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Factors Associated with Recent HIV Testing Among Men Who Have Sex with Men in New York City

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Abstract

Understanding factors associated with recent HIV testing among men who have sex with men (MSM) is important for designing interventions to increase testing rates and link cases to care. A cross-sectional study of MSM was conducted in NYC in 2011 using venue-based sampling. Associations between HIV testing in the past 12 months and relevant variables were examined through the estimation of prevalence ratios (PR) and 95 % confidence intervals (CI). Of 448 participants, 107 (23.9 %) had not been tested in the past 12 months. Factors independently associated with not testing in the previous 12 months were: lack of a visit to a healthcare provider in the past 12 months (aPR: 2.5; 95 % CI: 1.9, 3.2); age \geq 30 (adjusted PR: 1.9; 95 % CI: 1.4, 2.7); not having completed a bachelor's degree (aPR: 1.6; 95 % CI: 1.0, 2.4); and non-gay sexual identity (aPR: 1.4; 95 % CI: 1.0, 1.8); such MSM may be less aware of the need for frequent HIV testing.

Keywords

HIV; Men that have sex with men; New York City; HIV testing; HIV prevention

Introduction

An estimated 20 % (236,250) of all HIV cases in the United States are undiagnosed [1]. Half of new HIV infections are transmitted by persons unaware that they are HIV infected [2]; persons unaware are presumed to have a sexual transmission rate 3.5 times higher than those who are aware of their positive status [3]. Knowledge of positive HIV status has been associated with reductions in sexual transmission risk behavior [4,5] and early linkage to antiretroviral therapy has been shown to be effective in reducing transmissibility of HIV and immune system damage and mortality among those who are HIV positive [6, 7]. HIV testing is considered a core element of HIV prevention and the Centers for Disease Control and Prevention (CDC) recommends annual testing for those who are at high risk for HIV [8].

A total of 37,720 men who have sex with men (MSM) were living with HIV/AIDS in New York City (NYC) at the end of 2010 [9]. Nationally and in NYC, MSM comprise the greatest number of new HIV diagnoses [9, 10]. In 2010, most new HIV diagnoses among males in NYC were among MSM (63 %); excluding cases with unknown risk, the proportion rises to 86 %. Among all transmission risk groups, many of those concurrently diagnosed with AIDS in 2010 (AIDS diagnosed within 31 days of HIV diagnosis) were MSM ($n = 264$, 35 %), indicating a need for earlier detection in this population [9]. Nationally, it is estimated that approximately one-quarter of HIV-infected MSM have undiagnosed HIV infections [1, 11].

Recent developments in HIV testing technology and evolving policies are likely to increase rates of HIV testing among MSM. HIV testing technology improvements have resulted in more sensitive, convenient, and cost-effective tests, some of which can produce results in minutes [12]. In 2006, the CDC recommended that health care providers offer opt-out HIV screening for all patients between the ages of 13 and 64 years and that all those who are considered to be at high risk for HIV, including MSM, get tested at least annually [8]. In July 2010, the White House published the “National HIV/AIDS Strategy for the United States” prioritizing HIV prevention efforts, including strengthening HIV screening, especially for gay and bisexual men [13]. New York State amended the HIV testing law effective September 2010, so that all those between the ages of 13 and 64 years must be offered an HIV test for primary care or hospital visits [14].

Despite improvements in HIV testing technology and policies that increasingly promote more frequent and universal HIV testing, there are still subpopulations of MSM who are not being tested. Factors, such as income, race, and sexual identity have been found to be associated with utilization of HIV testing services [15]. In addition, individuals’ beliefs, attitudes and emotions about being tested, and the perceived convenience of the testing process may influence rates of HIV testing among MSM. National data collected from MSM between 2003 and 2005 revealed reasons for not testing for HIV in the past 12 months that included: belief that one’s historical practice of safer sex has resulted in a negligible risk of HIV infection; fear of a positive result; and lack of time to test [16]. The purpose of the current study was to determine factors associated with lack of recent HIV testing among a population of MSM in NYC who report that they are uninfected. It is intended that the

results of this study will inform interventions to expand HIV testing programs to include those who are at-risk of HIV infection and who do not test frequently.

