

Do Sexual Networks of Men Who Have Sex with Men in New York City Differ by Race/Ethnicity?

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Abstract

The United States HIV epidemic disproportionately affects black and Hispanic men who have sex with men (MSM). This disparity might be partially explained by differences in social and sexual network structure and composition. A total of 1267 MSM in New York City completed an ACASI survey and egocentric social and sexual network inventory about their sex partners in the past 3 months, and underwent HIV testing. Social and sexual network structure and composition were compared by race/ethnicity of the egos: black, non-Hispanic ($N=365$ egos), white, non-Hispanic ($N=466$), and Hispanic ($N=436$). 21.1% were HIV-positive by HIV testing; 17.2% reported serodiscordant and serostatus unknown unprotected anal/vaginal intercourse (SDUI) in the last 3 months. Black MSM were more likely than white and Hispanic MSM to report exclusively having partners of same race/ethnicity. Black and Hispanic MSM had more HIV-positive and unknown status partners than white MSM. White men were more likely to report overlap of social and sex partners than black and Hispanic men. No significant differences by race/ethnicity were found for network size, density, having concurrent partners, or having partners with ≥ 10 years age difference. Specific network composition characteristics may explain racial/ethnic disparities in HIV infection rates among MSM, including HIV status of sex partners in networks and lack of social support within sexual networks. Network structural characteristics such as size and density do not appear to have such an impact. These data add to our understanding of the complexity of social factors affecting black MSM and Hispanic MSM in the U.S.

Introduction

MEN WHO HAVE SEX WITH MEN (MSM) are severely affected by HIV in the United States, accounting for 63% of new infections.¹ Black MSM comprised 40% of new HIV infections despite making up a small proportion of the population.² In New York City (NYC), MSM accounted for 57% of all new HIV diagnoses in 2013.³ In a 2011 survey among MSM in NYC, HIV prevalence among black MSM was 42%, exceeding the prevalence among white (11%) and Hispanic MSM (15%).⁴

The racial/ethnic disparity in HIV infection rates among MSM has not been explained by differences in individual risk behaviors. A meta-analysis showed that black MSM were less likely to have many sexual partners and to report sub-

stance use compared with white MSM.⁵ No significant differences were detected in the frequency of unprotected anal intercourse, commercial sex work, and sex with an HIV-infected partner between black and white MSM. Reasons for high HIV infection rates among black MSM despite having lower or similar risk behaviors compared with whites include higher rates of sexually transmitted infections (STIs) and unrecognized HIV infection. Black MSM also have low level of knowledge about and uptake of HIV pre- and post-exposure prophylaxis (PrEP and PEP) for HIV prevention.

A growing body of research has shown that the sexual networks of black MSM may contribute to their increased HIV risk compared with non-black MSM. Sexual networks may play an integral role in HIV acquisition and transmission risk, as a person's risk of HIV infection is subject to not only

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an individual's risk behaviors but also to the risk behaviors and HIV status of other partners in his sexual network.⁶ Characteristics of network structure, such as network density (extent to which sexual network members have sex with one another),⁷ concurrency (sex with a partner that takes place between two sex acts with another partner),⁸ and overlap of social and sexual networks, have been shown to increase HIV transmission risk among heterosexual men and MSM.^{9–12} Network composition may also be important, with black MSM being more likely to choose partners of the same race/ethnicity and older partners, populations that have higher HIV prevalence.^{13,14}

To further develop our knowledge of sexual networks of MSM in NYC and how they differ by race/ethnicity, we compared network structural and compositional characteristics by race/ethnicity of MSM in NYC using data from the NYC M2M study.

Materials and Methods

The NYC M2M study was a cross-sectional study conducted between 2010–2013 to evaluate urban environment characteristics that influence sexual risk behaviors, substance use, and depression among MSM living in NYC. The methods have been described previously.^{15,16} In brief, MSM were recruited using two methods: (1) in-person recruitment utilizing a modified venue-based, time-space sampling methodology, and (2) internet- and mobile application-based recruitment. Men were eligible if they were biological male at birth, ≥ 18 years old, resided in NYC, and engaged in anal sex with a man in the last 3 months. The study was approved by the four institutional review boards of the co-investigators.

