not measure access to healthcare and healthcare utilization, both of which are associated with HIV testing among GBMSM.³² These factors should be considered in future work.

Despite these limitations, there are important implications of the finding that some sexually active GBMSM report never having tested for HIV. GBMSM who are younger, less educated, do not identify as gay, are unstably housed, live in rural areas, report regular condom use during anal sex, and are single may need targeted and sensitive interventions that address the personal and contextual barriers to HIV testing they experience.

We recommend four strategies to increase HIV testing among GBMSM. First, we encourage targeted and supplemental outreach that is not gay-identity specific. Second, we recommend that HIV testing options, including those at local health departments and outpatient settings, affirm a wide range of sexual behaviors and identities, and provide assurances of both privacy and confidentiality during testing and through results notification and linkage to care. Experienced and an-

ticipated stigma in healthcare settings, as well as privacy and confidentiality concerns among GBMSM, act as barriers to accessing sexual healthcare and disclosure of male–male sexual behavior to providers.^{33–35} Access to culturally competent, nonjudgmental healthcare that assures privacy and confidentiality remains essential for GBMSM to feel comfortable seeking sexual healthcare services, including HIV testing.³⁴

Third, telemedicine and Internet-based in-home self-testing and referrals should be explored more fully. Telemedicine and Internet-based interventions that use home-based self-testing are acceptable and feasible among GBMSM.^{36–38} Home-based self-testing, compared to traditional HIV counseling and testing services, substantially increases HIV testing rates for GBMSM.³⁹ These technology-based approaches may be an especially promising approach to increase HIV testing among individuals who experience structural (e.g., access) and social-psychological (e.g., stigma) barriers to testing, including rural and young GBMSM, who are more likely to be reached via Internet-based methods.^{40–45}

Fourth, attention to social inequities is necessary to increase HIV testing and realize the full potential of evolving biobehavioral HIV prevention strategies, such as PrEP and TaSP. HIV disproportionately affects individuals who are in the lowest socioeconomic strata and neighborhoods of the highest black racial concentration.^{7,46} Poverty, discrimination, and inequality serve as barriers to HIV testing.^{7,46} To increase HIV testing, we will need to think creatively about ways to address these social inequities, for example, by providing adequate food and housing to those in need. Prior research indicates that meeting people’s subsistence needs increases their ability to engage more effectively with the healthcare system.⁴⁷ Focused attention to the individual and structural barriers to HIV testing among GBMSM who have never tested for HIV will improve access to HIV testing and other biobehavioral HIV prevention strategies. Collectively, these efforts can help to reduce the incidence of HIV and alleviate disparities in HIV/AIDS in the United States.

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