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Multilevel Risk Factors for Greater HIV Infection of Black Men who Have Sex With Men in New York City

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Abstract

Background: There is a large and disproportionate burden of HIV in black men who have sex with men (MSM) which is not adequately explained by racial/ethnic differences in risk behaviors. However, social factors may account for this disparity in HIV infection. We examine the extent to which both individual risk behaviors and social factors reduce the effect of black race and may account for the disparity in HIV infection of black MSM.

Methods: In a cross-sectional study in New York City in 2011, MSM were venue sampled, interviewed, and HIV tested. Variables associated ($P < 0.10$) both with black race and testing HIV positive were analyzed using multivariate logistic regression.

Results: Of 416 participants who were HIV tested and did not self-report being positive, 19.5% were black, 41.1% were Hispanic, 30.5% were white, and 8.9% were of other race/ethnicity. Overall, 8.7% tested positive (24.7% of blacks, 7.6% of Hispanics, 1.0% of whites, and 5.4% of other). The effect of black race versus non–black race/ethnicity with testing HIV positive declined by 49.2%, (crude odds ratio, 6.5 [95% confidence interval, 3.2–13.3] vs. adjusted odds ratio, 3.3 [95% confidence interval, 1.5–7.5]), after adjustment for having a black last sex partner, not having tested for HIV in the past 12 months, Brooklyn residency, and having an annual income less than US$20,000.

Conclusions: Greater HIV infection risk of black MSM may result from social factors and less frequent HIV testing than from differences in risk behaviors. To reduce the disparity in HIV infection of black MSM, multilevel interventions that both ameliorate social risk factors and increase the frequency of HIV testing are needed.

In the United States and in New York City (NYC), men who have sex with men (MSM) comprise the largest transmission category of people living with HIV/AIDS and of people

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newly diagnosed as having HIV (2011).[1,2] Black MSM, in particular, are disproportionately affected by the HIV epidemic. Although black males only account for 10.2 % of NYC's population,[3] of 1802 MSM who were newly diagnosed as having HIV in NYC in 2011, 35.0% were black.[2] In addition, the only statistically significant increase in HIV incidence among young (13–29 years of age) MSM in the United States between 2006 and 2009 was among black MSM.[4] Black MSM have been found to be 7 times more likely to have undiagnosed HIV infection than white MSM.[5] A study of MSM recruited in NYC in 2008 estimated that black MSM were more than 3 times as likely to be recently infected with HIV as other MSM.[6] With this large and disproportionate burden of HIV in black MSM, there is an urgent need to understand the reasons for this disparity.

Individual risk behaviors alone do not sufficiently explain why black MSM are at greater risk for HIV infection.[5] Black MSM have been found to engage in less or similar sexual and drug use behaviors compared with other MSM.[7,8] In a systematic review, Millett and colleagues[9] found that only 2 hypotheses (that black MSM were more likely to have sexually transmitted diseases [STDs] and were less likely to know their HIV positive status) partially explained the disparity in HIV infection. Other studies have examined differences in sexual risk networks as a reason for the disparity.[10–12] The study of structural factors such as income level and urban residential location[13] may increase understanding about this disparity and offer new intervention opportunities.

In the current study, we examine multilevel factors that may be associated with the disparity in HIV infection of black MSM in NYC. Among the factors analyzed are individual sexual and drug risk behaviors that may lead to the acquisition of HIV, sexual partnerships and networks that may increase the risk of exposure, and structural factors such as income level and residential location that may contribute to both risk behaviors and patterns of exposure. The analysis assesses the extent to which these factors are associated with both HIV infection and being a black MSM and are possible mediators that reduce the effect of black race and may account for the disparity in HIV infection.[14]

MATERIALS AND METHODS

Sampling and Recruitment

In 2011, MSM were recruited in NYC to participate in the third MSM cycle of the Centers for Disease Control and Prevention (CDC)–sponsored National HIV Behavioral Surveillance (NHBS) study. The NHBS is an ongoing national, cross-sectional study that monitors HIV risk behaviors, testing history, exposure to and use of HIV prevention services, and HIV prevalence among MSM, injection drug users, and heterosexuals at high risk in 3-year cycles.[15] It is conducted in collaboration with the CDC by local public health departments, universities, and other collaborators.