After written informed consent, participants completed an audio computer-assisted self-interview (ACASI) questionnaire and social and sexual network questionnaire (SSNQ) with an interviewer. Participants then received HIV risk reduction counseling and were offered a rapid HIV antibody test (OraSure). Reactive HIV tests were confirmed by Western Blot. Participants who tested HIV-positive were referred for treatment and services.

ACASI questionnaire

The ACASI questionnaire collected sociodemographic variables, including age, race/ethnicity, and self-identification as Latino/Hispanic. For this analysis, race/ethnicity was categorized as (1) black, non-Hispanic, (2) Hispanic, (3) white, non-Hispanic, and (4) other. Men classified as other (Asian, American Indian or Alaskan Native, Native Hawaiian or other Pacific Islander, or other) were excluded from subsequent analyses due to heterogeneity in this group.

Self-reported HIV serostatus and history of STIs (syphilis, genital or rectal gonorrhea, genital or rectal chlamydia, new genital or rectal herpes infection in the last 12 months) were collected. On-site HIV test results were designated as negative, positive, or refuse to test/unknown. HIV test results were compared with self-reported HIV serostatus: men who tested HIV-positive and self-reported being HIV-positive were classified as having previously diagnosed HIV infection, while those who tested HIV-positive and self-reported being HIV-negative or unknown status were categorized as having newly diagnosed HIV.

Questions about use of alcohol and injection and non-injection drugs in the last 3 months were included. Heavy alcohol use was defined as having a score of ≥ 4 (range 0–12) on the three-item Alcohol Use Disorders Identification Test-Consumption (AUDIT-C).¹⁷

Social and sexual network questionnaire

Participants were first asked, using a name generator, to name up to 10 people with whom they had a social relationship using four domains (intimate interaction, health support, material assistance, and social interaction) and up to 15 partners with whom they had anal or vaginal sex in the last 3 months. The participants were asked whether anyone in their social network was also a sexual partner.

They were also asked to approximate how many additional sex partners they had if they reported having more than 15 in the last 3 months. The following were asked about each named sex partner: (1) age, gender, and race/ethnicity, (2) perceived HIV status and HIV status disclosure, (3) sex partner type, (4) anal (insertive and receptive) or vaginal sex and condom use with the partner in the last 3 months, and (5) alcohol and drug use with sex and condom use with the partner in the last 3 months. Sex partner type was categorized as: (1) primary or main, (2) steady, non-primary, (3) casual, (4) exchange or trade, or (5) anonymous.

HIV seroconcordance/discordance was defined as having a partner with perceived HIV status that was the same/different as the self-reported HIV status of the participant. Serodiscordant/serostatus unknown unprotected anal or vaginal intercourse (SDUI) was defined as having unprotected intercourse (anal and/or vaginal) with a partner in the last 3 months with HIV serodiscordance or serostatus unknown, and was dichotomized as any or no SDUI.

Social and sexual network structure

Sexual network size was determined by summing the total number of people in the sexual networks in the last 3 months, social partners who were also sex partners, enumerated sex partners, and number of additional sex partners beyond the named 15 partners. Social network size was calculated by adding the total number of people in the social networks based on the four domains and number of additional social network members beyond the named 10 people.

Sexual network density describes the extent to which sexual network members, excluding the participant, are linked (i.e., have sex with one another).⁷ Density could range from 0% (no partner linked sexually to any other member of the participant's sexual network) to 100% (all partners linked sexually to one another). Overlap between social and sexual networks was based on whether the participants specified any members of the social networks who were also sex partners.

Sexual network composition

Sex partners' race/ethnicity was classified as: (1) black, non-Hispanic, (2) Hispanic, (3) white, non-Hispanic, and (4) other, and was then compared with the race/ethnicity of the participants. A participant was categorized as having partners of exclusively same or exclusively different race/ethnicity or partners of same and different race/ethnicity compared with the participant.