Methods

Sampling and Recruitment

Subjects were recruited to participate in the CDC-sponsored National HIV Behavioral Surveillance (NHBS) study of MSM in NYC in 2011. NHBS is an ongoing national, cross-sectional study sponsored by the CDC that monitors HIV risk behaviors, testing history, exposure to and use of HIV prevention services, and HIV prevalence among MSM, injection drug users (IDU), and high-risk heterosexuals in three-year cycles [17, 18]. NHBS is conducted in collaboration with the CDC by local public health departments, universities, and other collaborators. NHBS uses venue-based sampling (VBS), a quasi-probability study design that reduces the impact of selection bias to enumerate and recruit MSM participants [17]. VBS methods for NHBS have been described in detail elsewhere [19]. Recruitment venues were categorized as bars; cafes or restaurants; dance clubs; house ball events; fitness clubs or gyms; gay pride or similar events; social organizations; parks and beaches; retail businesses; street locations; raves, circuit parties, or similar events; sex establishments or environments; and other venues. The study team constructed a universal list of all MSM-oriented social venues in NYC by reviewing publications, interviewing key informants, and conducting other ethnographic research. Venues were included if at least 50 % of the venue population were adult MSM, as determined through observational and interview-based ethnography. Each venue's peak hours of operation, in standardized 4 h time blocks, were also determined through this method. Throughout the study, the universe of potential MSM venues was updated as new venues opened and known venues closed or changed populations. All information on venues and peak time periods was entered into software designed by the CDC for NHBS that randomly selected venues and time periods for recruitment events.

There were 54 recruitment events conducted over 15 weeks from July through October 2011. At each recruitment event, field staff operating in a mobile van outside the venue enumerated all adult men who entered the venue (or crossed an imaginary line when no venue entrance existed). Enumerated men were sequentially and non-preferentially approached by interviewers who described the study to them, and interested men were screened for eligibility. Eligible men who provided their informed consent were given a structured survey interview administered privately by trained interviewers and a voluntary HIV test. The eligibility criteria were male, 18 years of age, NYC residence, and English or Spanish comprehension. MSM sexual history was not an eligibility criterion, but men who did not report having anal or oral sex with a man in the past 12 months were excluded from this analysis. Those who reported that they were HIV positive, including those first identified positive in the last 12 months, were also eliminated from this analysis since the outcome of interest was risk factors for not getting HIV tested in the last 12 months and those who are aware of their infection are likely to change their behavior following their diagnosis and would therefore differ in risk from those who self-reported negative or unknown status [4].

Measures

The survey instrument was developed by the CDC in collaboration with local NHBS project sites. Several additional questions were developed and included in the structured interview to address local NYC research interests. Interview data were collected on demographics, HIV testing experiences, and medical history. Participants were asked if they had ever had an HIV test; those who had were asked the date and result of their most recent HIV test. Those who reported not testing for HIV in the past 12 months were asked to identify the most important factor for not getting tested. Oral mucosal transudate was collected and tested for HIV antibodies using the OraQuick Advance oral specimen collection device (OraSure Technologies, Bethlehem, PA, USA). If the test was positive, participants were asked to provide oral mucosal transudate specimens for confirmation using OraSure HIV-1 Western Blot testing kits (OraSure Technologies, Bethlehem, PA, USA), and to return in 2 weeks for their confirmatory test results. Participants were given the option to only provide a specimen for the HIV confirmatory test if they did not want to take the rapid test. Subjects were compensated \$20 for completing the survey and an additional \$10 for taking an HIV test.

Statistical Analysis

Means and standard deviations (for normal continuous data); medians and interquartile ranges (IQR) (for non-normal continuous data); and the frequencies and percentages for each level of categorical variables were calculated. Associations between HIV testing in the past 12 months and relevant variables, based on the findings of previously published research, were examined through the estimation of prevalence ratios (PR) and 95 % confidence intervals (CI) using bivariate logistic regression models. Variables significant ($p < 0.1$) in bivariate analyses were considered for inclusion in the multivariate logistic regression model. Variables were entered and eliminated from the model in a stepwise manner with $p < 0.1$ for entry and $p < 0.05$ for retention. Analyses were conducted using SAS 9.2 (Cary, NC, USA).

Ethics

All study procedures involving human subjects were approved by the NYC Department of Health and Mental Hygiene (DOHMH) and John Jay College of Criminal Justice Institutional Review Boards.

Results

Sample Recruitment

Of 2,597 men who were enumerated when entering the sampled venues, 1,503 (57.9 %) were approached and 557 (37.1 %) of those approached were screened for eligibility. Of those screened, 536 (96.2 %) were eligible and interviewed. Those who did not have sex with men in the last 12 months ($n = 15$, 2.8 %) and those that lived in the metropolitan statistical area (MSA), but were not NYC residents ($n = 11$, 2.1 %) were excluded from the analysis. Of these 510 sexually active NYC MSM, 62 (12.2 %) who reported that they were HIV positive were eliminated from the analysis, including seven who reported first testing

positive in the last 12 months. The total sample size for the risk factor analysis was 448 participants.