Venue-based sampling was used to recruit participants.[16] Venues were sampled from a universal list of MSM-oriented social venues, that is, venues where at least 50% of the venue population was adult MSM. Venues included bars, dance clubs, parks, and other gay-oriented venues. Using CDC-designed software, venues and peak hours of operation, in standardized 4-hour time blocks, were randomly selected for recruitment events.

Recruitment was conducted for 15 weeks from July through October 2011, with 54 events sampled. At each event, study staff sequentially and nonpreferentially approached adult men entering the venue and described the study to them. Those interested in participating were screened for eligibility. The eligibility criteria were as follows: male, at least 18 years of age, NYC residence, and English or Spanish comprehension. Eligible men who provided their informed consent were given a structured interview in private by trained interviewers and a voluntary HIV test. Participation in the study was anonymous. Participants were compensated US$20 for completing the interview and an additional US$10 for taking an HIV test.

Men with no MSM sexual history in the past 12 months were excluded from this analysis, as were those who self-reported being HIV positive, because the outcome of interest was undiagnosed HIV infection and knowledge of an HIV positive diagnosis is associated with a reduction in risk behavior.[17] Those who were not tested for HIV in the study and those who did not report their racial/ethnic identity were also excluded.

Measures

Interview data included sociodemographic characteristics, health care utilization, HIV testing history, exposure to HIV prevention, alcohol and drug use behaviors, sexual risk behaviors and partnerships, and STD diagnoses. Participants' race/ethnicity was determined through self-report and included Hispanic, non-Hispanic black, non-Hispanic white, and non-Hispanic other. Oral mucosal transudate was collected and tested for HIV antibodies using the OraQuick Advance oral specimen collection device (OraSure Technologies, Bethlehem, PA). If the test result 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) and to return in 2 weeks for their confirmatory test results. Participants were considered HIV positive if the Western blot test result was positive.

Statistical Analysis

Means and SDs (for normal continuous data), medians and interquartile ranges (for nonnormal continuous data), and the frequencies and percentages for each level of categorical variables were calculated. Associations between testing HIV positive and relevant variables, and black race and relevant variables, were initially examined through the estimation of odds ratios (ORs) and 95% confidence intervals (95% CIs) in bivariate logistic regression models. Variables significantly ($P < 0.10$) associated with both HIV infection and black race in bivariate analyses were then tested for inclusion in the multivariate logistic regression model. Black race was retained in the multivariate model, whereas variables that were associated with both HIV infection and black race were entered and eliminated from the model using a stepwise method with $P < 0.10$ for entry and $P < 0.05$ for retention. To confirm the final model, a backward elimination analysis was conducted with black race and those variables with a significance of $P < 0.05$ retained in the final model. The percentage change between the crude and adjusted OR (aOR) of black race was used to assess the influence of mediating covariates on the disparity in HIV infection of black MSM compared with nonblacks. Analyses were conducted using SAS 9.2 (Cary, NC).

Ethics

All study procedures were approved by the NYC Department of Health and Mental Hygiene and John Jay College of Criminal Justice Institutional Review Boards.

RESULTS

Of 2597 men who were counted when entering the venues, 1503 (57.9%) were approached. Of those approached, 557 (37.1%) were screened for eligibility, of whom 536 (96.2%) were eligible and interviewed. Those who did not have sex with men in the past 12 months (n = 15; 2.8%) and those who were not NYC residents (n = 11; 2.1%) were excluded from the analysis. Of the remaining 510, 62 (12.2%) who self-reported being HIV positive were excluded from the analysis. Of the 448, 30 (6.7%) who were not tested for HIV in the study and 2 (0.4%) who refused to report their race/ethnicity were excluded. The analysis sample size was 416.

Sample Characteristics

Participants were recruited from bars (64.7%), parks (14.7%), and other venues (20.7%; Table 1). Participants resided in all NYC boroughs, including Manhattan (35.8%), Queens (18.3%), Brooklyn (24.5%), the Bronx (20.9%), and Staten Island (0.5%). By race/ethnicity, 19.5% were black, 41.1% were Hispanic, 30.5% were white, and 8.9% were of “other” race/ethnicity.. The median age was 28 years (interquartile range, 22–39 years), with 54.8% being younger than 30 years. Most (78.1%) identified as gay, 19.7% as bisexual, and 2.2% as heterosexual. Most (91.6%) had disclosed to others that they were attracted to and/or had sex with men. Most (91.6%) had graduated from high school, 67.8% were employed (full or part time), whereas a minority reported having an annual income less than US$20,000 (38.2%) and ever being homeless in the past 12 months (14.9%). Few (8.4%) had been incarcerated for more than 24 hours in the past 12 months.