TABLE 1. COMPARISON OF SOCIODEMOGRAPHICS, HIV SEROSTATUS, AND RISK BEHAVIOR CHARACTERISTICS BY RACE/ETHNICITY, PARTICIPANT LEVEL DATA (N=1267)

Characteristic, n (%)	Total (N=1267)	Black, non-Hispanic (N=365)	Hispanic (N=436)	White, non-Hispanic (N=466)	p Value
Sociodemographics					
Age (years)					<0.01
18–24	324 (25.6)	101 (27.7)	137 (31.4)	86 (18.5)	
25–29	339 (26.8)	95 (26.0)	119 (27.3)	125 (26.9)	
30–40	319 (25.2)	85 (23.3)	99 (22.7)	135 (29.0)	
≥41	284 (22.4)	84 (23.0)	81 (18.6)	119 (25.6)	
Education					<0.01
Less than high school graduate	74 (5.8)	35 (9.6)	37 (8.5)	2 (0.4)	
High school graduate	138 (10.9)	60 (16.4)	58 (13.3)	20 (4.3)	
Some college	433 (34.2)	152 (41.6)	187 (42.9)	94 (20.2)	
College graduate or more	622 (49.1)	118 (32.3)	154 (35.3)	350 (75.1)	
Annual household income					<0.01
<\$10,000	243 (20.2)	103 (29.7)	92 (22.5)	48 (10.7)	
\$10,000–\$39,999	459 (38.1)	140 (40.4)	179 (43.8)	140 (31.2)	
\$40,000–\$59,999	313 (26.0)	77 (22.2)	91 (22.3)	145 (32.3)	
≥\$60,000	190 (15.8)	27 (7.8)	47 (11.5)	116 (25.8)	
Sexual identity					<0.01
Exclusively homosexual/gay	1112 (87.8)	294 (80.6)	380 (87.2)	438 (94.0)	
Exclusively bisexual	126 (9.9)	55 (15.1)	47 (10.8)	24 (5.2)	
Straight/other	29 (2.3)	16 (4.4)	9 (2.1)	4 (0.9)	
HIV and STI history					
HIV serostatus by self-report (N=1,214) ^a					<0.01
Positive	294 (24.2)	115 (33.3)	121 (28.9)	58 (12.9)	
Negative	920 (75.8)	230 (66.7)	298 (71.1)	392 (87.1)	
HIV serostatus by HIV testing (N=941) ^b					<0.01
Positive, previously infected	179 (19.0)	61 (25.0)	77 (24.2)	41 (10.8)	
Positive, newly diagnosed	20 (2.1)	11 (4.5)	7 (2.2)	2 (0.5)	
Negative	742 (78.9)	172 (70.5)	233 (73.5)	337 (88.7)	
Sexually transmitted infections in last 12 months	103 (8.1)	28 (7.7)	44 (10.1)	31 (6.7)	0.16
Risk behaviors					
Heavy alcohol use in last 3 months ^c	406 (35.6)	84 (26.3)	141 (36.5)	181 (41.7)	<0.01
Any drug use in last 3 months					
Marijuana	671 (53.0)	193 (53.0)	237 (54.4)	241 (51.8)	0.73
Amyl nitrates/poppers	446 (35.3)	85 (23.4)	153 (35.2)	2089 (44.6)	<0.01
Powdered cocaine	251 (19.8)	55 (15.1)	89 (20.4)	107 (23.0)	0.02
Crack cocaine	35 (2.8)	13 (3.0)	13 (3.0)	9 (1.9)	0.34
Methamphetamines/amphetamines	71 (5.6)	11 (3.0)	27 (6.2)	33 (7.1)	0.03
Club drugs (Special K, GHB, etc.)	142 (11.2)	22 (6.0)	44 (10.1)	76 (16.3)	<0.01
Viagra or similar drugs	156 (12.3)	34 (9.2)	40 (9.2)	82 (17.6)	<0.01
Other prescription drugs	162 (12.8)	19 (5.2)	50 (11.5)	93 (20.0)	<0.01
Unprotected receptive anal intercourse (URAI) with a male partner in last 3 months	567 (78.8)	155 (83.3)	213 (81.3)	199 (73.2)	0.02
Unprotected insertive anal intercourse (UIAI) with a male partner in last 3 months	582 (81.6)	181 (87.9)	210 (83.0)	191 (75.2)	<0.01