Participant Characteristics

The study sample characteristics are shown in Table 1. Participants were recruited from bars ($n = 285$, 63.6 %), parks ($n = 68$, 15.2 %), street locations ($n = 50$, 11.2 %), gay pride or similar events ($n = 20$, 4.5 %), dance clubs ($n = 19$, 4.2 %), and cafes and restaurants ($n = 6$, 1.3 %). The median age of the study population was 28 years (IQR 22, 39 years). There were 182 (40.8 %) Hispanic, 132 (29.6 %) white, 93 (20.9 %) black, and 39 (8.7 %) other race participants. One-quarter (25.9 %, $n = 116$) had completed college, and 171 (38.3 %) reported an income less than \$20,000/year. Most study participants reported their sexual identity to be “homosexual or gay” (77.0 %, $n = 344$), 93 (20.8 %) reported “bisexual,” and 10 (2.2 %) “heterosexual or straight.”

One-quarter ($n = 107$, 23.9 %) of those included in the analysis had not been tested in the past 12 months and very few participants (6.0 %, $n = 27$) had never been tested for HIV. The majority of participants had visited a healthcare provider in the past 12 months ($n = 374$, 83.5 %); of these, 236 (63.1 %) had been offered an HIV test as part of their visit. Fewer than half of participants ($n = 197$; 44.0 %) had been tested for other sexually transmitted infections in the past 12 months. When asked the most important reason for not testing in the past 12 months, participants cited belief they were at low risk for infection ($n = 45$, 42.1 %), fear of a possible HIV positive diagnosis ($n = 30$; 28.0 %), lack of time ($n = 11$; 10.3 %), no health insurance ($n = 2$, 1.9 %), in a committed relationship ($n = 1$; 0.9 %), and infrequent sex ($n = 1$; 0.9 %). No particular reason for not testing in the past 12 months was reported by 17 (15.9 %).

Variables Associated with HIV Testing in the Past 12 Months

Variables associated with HIV testing in the past 12 months are shown in Table 1. In bivariate analysis, age ≥ 30 , park recruitment venue compared with bar, lack of a Bachelor’s degree or higher, unemployment, lack of health insurance, non-gay sexual identity, lack of disclosure of same-sex attraction to others, receptive anal intercourse in the past week, any unprotected anal intercourse in the past year, and a lack of at least one healthcare visit in the past 12 months were associated with not having tested for HIV in the past 12 months. In the final multivariate model, age ≥ 30 (adjusted PR: 1.9; 95 % CI: 1.4, 2.7); lack of a Bachelor’s degree or higher (aPR: 1.6; 95 % CI: 1.0, 2.4); non-gay sexual identity (aPR: 1.4; 95 % CI: 1.0, 1.8); and a lack of at least one healthcare visit in the past 12 months (aPR: 2.5; 95 % CI: 1.9, 3.2) were independently associated with not having tested for HIV in the past 12 months.

Study HIV Results

A total of 418 (93.3 %) participants had valid HIV study test results. There was no difference between the proportion of MSM who reported testing for HIV in the past 12 months and the proportion consenting to take an HIV test as part of the study ($p = 0.63$). Among those MSM who tested for HIV as part of this study, 318 (76.1 %) reported having

been tested for HIV in the past 12 months, of whom 18 (5.7 %) were positive and among the 100 who did not test for HIV in the past 12 months, 18 (18.0 %) were positive ($p = 0.001$).

Discussion

The current study of NYC MSM who reported HIV negative or unknown status found that a small proportion had never tested for HIV, and approximately one-quarter was last tested more than 1 year previously. The proportion of MSM not tested in the past 12 months in the current study was found to be somewhat lower than previous studies of MSM in NYC and other urban areas [20, 21]. The 2010 NYC Community Health Survey (CHS) found that among MSM who reported having sex with at least one man in the past 12 months, 47.2 % (95 % CI: 35.1–59.7 %) reported not testing for HIV in the past 12 months [22]. CHS utilizes stratified random sampling, which may provide a better estimate of testing behavior for the general population of MSM in NYC, but there may be differences in who decides to participate in each study. Also, CHS did not ask about HIV status, which makes it impossible to restrict analyses to those who are HIV negative or unaware of their status; the CHS estimate of past 12 month HIV testing may have been lower than that found in the current study if a substantial proportion of the CHS MSM participants were diagnosed with HIV more than 1 year ago. NYC NHBS MSM cross-sectional data indicate a declining trend in the prevalence of not testing for HIV in the past 12 months (2004: 37.6 %, 2008: 35.3 %, 2011: 23.8 %, $p < 0.0001$) (K. H. Reilly, unpublished data, 2012). One-quarter still represents a substantial portion of those at-risk for infection who are not being screened annually.