In the past 12 months, 7.5% reported sex with a female, 51.2% had more than 3 sex partners, 53.1% engaged in unprotected anal intercourse with a male partner, 9.4% reported receiving drugs or money in exchange for sex, 30% had concurrent sexual partnerships, and 39.9% met sex partners on the Internet or by using a smart phone application (these and the following sample characteristics are not shown in Table 1). The last sex partner characteristics included being of the same race/ethnicity as the participant (46.0%); being of black race (22.4%), being older in age than the participant (46.3%), younger in age (31.1%), and the same age (22.7%); and being HIV positive (3.1%). In the past 12 months, 26% had used any noninjection stimulant drugs (powder cocaine, crack cocaine, methamphetamine, or ecstasy), 6.5% had used other noninjection drugs excluding marijuana, 20% had used marijuana only, and 54.3% had engaged in binge drinking (≥5 drinks at one “sitting”). Only 2.4% had ever injected drugs.

The Prevalence of HIV Infection Overall and by Race/Ethnicity

Overall, 8.7% (n = 36) tested HIV positive (Table 2). By race/ethnicity, 24.7% (n = 20) of blacks, 7.6% (n = 13) of Hispanics, 0.8% (n = 1) of whites, and 5.4% (n = 2) of “other” race/ethnicity were infected. Each racial/ethnic group was significantly less likely to be infected

than blacks. Among all participants who did not identify as black ("nonblack"), 4.8% (n = 16) were infected. Blacks were more than 6 times more likely to be infected than all nonblack MSM (OR, 6.5; 95% CI, 3.2–13.3; $P < 0.0001$), 4 times more likely than Hispanics (OR, 4.0; 95% CI, 1.9–8.5; $P < 0.001$), and 41 times more likely than whites (OR, 41.3; 95% CI, 5.4–314.9; $P < 0.0004$).

Bivariate Analyses of Other Variables Associated With HIV Infection

Other variables significantly ($P < 0.05$) associated with HIV infection included being recruited in a park compared with a bar, residing in Brooklyn compared with Manhattan and with the Bronx, age at least 30 years, not having graduated from high school, being unemployed, having an annual income less than US$20,000, not having tested for HIV in the past 12 months, and having a black last sex partner (Table 2). Being incarcerated for more than 24 hours in the past 12 months was associated with HIV infection at $P < 0.07$.

Bivariate Analyses of Variables Associated With Black Race

Variables significantly ($P < 0.05$) associated with black race (shown in Table 3) included being recruited in a park compared with a bar and from other (nonbar and nonpark) venues compared with a bar, residing in Brooklyn compared with Queens, gay identity (inverse association), not having graduated from high school, being unemployed, having an annual income less than US$20,000, ever being homeless in the past 12 months, incarcerated for more than 24 hours in the past 12 months, having sex with a female in the past 12 months, receiving drugs or money in exchange for sex in the past 12 months, having a black last sex partner, and testing HIV positive. Not having tested for HIV in the past 12 months was associated with black race at $P < 0.07$.

Variables Associated With Both HIV Infection and Black Race

Variables associated ($P < 0.10$) with both HIV infection and black race included being recruited in a park compared with a bar, Brooklyn resident versus a resident of other boroughs, not having graduated from high school, being unemployed, having an annual income less than US$20,000, incarcerated more than 24 hours in the past 12 months, not having tested for HIV in the past 12 months, and having a black last sex partner.

Multivariate Analysis

In the multivariate analysis with testing HIV positive as the outcome, variables that were kept in the final model after the retention of black race versus non–black race/ethnicity (aOR, 3.3; 95% CI, 1.5–7.5) included having a black last sex partner (aOR, 3.3; 95% CI, 1.4–7.5), not having tested for HIV in the past 12 months (aOR, 3.2; 95% CI, 1.4–7.1), Brooklyn resident versus resident of other boroughs (aOR, 2.7; 95% CI, 1.2–5.9), and having an annual income less than US$20,000 (aOR, 2.3; 95% CI, 1.005–5.2; Table 4). The final model was the same when variables were selected using the backward elimination method. After adjustment for the mediating covariates in the final model, the effect size of black race versus non–black race/ethnicity on testing HIV positive declined by 49.2%, from an OR of 6.5 to an aOR of 3.3.