(continued)

TABLE 1. (CONTINUED)

Characteristic, n (%)	Total (N = 1267)	Black, non-Hispanic (N = 365)	Hispanic (N = 436)	White, non-Hispanic (N = 466)	p Value
Unprotected anal/vaginal intercourse (UAVI) with alcohol or drugs with a partner in last 3 months	413 (32.6)	96 (26.3)	136 (31.2)	181 (38.8)	<0.01
Serodiscordant/serostatus unknown unprotected anal/vaginal intercourse (SDUI) with a partner in last 3 months ^d	218 (17.2)	66 (18.1)	74 (17.0)	78 (16.7)	0.87

^aMen who refused to answer the question, had unknown HIV status, or had never tested for HIV were excluded.

^bHIV status by HIV testing among those men who agreed to HIV testing. Men who refused HIV testing or who had indeterminate or missing results were excluded.

^cHeavy alcohol use in the past 3 months was defined as having a score of ≥ 4 on the three-item Alcohol Use Disorders Identification Test-Consumption (AUDIT-C).

^dSDUI was defined as having unprotected intercourse (anal and/or vaginal) with a male, female, or transgender sex partner in the last 3 months with HIV serodiscordance or serostatus unknown.

Absolute numerical age difference between the participants and sex partners was computed. Participants were then classified as having no partner with ≥ 10 years age difference vs. having a partner with ≥ 10 years age difference. Number of female sex partners was calculated using partner-level data.

Individual concurrency was defined as the participant answering 1 or more to the question: "How many other people did you have anal or vaginal sex with while you were sexually involved with [name] in the past 3 months?" Perceived partner concurrency was defined as the participant answering yes to the question for each partner: "Did you believe [name] had other sexual partners while you were sexually involved with [name] in the past 3 months?" Other partner-level variables included gender, sex partner type, perceived HIV status, and HIV status disclosure by participant to partner.

Statistical methods

Differences in sociodemographics, HIV serostatus, risk behaviors, and network characteristics were compared by the following racial/ethnic groups: black, non-Hispanic; Hispanic; and white, non-Hispanic. Chi-square or Fisher's exact tests were used to compare proportions, while *t*-test was used to compare sexual network density. Partner-level data using data from all sex partners named by the men were similarly compared by race/ethnicity of the participants using Chi-square or Fisher's exact test. A *p*-value < 0.05 was considered statistically significant. Bivariable logistic regression models were computed to identify sociodemographic, risk behavior, and sexual network characteristics that were associated with self-reported HIV-positive status, compared with self-reported HIV-negative status. The multivariable models included characteristics that were significant with *p*-value ≤ 0.10 in the bivariable models. Final multivariable models were generated using a backward elimination process, with retention of variables at *p* < 0.05 . All analyses were conducted in SAS version 9.3 (SAS Institute Inc., Cary, NC, USA).

Results

A total of 1503 men enrolled into the study. After excluding men who did not complete the SSNQ, did not report

any sex partners in the last 3 months, or were classified as other for race/ethnicity, 1267 men were included in this analysis. Of 1267 men, 365 were black, non-Hispanic (28.8%); 436 Hispanic (34.4%); and 466 white, non-Hispanic (37.7%). Of 1214 men reporting their HIV status, 24.2% were HIV-positive. Of 941 men who agreed to HIV testing and had test results available, 19.0% were previously HIV-positive and 2.1% were considered newly diagnosed with HIV.