Older age has previously been found to be associated with not testing for HIV in the past year [20, 23]. Older MSM may not be targeted for HIV prevention programs, may no longer consider themselves to be at risk, or may be fatigued by HIV testing messages. National NHBS MSM data from 2005 also found that those who had not been tested for HIV in the past 12 months were less likely to be college educated [21]. A low level of education has been associated with other deleterious health outcomes [24]. Educational attainment is thought to affect health by intermediaries such as health knowledge, work, and social variables [25]. Those who reported non-gay sexual identity may not be targeted for HIV testing interventions and may perceive themselves to be at lower risk compared to gay identified MSM. Other studies of MSM have found that MSM who do not identify as gay have lower rates of testing [15, 26].

A Boston study noted that many MSM would be more comfortable testing for HIV if the test were included as part of a routine health exam [27]. In a NYC 2007 CHS sample of 8,911 adults, only 11 % of participants stated that a physician had recommended an HIV test in the past 12 months, but among those to whom this offer was made, 78 % had been tested for HIV in the past 12 months [28]. Visiting a physician in the past 12 months was also associated with ever testing for HIV in a Philadelphia study of high risk heterosexuals; the majority of those participants reported they would take an HIV test if it was offered by a health care provider [29]. The 2010 amended New York State HIV testing law, which mandates the offer of an HIV test to all persons 13–64 years of age at primary care or hospital visits [14], is only helpful if individuals at-risk for HIV infection utilize health care

services where they have the opportunity to be offered an HIV test. Men may be less likely to regularly access health services than women [30]. The 2009 NYC CHS found that 85.1 % of females reported having a personal doctor compared with 77.1 % of males and 21.1 % of males were uninsured compared with 12.8 % of females [31]. Similarly, the Philadelphia study found that men were more likely to be uninsured, not visit a physician in the past year, and not have a regular health care provider compared with women [29].

The main reasons for not testing as cited by participants in the current study, specifically not perceiving oneself to be at risk for infection and fear of a positive diagnosis, are similar to those found in other studies [27, 32–34]. These divergent reasons indicate that different responses are needed to encourage HIV testing among this population. Perceived risk may not be indicative of actual risk and several studies have found that many at high risk for HIV infection underestimate their risk [35, 36]. A NYC study among all risk groups of recently diagnosed HIV infections with concurrent AIDS diagnoses (CD4 count of 200 cells/mL or CD4 % <14 within 90 days of HIV diagnosis) found that of those who did not test in the year before their diagnosis, the main reason reported by the majority of participants was that they did not believe they were at risk of infection [37]. Fear is another impediment to testing. A common theme distilled from qualitative research is that lack of knowledge of HIV status is preferred to dealing with the reality of a positive diagnosis [38]. These factors have been common since the beginning of the HIV epidemic [39, 40], and yet, after decades of HIV prevention research, are still difficult to overcome. Potential mediators should be considered to overcome these barriers. Susceptible populations, such as MSM, should be informed of the realities of a positive diagnosis, including resources available for those who are HIV positive, and that receiving treatment early in the course of infection can improve disease outcome [4, 5]. The current study found that those who did not have an HIV test in the past 12 months were over twice as likely to have tested positive in the study compared with those who had been tested within the past 12 months. These results indicate inadequate testing uptake among those at high risk for infection and reinforce the need for more frequent HIV testing in order to encourage early linkage to care and improved patient outcomes [6, 7], as well as contributing to the preventing HIV transmission [3]. The availability of affordable HIV home self-testing kits may encourage more frequent testing among those at risk for infection [41]. NYC surveillance numbers reaffirm the need for more frequent testing among MSM; of 1,683 new HIV infections reported among MSM in NYC in 2010, 15.7 % were concurrent with AIDS diagnoses. Although the number of concurrent AIDS diagnoses among MSM in NYC has decreased from past years, 15.7 % still represents a sizeable proportion, indicating that further efforts should be made to decrease the proportion of late diagnoses. An assessment of population-based changes following the implementation of a NYC DOHMH-sponsored HIV testing initiative in the Bronx found that from 2005 to 2009 an increase in testing was correlated with a decrease in concurrent HIV/AIDS diagnoses [42].