DISCUSSION

Among MSM who did not self-report being HIV positive, black MSM were more than 6 times more likely than nonblack MSM to test positive. However, black race was not significantly associated with being more likely to engage in unprotected anal sex and having more sex partners. Instead, black race was a marker for other factors that increased the risk of HIV infection, including social factors (sexual network characteristics, borough of residence, and poverty) and the frequency of HIV testing. In the multivariate model, these other factors reduced the effect size of black race on HIV infection by half.

The greater risk of HIV infection of black MSM may partly result from their assortative sexual networks with other black MSM. The likelihood of exposure to HIV may be greater if sexual partners are drawn from a high HIV prevalence population. The disparity in HIV infection of black MSM may reflect a higher prevalence of HIVamong black MSM combined with a greater likelihood that their sex partners are also black, that is, sex partner homophily.[18] Studies in San Francisco[10] and Chicago[11] also found that black MSM were more likely to have sex partners who were black, and nonblack MSM were more likely to prefer and have nonblack sex partners. High rates of sex partner homophily among black MSM may increase their risk of exposure, given similar levels of unprotected sex as other MSM. Moreover, individual black MSM may be unaware of the high prevalence of HIV infection among black MSM as a whole and perceive assortative sexual mixing with other black MSM as protective, which may encourage unprotected sex and increase the risk of transmission.[19] Sex partner homophily may also contribute to the maintenance of the racial/ethnic disparity in HIV infection because of fewer sexual network bridges between black MSM and MSM in other racial/ethnic groups.

The association of being a Brooklyn resident with both HIV infection and black race suggests that sociogeographic factors influence the disparity in HIV infection. The geographic clustering of HIV may reflect sexual partner clustering within overlapping geographic areas and sexual networks. Such geographic and sexual network clustering has been found with other sexually transmitted infections, such as gonorrhea, and may also represent geographically based “core groups” that maintain endemic HIV infection in a neighborhood.[20] Black MSM who reside in Brooklyn, particularly in Central Brooklyn where the number of black MSM with undiagnosed HIV infection was highest (data not shown), and who also have sex partners residing in Brooklyn, may be at greater risk of infection because of the high prevalence of HIV among MSM in Brooklyn, which, in 2011, had the second highest number of new diagnoses of HIV among MSM in NYC after Manhattan (441 vs. 585).[2]

Low income has been associated with poorer health outcomes.[21] Black MSM with lower incomes may have been less able to access HIV health services and prevention programs that were located in more affluent gay neighborhoods, such as those in Manhattan. In this study, MSM with an annual income less than US$20,000 were significantly less likely to live in Manhattan than in other NYC boroughs (25.2% vs. 42.4%, $P < 0.001$).

The association of not testing for HIV in the past 12 months with HIV infection may indicate that many who are not tested are unaware of their infection risk or are unwilling or unable to get tested. The 2 main reasons for not testing given by MSM in this NYC cycle of NHBS, as reported in a separate analysis of factors associated with recent testing among MSM, were not perceiving oneself to be at risk for infection and fear of a positive diagnosis.[22] Many black MSM may be afraid of a positive HIV test result not only because of the health consequences of being infected with HIV but also because of the stigma of being perceived as HIV positive and disclosure of their positive status.[23] Not being tested for HIV or infrequent testing also may have population-level effects. Black MSM infected with HIV are less likely than other MSM to be aware that they are infected, which will delay their linkage to care and initiation of antiretroviral therapy (ART).[24] Lower use of ART by HIV infected black MSM may lead to a higher community viral load and greater transmission risk in this population.[5,25]

Interventions are urgently needed to reduce HIV infections among black MSM. This analysis suggests that interventions need to address both social factors and the lower frequency of HIV testing. Interventions targeting the social and sexual networks of black MSM may be effective. A study in NYC comparing HIV testing strategies found that a social/sexual network intervention was more likely to detect newly diagnosed infections among black (African American) MSM than an intervention using a van-based venue testing strategy.[26] As part of the HIV Prevention Trials Network 061, participants were asked to refer sexual network members in a feasibility study of a multi-component intervention to reduce HIV infection among black MSM.[27] Couples interventions could focus on increasing awareness of shared risk and developing practices to prevent HIV transmission. For HIV-serodiscordant couples, preexposure prophylaxis for the uninfected partner may be appropriate, although questions surrounding the initiation of and adherence to preexposure prophylaxis remain.[28] Partner notification and contact tracing could help to identify infected or at-risk partners and facilitate linkage to care for those infected. Personal social network interventions could be used to develop group norms supporting safer sexual practices. Neighborhood-level interventions targeted at neighborhoods where HIV is clustered among black MSM could include testing campaigns, media or popular opinion leader interventions, or the diffusion of risk reduction practices through neighborhood social networks. The location of no- or low-cost HIV prevention and treatment services in neighborhoods where low-income MSM reside or congregate could also help to reduce the spread of HIV infection among black MSM.