Blacks and Hispanics were less likely to identify as exclusively homosexual/gay and more likely to identify as exclusively bisexual and straight/other compared with white men (Table 1). Black and Hispanic men were more likely to report unprotected receptive and insertive anal intercourse with a male partner compared with white men. White men were more likely to report unprotected anal/vaginal intercourse with alcohol or drugs with a partner compared with black and Hispanic men.

Social and sexual network structural characteristics

Using participant-level data, no significant difference in sexual network size was found by race/ethnicity (Table 2). Black and Hispanic men had smaller social network size compared with white men. Whites were more likely to report having an overlap of social and sexual networks compared with black and Hispanic men. No significant differences by race/ethnicity were noted in sexual network density.

Sexual network compositional characteristics

Black men were more likely to report exclusively having a partner of the same race/ethnicity compared with Hispanic and white men. No significant differences by race/ethnicity were noted in having a sex partner with ≥ 10 years age difference or individual concurrency (Table 2). Using data at the partner-level (Table 3), both black and Hispanic men were more likely to have HIV-positive and unknown status sex partners compared with white men. HIV serostatus disclosure was higher among black men compared with Hispanic and white men. Black and Hispanic men were more likely to have a partner with HIV serodiscordance than white men. There was no significant difference in perceived partner concurrency by race/ethnicity.

TABLE 2. COMPARISON OF SEXUAL NETWORK CHARACTERISTICS BY RACE/ETHNICITY, PARTICIPANT LEVEL DATA (N=1267)

Characteristic, n (%)	Total (N=1267)	Black, non-Hispanic (N=365)	Hispanic (N=436)	White, non-Hispanic (n=466)	p Value
Sexual network size (last 3 months)					0.31
1 partner	365 (28.8)	111 (30.4)	136 (31.2)	118 (25.3)	
2	266 (21.0)	79 (21.6)	88 (20.2)	99 (21.2)	
3	252 (19.9)	74 (20.3)	88 (20.2)	90 (19.3)	
≥4	384 (30.3)	101 (27.7)	124 (28.4)	159 (34.1)	
Social network size					<0.01
0–4 partners	437 (34.5)	156 (42.7)	186 (42.7)	95 (20.4)	
5–6	339 (26.8)	96 (26.3)	112 (25.7)	131 (28.2)	
7–8	215 (17.0)	39 (10.7)	77 (17.7)	99 (21.3)	
9–10	275 (21.7)	74 (20.3)	61 (14.0)	140 (30.1)	
Sexual partner with same race/ethnicity					<0.01
Exclusively same race/ethnicity	303 (23.9)	115 (31.5)	65 (14.9)	123 (26.4)	
Exclusively different race/ethnicity	467 (36.9)	139 (38.1)	198 (45.4)	130 (27.9)	
Both same and different race/ethnicity	497 (39.2)	111 (30.4)	173 (39.7)	213 (45.7)	
Sexual partner in last 3 months with ≥10 years age difference					0.55
Yes	60 (4.7)	15 (4.1)	19 (4.4)	26 (5.6)	
No	1207 (95.3)	350 (95.9)	417 (95.6)	440 (94.4)	
Any overlap of social and sexual networks					0.01
Yes	476 (37.6)	155 (35.6)	122 (33.4)	199 (42.8)	
No	790 (62.4)	281 (65.5)	243 (66.6)	266 (33.7)	
Individual concurrency in last 3 months ^a					0.83
Yes	769 (60.9)	222 (61.2)	260 (59.8)	287 (61.7)	
No	494 (39.1)	141 (38.8)	175 (40.2)	178 (38.3)	
Sexual network density %, mean (SD) (N=902)	48.4 (17.9)	49.5 (18.5)	48.7 (17.7)	47.4 (17.5)	0.33

^aIndividual concurrency was defined as the participant answering 1 or more to the following question: “How many other people did you have anal or vaginal sex with while you were sexually involved with [name] in the past 3 months?”