This study was subject to several limitations. Those who tested within the last 12 months, but reported their HIV positive status were excluded from the analysis. The rationale for excluding all known positives is that those who are aware of their infection are likely to change their behavior and would therefore differ in risk from those who self-reported negative or unknown status [4, 5]. For example, including those who tested positive may

inflate the association between visiting a health care provider in the past 12 months and testing for HIV in the past 12 months if those who are newly positive seek out health care for treatment after their diagnosis. There were seven self-reported HIV positive participants who were excluded from this analysis; as they represented only 2 % of all those who were tested in the past 12 months, it is unlikely that their exclusion would substantially change the results. More importantly, the study questionnaire elicited sensitive information regarding sexual behavior and HIV status; participants may not have felt comfortable disclosing this information to study staff interviewers. If many of those who reported not testing in the past 12 months did so because they were HIV positive and aware of their status, but did not feel comfortable reporting this status to the study interviewer, the risk factors elucidated in the study may have differed from those found. Assuming that those who are aware of their HIV infection engage in less risky behavior [4, 5], including in the analysis those who reported negative or unknown status, but did not test in the last 12 months because they were aware of their HIV infection, may have resulted in an underestimate of the magnitude of the association between HIV testing and other risk behaviors. This study was also subject to recall bias; however, questions pertaining to expected more frequent behaviors were framed in terms of shorter time periods (e.g., last time, last week) and expected less frequent behaviors were framed in terms of longer time periods (e.g., last 12 months). Participants were selected through a quasi-probability sample of designated NYC MSM venues. Efforts were made to include a diverse selection of MSM venues in the sampling universe. MSM that do not attend these venues, however, would not have had the opportunity to participate in this study. This study's findings may not be generalizable to all MSM in NYC or other MSM populations.

This study highlights the need to increase HIV testing among subpopulations of MSM. NHBS provides basic research in behavioral surveillance; the results from this study have been and will continue to be presented within the NYC DOHMH and to community based organizations that conduct HIV testing so that they may apply these findings to their HIV testing campaigns and programs. Traditional prevention campaigns, which target specific risk groups, may not be effective at reaching susceptible subpopulations [43]. Outreach efforts should consider alternative methods of reaching those MSM who are non-college educated, older, who do not identify as gay, and who do not regularly access medical care. Social networking may be an effective means of recruiting those who would not otherwise be tested [44]. The NYC DOHMHs HIV Field Services Unit has found partner services to be useful for diagnosing HIV at earlier stages of infection and providing early linkage to treatment [45]; since NYC DOHMH maintains a name-based registry of persons with HIV/AIDS and are able to match reported positive HIV tests, the field services unit is often able to distinguish between new and repeat HIV diagnoses [46]. Future research and prevention efforts should explore developing, implementing and evaluating HIV testing initiatives and social marketing campaigns that will be acceptable to those who are not testing annually. Such MSM may be less aware of the need for frequent HIV testing or may be a hidden population that fears stigmatization associated with HIV testing.