In the HIV care continuum, many black MSM may be unaware of being infected with HIV and are diagnosed concurrently as having AIDS at a late stage in the disease. More frequent HIV testing among black MSM may lead to earlier diagnosis and, for those infected, earlier linkage to care and initiation of ART, which can reduce infectivity. Those testing positive may also reduce their transmission behaviors, whereas those testing negative can be informed about how to reduce their infection risk. These combined effects of increasing the frequency of HIV testing may reduce the spread of HIV among black MSM.[24,25,29]

Limitations

This study was subject to several limitations. Those categorized as having an undiagnosed HIV infection may have been misclassified if they did not report a previous HIV-positive test result. However, being HIV negative was not an eligibility criterion, and those who knew that they were HIV positive and reported being negative were not at an advantage for entering the study. The study was cross sectional, and the risk factors analyzed may have occurred after infection with HIV, although those with an undiagnosed infection were unaware of being infected when they were interviewed and their risks may have been similar to those when they were infected. The power to detect statistical significance for small effects may have been limited by the relatively small sample sizes of black MSM overall and of those black MSM who tested positive. Variables derived from a participant's last sexual partnership may be conservative measures of HIV risk if participants with lower-risk last sex partners also had higher-risk sex partners in the past 12 months. Although a diverse selection of MSM venue types was included in the sampling universe, MSM who did not attend these venue types would not have been represented in the study. The sample was not a probability sample or weighted by venue attendance probabilities.[30] Caution is therefore necessary in making inferences to the general MSM population in NYC or to other MSM populations.

CONCLUSIONS

Black MSM have been found to engage in less or similar sexual and drug use behaviors compared with other MSM. In this current study, black MSM were at greater risk for HIV infection not because of their risk behaviors but because of mediating factors, including social factors that increased their risk of exposure to HIV and their lower frequency of HIV testing. The social factors included an increased risk of having sexual partners and networks with potentially high HIV prevalence, living in neighborhoods with a high frequency of new HIV diagnoses, and economic impoverishment, which may have reduced their access to HIV prevention. Their lower frequency of HIV testing may have increased their transmission risk and led to higher community viral loads that increased their risk of exposure to HIV. However, these factors did not entirely explain the disparity in HIV infection, and ongoing research is therefore needed. To reduce the disparity in HIV infection of black MSM, multilevel interventions are needed that, in addition to promoting consistent condom use, ameliorate social risk factors and increase the frequency of HIV testing.

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TABLE 1.

Sample Characteristics of Non–Self-Reported HIV-Positive MSM in NYC, 2011

Variable	Total, n (Column %)
Total	416 (100)
Recruitment venue	
Bar	269 (64.7)
Park	61 (14.7)
Other*	86 (20.7)
Borough of residence	
Manhattan	149 (35.8)
Queens	76 (18.3)
Brooklyn	102 (24.5)
Bronx	87 (20.9)
Staten Island	2 (0.5)
Race/ethnicity	
Black	81 (19.5)
Hispanic	171 (41.1)
White	127 (30.5)
Other	37 (8.9)
Age, y	
18–29	228 (54.8)
≥30	188 (45.2)
Sexual identity	
Gay	324 (78.1)
Bisexual/Heterosexual	91 (21.9)
Told others attracted to and/or has sex with men	
Yes	380 (91.6)
No	35 (8.4)
Education	
<High school graduate	35 (8.4)
≥High school graduate	381 (91.6)
Employed (currently)	
Yes	282 (67.8)
No	134 (32.2)
Income (past 12 mo), US$	
<20,000	159 (38.2)
≥20,000	257 (61.8)
Ever homeless (past 12 mo)	
Yes	62 (14.9)
No	354 (85.1)
Incarcerated >24 h (past 12 mo)	
Yes	35 (8.4)

Variable	Total, n (Column %)
No	381 (91.6)

* Street locations, gay pride or similar events, dance clubs, and cafes and restaurants.

TABLE 2.

Variables* Associated ($P < 0.10$) With HIV Infection Among Non–Self-Reported HIV-Positive MSM in NYC, 2011

Variable	Total, n (Column %)	HIV Positive, n (Row %)	OR (95% CI)	*P*
Total	416 (100)	36 (8.7)	—	—
Recruitment venue				
Bar	269 (64.7)	14 (5.2)	1.0	
Park	61 (14.7)	15 (24.6)	5.9 (2.7–13.1)	<0.0001
Other	86 (20.7)	7 (8.1)	1.6 (0.6–4.1)	0.32
Borough of residence				
Manhattan	149 (35.8)	3 (2.0)	0.08 (0.02–0.29)	<0.0001
Queens	76 (18.3)	8 (10.5)	0.48 (0.2–1.2)	0.10
Brooklyn	102 (24.5)	20 (19.6)	1.0	
Bronx	87 (20.9)	5 (5.8)	0.25 (0.09–0.70)	0.008
Staten Island	2 (0.5)	0 (0.0)	†	†
Race/ethnicity				
Black	81 (19.5)	20 (24.7)	1.0	
Hispanic	171 (41.1)	13 (7.6)	0.3 (0.1–0.5)	0.0004
White	127 (30.5)	1 (0.8)	0.02 (0.003–0.2)	0.0003
Other	37 (8.9)	2 (5.4)	0.2 (0.04–0.8)	0.02
Age, y				
18–29	228 (54.8)	12 (5.3)	1.0	
≥30	188 (45.2)	24 (12.8)	2.6 (1.3–5.4)	0.009
Education				
<High school graduate	35 (8.4)	8 (22.9)	3.7 (1.6–9.0)	0.003
≥High school graduate	381 (91.6)	28 (7.3)	1.0	
Employed (currently)				
Yes	282 (67.8)	18 (6.4)	1.0	
No	134 (32.2)	18 (13.4)	2.3 (1.1–4.5)	0.02
Income (past 12 mo), US$				
<20,000	159 (38.2)	25 (15.7)	4.2 (2.0–8.8)	0.0002
≥20,000	257 (61.8)	11 (4.3)	1.0	

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Variable	Total, n (Column %)	HIV Positive, n (Row %)	OR (95% CI)	*P*
Incarcerated >24 h (past 12 mo)				
Yes	35 (8.4)	6 (17.1)	2.4 (0.9–6.3)	<0.07
No	381 (91.6)	30 (7.9)	1.0	
HIV test (past 12 mo)				
Yes	316 (76.0)	18 (5.7)	1.0	
No	100 (24.0)	18 (18.0)	3.6 (1.8–7.3)	0.0003
Black last sex partner				
Yes	93 (22.4)	20 (21.5)	5.2 (2.6–10.6)	<0.0001
No	322 (77.6)	16 (5.0)	1.0	

[*] Other variables that were analyzed but were not significantly ($P \geq 0.10$) associated with HIV infection included the following: sexual identity; told others attracted to and/or has sex with men; ever homeless in the past 12 months; has medical insurance; visited health care provider in the past 12 months; receiving free condoms in the past 12 months; receiving HIV counseling in the past 12 months (1:1 counseling, group counseling); alcohol and drug use in the past 12 months (binge drinking, any noninjection stimulant drug use, other noninjection drug use excluding marijuana, and marijuana use only); sexual risk behaviors in the past 12 months (sex with a female, >3 male sex partners, unprotected anal intercourse with a male, receiving drugs or money in exchange for sex, concurrent sexual partnerships, meeting sex partners on the Internet or smart phone app); last sex partner characteristics (same race/ethnicity as participant, age relative to the participant's age, HIV positive); ever injected drugs; and any STD in the past 12 months.

[†] Odds ratio and *P* value not applicable because of zero cell frequency.

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TABLE 3.