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References

1. Chen M, Rhodes PH, Hall HI, Kilmarx PH, Branson BM, Valleroy LA. Prevalence of undiagnosed HIV infection among persons aged 13 Years—National HIV Surveillance System, United States, 2005–2008. *MMWR Morb Mortal Wkly Rep.* 2012;61(02):57–64.
2. Hall HI, Holtgrave DR, Maulsby C. HIV transmission rates from persons living with HIV who are aware and unaware of their infection. *AIDS.* 2012;26(7):893–6. [PubMed: 22313960]
3. Marks G, Crepaz N, Janssen RS. Estimating sexual transmission of HIV from persons aware and unaware that they are infected with the virus in the USA. *AIDS.* 2006;20(10):1447–50. [PubMed: 16791020]
4. Marks G, Crepaz N, Senterfitt JW, Janssen RS. Meta-analysis of high-risk sexual behavior in persons aware and unaware they are infected with HIV in the United States: implications for HIV prevention programs. *J Acquir Immune Defic Syndr.* 2005;39(4):446–53. [PubMed: 16010168]
5. Higginbotham S, Holmes R. Adoption of protective behaviors among persons with recent HIV infection and diagnosis. *MMWR Morb Mortal Wkly Rep.* 2000;49(23):512–5. [PubMed: 10882290]
6. Moir S, Buckner CM, Ho J, et al. B cells in early and chronic HIV infection: evidence for preservation of immune function associated with early initiation of antiretroviral therapy. *Blood.* 2010;116(25):5571–9. [PubMed: 20837780]
7. Kitahata MM, Gange SJ, Abraham AG, et al. Effect of early versus deferred antiretroviral therapy for HIV on survival. *N Engl J Med.* 2009;360(18):1815–26. [PubMed: 19339714]
8. Branson BM, Handsfield HH, Lampe MA, et al. Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings. *MMWR Morb Mortal Wkly Rep.* 2006;55(RR14):1–17. [PubMed: 16410759]
9. New York City Department of Health and Mental Hygiene: New York City HIV/AIDS Annual Surveillance Statistics. 2011. <http://www.nyc.gov/html/doh/downloads/pdf/ah/surveillance2010-tables-all.pdf>. Accessed 8 Feb 2012.
10. Torian L, Chen M, Rhodes P, Hall HI. HIV surveillance—United States, 1981–2008. *MMWR Morb Mortal Wkly Rep.* 2011;60(21): 689–93. [PubMed: 21637182]
11. Campsmith ML, Rhodes PH, Hall HI, Green TA. Undiagnosed HIV prevalence among adults and adolescents in the United States at the end of 2006. *J Acquir Immune Defic Syndr.* 2010;53(5):619–24. [PubMed: 19838124]
12. Branson BM. State of the art for diagnosis of HIV infection. *Clin Infect Dis.* 2007;45(Suppl 4):S221–5. [PubMed: 18190290]
13. White House Office of National AIDS Policy: National HIV/AIDS Strategy for the United States. 2011. <http://www.whitehouse.gov/sites/default/files/uploads/NHAS.pdf>. Accessed 7 March 2012.
14. New York State Department of Health: Frequently asked questions regarding the amended HIV testing law. 2011. <http://www.health.ny.gov/diseases/aids/testing/law/faqs.htm>. Accessed 8 Feb 2012.
15. Lauby JL, Milnamow M. Where MSM have their first HIV test: differences by race, income, and sexual identity. *Am J Mens Health.* 2009;3(1):50–9. [PubMed: 19477719]
16. Sanchez T, Finlayson T, Drake A, et al. Human immunodeficiency virus (HIV) risk, prevention, and testing behaviors: United States, National HIV Behavioral Surveillance System: men who have sex men, November 2003–April 2005. *MMWR Morb Mortal Wkly Rep.* 2006;55(SS06):1–16. [PubMed: 16410759]