Variables* Associated ($P < 0.10$) With Black Race Among Non–Self-Reported HIV-Positive MSM in NYC, 2011

Variable	Total, n (Column %)	Black Race, n (Row %)	OR (95% CI)	*P*
Total	416 (100)	81 (19.5)	—	—
Recruitment venue				
Bar	269 (64.7)	35 (13.0)	1.0	
Park	61 (14.7)	27 (44.3)	5.9 (3.3–10.7)	<0.0001
Other	86 (20.7)	19 (22.1)	2.3 (1.3–4.1)	0.005
Borough of residence				
Manhattan	149 (35.8)	28 (18.8)	0.6 (0.4–1.1)	0.11
Queens	76 (18.3)	8 (10.5)	0.3 (0.1–0.7)	0.007
Brooklyn	102 (24.5)	28 (27.5)	1.0	
Bronx	87 (20.9)	17 (19.5)	0.6 (0.3–1.3)	0.20
Staten Island	2 (0.5)	0 (0.0)	†	†
Sexual identity				
Gay	324 (78.1)	56 (17.3)	0.5 (0.3–0.9)	0.02
Bisexual/Heterosexual	91 (21.9)	25 (27.5)	1.0	
Education				
<High school graduate	35 (8.4)	15 (42.9)	3.0 (1.5–5.9)	0.002
≥High school graduate	381 (91.6)	66 (17.3)	1.0	
Employed (currently)				
Yes	282 (67.8)	41 (14.5)	1.0	
No	134 (32.2)	40 (29.9)	2.1 (1.3–3.4)	0.001
Income (past 12 mo), US$				
<20,000	159 (38.2)	44 (27.7)	2.5 (1.6–4.0)	0.0001
≥20,000	257 (61.8)	37 (14.4)	1.0	
Ever homeless (past 12 mo)				
Yes	62 (14.9)	23 (37.1)	3.0 (1.7–5.4)	<0.001
No	354 (85.1)	58 (16.4)	1.0	
Incarcerated >24 h (past 12 mo)				
Yes	35 (8.4)	12 (34.3)	2.2 (1.1–4.6)	0.03

Variable	Total, n (Column %)	Black Race, n (Row %)	OR (95% CI)	*P*
No	381 (91.6)	69 (18.1)	1.0	
HIV test (past 12 mo)				
Yes	316 (76.0)	55 (17.4)	1.0	
No	100 (24.0)	26 (26.0)	1.7 (1.0–2.8)	<0.07
Sex with a female (past 12 mo)				
Yes	31 (7.5)	12 (38.7)	2.8 (1.4–5.8)	0.005
No	385 (92.5)	69 (17.9)	1.0	
Receiving drugs or money in exchange for sex (past 12 mo)				
Yes	39 (9.4)	17 (43.6)	3.3 (1.7–6.4)	0.0004
No	377 (90.6)	64 (17.0)	1.0	
Black last sex partner				
Yes	93 (22.4)	38 (40.9)	4.6 (2.8–7.5)	<0.001
No	322 (77.6)	43 (13.4)	1.0	
HIV infection				
Positive	36 (8.7)	20 (55.6)	6.5 (3.2–13.3)	<0.0001
Negative	380 (91.3)	61 (16.1)	1.0	

[*] Other variables that were analyzed but were not significantly ($P \geq 0.10$) associated with black race included the following: age; told others attracted to and/or has sex with men; has medical insurance; visited health care provider in the past 12 months; receiving free condoms in the past 12 months; receiving HIV counseling in the past 12 months (1:1 counseling, group counseling); alcohol and drug use in the past 12 months (binge drinking, any noninjection stimulant drug use, other noninjection drug use excluding marijuana, and marijuana use only); sexual risk behaviors in the past 12 months (>3 male sex partners, unprotected anal intercourse with a male, concurrent sexual partnerships, meeting sex partners on the Internet or smart phone app); last sex partner characteristics (same race/ethnicity as participant, age relative to the participant's age, HIV positive); ever injected drugs; and any STD in the past 12 months.

[†] Odds ratio and *P* value not applicable because of zero cell frequency.

TABLE 4.

Black Race and Other Variables * Retained in the Multivariate Model for HIV Infection Among Non–Self-Reported HIV-Positive MSM in NYC, 2011

Variable	aOR (95% CI)	*P*
Black race	3.3 (1.5–7.5)	0.004
Black last sex partner	3.3 (1.4–7.5)	0.005
Not tested for HIV in past 12 mo	3.2 (1.4–7.1)	0.005
Brooklyn resident vs. resident of other boroughs	2.7 (1.2–5.9)	0.01
Income <US$20,000/y	2.3 (1.005–5.2)	0.049

* Other variables that were tested in the multivariate analysis but were not retained because they were not significant ($P \geq 0.05$) in the final step included being recruited in a park compared with a bar, not having graduated from high school, being unemployed, and incarcerated more than 24 hours in the past 12 months.

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