17. Gallagher KM, Sullivan PS, Lansky A, Onorato IM. Behavioral surveillance among people at risk for HIV infection in the US: the National HIV Behavioral Surveillance System. *Public Health Rep.* 2007;122(Suppl 1):32–8. [PubMed: 17354525]
18. Lansky A, Sullivan PS, Gallagher KM, Fleming PL. HIV behavioral surveillance in the US: a conceptual framework. *Public Health Rep.* 2007;122(Suppl 1):16–23. [PubMed: 17354523]
19. MacKellar DA, Gallagher KM, Finlayson T, Sanchez T, Lansky A, Sullivan PS. Surveillance of HIV risk and prevention behaviors of men who have sex with men—a national application of venue-based, time-space sampling. *Public Health Rep.* 2007;122(Suppl 1):39–47. [PubMed: 17354526]
20. Daskalakis D, Silvera R, Bernstein K, et al. Implementation of HIV testing at 2 New York City bathhouses: from pilot to clinical service. *Clin Infect Dis.* 2009;48(11):1609–16. [PubMed: 19400690]
21. Oster AM, Miles IW, Le BC, et al. HIV testing among men who have sex with men—21 cities, United States, 2008. *MMWR Morb Mortal Wkly Rep.* 2011;60(21):694–9. [PubMed: 21637183]
22. New York City Department of Health and Mental Hygiene: Community Health Survey. 2010. https://a816-healthpsi.nyc.gov/SASStoredProcess/guest?_PROGRAM=/EpiQuery/CHS/chsindex&year=2010. Accessed 12 June 2012.
23. Helms DJ, Weinstock HS, Mahle KC, et al. HIV testing frequency among men who have sex with men attending sexually transmitted disease clinics: implications for HIV prevention and surveillance. *J Acquir Immune Defic Syndr.* 2009;50(3):320–6. [PubMed: 19194309]
24. Cutler DM, Lleras-Muney A. Education and health: evaluating theories and evidence: National Bureau of Economic Research; 2006.
25. Braveman P, Egerter S, Williams DR. The social determinants of health: coming of age. *Annu Rev Public Health.* 2011;32:381–98. [PubMed: 21091195]
26. Pathela P, Hajat A, Schillinger J, Blank S, Sell R, Mostashari F. Discordance between sexual behavior and self-reported sexual identity: a population-based survey of New York City men. *Ann Intern Med.* 2006;145(6):416–25. [PubMed: 16983129]
27. Mimiaga MJ, Goldhammer H, Belanoff C, Tetu AM, Mayer KH. Men who have sex with men: perceptions about sexual risk, HIV and sexually transmitted disease testing, and provider communication. *Sex Transm Dis.* 2007;34(2):113–9. [PubMed: 16810121]
28. Kim EK, Thorpe L, Myers JE, Nash D. Healthcare-related correlates of recent HIV screening in New York City. *Prev Med.* 2012;54(6):440–3. [PubMed: 22449481]
29. Bond L, Lauby J, Batson H. HIV testing and the role of individual-and structural-level barriers and facilitators. *AIDS Care.* 2005;17(2):125–40. [PubMed: 15763709]
30. Bertakis KD, Azari R, Helms LJ, Callahan EJ, Robbins JA. Gender differences in the utilization of health care services. *J Fam Pract.* 2000;49(2):147–52. [PubMed: 10718692]
31. New York City Department of Health and Mental Hygiene: Community Health Survey. 2009. https://a816-healthpsi.nyc.gov/SASStoredProcess/guest?_PROGRAM=%2FEpiQuery%2FCHS%2Fchsindex&year=2009. Accessed 12 June 2012.
32. MacKellar DA, Valleroy LA, Secura GM, et al. Unrecognized HIV infection, risk behaviors, and perceptions of risk among young men who have sex with men: opportunities for advancing HIV prevention in the third decade of HIV/AIDS. *J Acquir Immune Defic Syndr.* 2005;38(5):603–14. [PubMed: 15793373]
33. Hutchinson AB, Corbie-Smith G, Thomas SB, Mohanan S, del Rio C. Understanding the patient's perspective on rapid and routine HIV testing in an inner-city urgent care center. *AIDS Educ Prev.* 2004;16(2):101–14. [PubMed: 15134119]
34. Song Y, Li X, Zhang L, et al. HIV-testing behavior among young migrant men who have sex with men (MSM) in Beijing, China. *AIDS Care.* 2011;23(2):179–86. [PubMed: 21259130]
35. Whiteside YO, Harris T, Scanlon C, Clarkson S, Duffus W. Self-perceived risk of HIV infection and attitudes about preexposure prophylaxis among sexually transmitted disease clinic attendees in South Carolina. *AIDS Patient Care STDS.* 2011;25(6):365–70. [PubMed: 21470046]
36. Nunn A, Zaller N, Cornwall A, et al. Low perceived risk and high HIV prevalence among a predominantly African American population participating in Philadelphia's rapid HIV testing program. *AIDS Patient Care STDS.* 2011;25(4):229–35. [PubMed: 21406004]

37. Mills CW, Sabharwal CJ, Udeagu CC, et al. Barriers to HIV testing among HIV/AIDS concurrently diagnosed persons in New York City. *Sex Transm Dis.* 2011;38(8):715–21. [PubMed: 21844723]
38. Lorenc T, Marrero-Guillamon I, Llewellyn A, et al. HIV testing among men who have sex with men (MSM): systematic review of qualitative evidence. *Health Educ Res.* 2011;26(5):834–46. [PubMed: 21873612]
39. Lyter DW, Valdiserri RO, Kingsley LA, Amoroso WP, Rinaldo CR Jr. The HIV antibody test: why gay and bisexual men want or do not want to know their results. *Public Health Rep.* 1987;102(5):468–74. [PubMed: 3116576]
40. Siegel K, Levine MP, Brooks C, Kern R. The motives of gay men for taking or not taking the HIV antibody test. *Soc Probl.* 1989;36(4):368–83.
41. Carballo-Diequez A, Frasca T, Dolezal C, Balan I. Will gay and bisexually active men at high risk of infection use over-the-counter rapid HIV tests to screen sexual partners? *J Sex Res.* 2012;49(4):379–87. [PubMed: 22293029]
42. Myers JE, Braunstein SL, Shepard CW, et al. Assessing the impact of a community-wide HIV testing scale-up initiative in a major urban epidemic. *J Acquir Immune Defic Syndr.* 2012;61(1):23–31. [PubMed: 22739134]
43. Braunstein SL, Shepard CW. The potential pitfalls of targeted screening for acute HIV infection: the view from New York City. *J Infect Dis.* 2011;204(3):487–8. [PubMed: 21742849]
44. Fuqua V, Chen YH, Packer T, et al. Using social networks to reach black MSM for HIV testing and linkage to care. *AIDS Behav.* 2012;16(2):256–65. [PubMed: 21390535]
45. Bocour A, Renaud TC, Udeagu CN, Shepard CW. HIV partner services are associated with earlier diagnosis and linkage to HIV medical care Paper presented at: XIX International AIDS Conference; Washington, DC; July 22–27, 2012.
46. Renaud TC, Woog V, Ramaswamy CK, et al. Overstating social networks' ability to diagnose new cases of HIV. *Am J Public Health.* 2010;100(S1):S5–6. [PubMed: 20147665]

Table 1

Variable associations with not testing for HIV in the past 12 months among MSM in New York City (*n* = 448)

Variable	N	N (%) no HIV test in past 12 months	Univariate		Multivariate	
			PR (95 % CI)	p value	PR (95 % CI)	p value
Age						
18–29	243	41 (16.9)	1.0		1.0	
30	205	66 (32.2)	1.9 (1.4, 2.7)	0.0002	1.9 (1.4, 2.7)	<0.0001
Race						
Black	93	28 (30.1)	1.3 (0.9, 1.9)	0.11		
Other	353	79 (22.4)	1.0			
Country of birth						
United States	347	79 (22.8)	1.0			
Puerto Rico	14	5 (35.7)	1.6 (0.8, 3.3)	0.23		
Foreign	87	23 (26.4)	1.2 (0.8, 1.7)	0.46		
Recruitment venue						
Bar	285	62 (21.8)	1.0			
Park	68	23 (33.8)	1.6 (1.0, 2.3)	0.03		
Other	95	22 (23.2)	1.1 (0.7, 1.6)	0.77		
Highest level of education completed						
College	116	20 (19.0)	1.0		1.0	
No college	332	87 (26.8)	1.5 (1.0, 2.4)	0.06	1.6 (1.0, 2.4)	0.03
Employed						
Yes	303	63 (21.8)	1.0			
No	145	44 (31.0)	1.5 (1.0, 2.0)	0.02		
Currently has medical insurance						
Yes	340	73 (21.5)	0.7 (0.5, 1.0)	0.03		
No	108	34 (31.5)	1.0			
Seen a health care provider in the past 12 months						
Yes	374	71 (19.0)	1.0		1.0	<0.0001
No	74	36 (48.6)	2.6 (1.9, 3.5)		2.5 (1.9, 3.2)	
Sexual identity						

Variable	N	N (%) no HIV test in past 12 months	Univariate		Multivariate	
			PR (95 % CI)	p value	PR (95 % CI)	p value
Gay	344	71 (21.8)	1.0		1.0	
Bisexual/straight	103	36 (35.0)	1.6 (1.2, 2.4)	0.002	1.4 (1.0, 1.8)	0.04
Sex with a female in the past 12 months						
Yes	35	12 (34.3)	1.5 (0.9, 2.4)	0.11		
No	413	95 (23.0)	1.0			
Told others attracted to and/or has sex with men						
Yes	408	88 (21.6)	1.0			
No	39	19 (48.7)	2.3 (1.6, 3.3)	<0.0001		
Receptive anal intercourse in the past week						
Yes	311	61 (20.6)	0.6 (0.4, 0.8)	0.002		
No	136	45 (33.8)	1.0			
Insertive anal intercourse with a man in the past week						
Yes	301	69 (22.9)	0.9 (0.6, 1.3)	0.57		
No	146	37 (25.3)	1.0			
2 male sex partners in the past 12 months						
Yes	360	83 (23.1)	0.8 (0.6, 1.2)	0.40		
No	88	24 (27.3)	1.0			
Any unprotected anal intercourse with a man in the past 12 months						
Yes	237	49 (20.7)	0.8 (0.5, 1.0)	0.09		
No	211	58 (27.5)	1.0			

Bold values indicate statistically significant ($p < 0.05$)