Association with self-reported HIV status

Older age (vs. age 18–24 years), being black, non-Hispanic and Hispanic (vs. white, non-Hispanic), and any drug use were significantly associated with self-reported HIV-positive status based on multivariable logistic regression models (Table 4). Being a college graduate or more (vs. less than high school graduate), heavy alcohol use, and having only non-black sex partners (vs. only black partners) were associated with decreased odds of self-reported HIV-positive status.

Discussion

In this large sample of racially and ethnically diverse MSM living in NYC, we found significant differences between black, Hispanic, and white MSM in regard to network structure and composition. With regards to network structural characteristics, social networks of black and Hispanic men were smaller and were less likely to overlap with their sexual networks. Social networks have been shown to influence HIV risk by dissemination of HIV prevention messages, enforcement of peer norms of HIV risk reduction practices (e.g., condom use norms, HIV pre- and post-exposure prophylaxis use, and antiretroviral therapy as ‘treatment as prevention’ for HIV-infected men), and provision of social support within drug use and MSM sex networks.^{12,18,19}

A study among black MSM examining the role of family in social networks showed that having a greater proportion of

family members in their social networks was associated with decreased sexual risk behaviors.¹⁸ In overlapping sexual and social networks in which the closeness of sex partners is strengthened through social support and friendship, peer norms in HIV risk reduction behaviors, such as consistent condom use and regular HIV testing,¹⁹ are generally stronger than in networks in which there is no overlap of social and sexual network members.

We did not detect any difference in sexual network size by race/ethnicity, consistent with other reports of black MSM having similar or fewer sex partners compared with MSM of other races and ethnicities.^{5,14} Our study did not find any difference in sexual network density by race/ethnicity; however, this might reflect a limitation of our study’s ego-centric network design, in which the men might have inaccurate knowledge about actual sexual relationships between their sex partners.

With regards to sexual network composition, race/ethnicity and HIV status of sexual partners were significantly different by the race/ethnicity of the participants. Almost a third of black men reported exclusively having a sex partner of the same race/ethnicity in the last 3 months, significantly higher than Hispanic and white men. These findings are consistent with multiple studies that showed higher levels of same-race partnerships among black MSM compared with MSM of other races and ethnicities.^{14,20,21} An individual’s HIV exposure risk is heightened if one’s sex partners are primarily

TABLE 3. COMPARISON OF SEXUAL NETWORK CHARACTERISTICS BY RACE/ETHNICITY, PARTNER LEVEL DATA (N=4170)

Characteristic, n (%)	Total (N=4170)	Black, non-Hispanic (N=1147)	Hispanic (N=1377)	White, non-Hispanic (N=1646)	p Value
Gender of sexual partner in last 3 months					0.02
Male	4117 (98.9)	1126 (98.2)	1362 (99.1)	1629 (99.2)	
Female	34 (0.8)	13 (1.1)	12 (0.9)	9 (0.6)	
Transgender (male to female, female to male)	13 (0.3)	8 (0.7)	1 (0.1)	4 (0.2)	
Sex partner type in last 3 months					<0.01
Primary or main partner	523 (12.6)	147 (12.8)	190 (13.8)	186 (11.3)	
Steady, non-primary partner	763 (18.3)	232 (20.2)	280 (20.3)	251 (15.3)	
Casual partner	1891 (45.4)	472 (41.2)	602 (43.7)	817 (49.8)	
Exchange partner	87 (2.1)	34 (3.0)	35 (2.5)	18 (1.1)	
Anonymous partner	901 (21.6)	262 (22.8)	270 (19.6)	369 (22.5)	
HIV status of partner in last 3 months					<0.01
Positive	572 (13.8)	172 (15.0)	207 (15.0)	193 (11.8)	
Negative	2600 (62.6)	640 (55.9)	830 (60.3)	1130 (69.2)	
Unknown	982 (23.6)	333 (29.1)	339 (24.6)	310 (19.0)	
Among all study participants:					<0.01
HIV status disclosure by participant to partner in last 3 months					
Yes	2978 (71.5)	750 (65.4)	995 (33.4)	1233 (41.4)	
No	1084 (26.0)	375 (32.7)	360 (33.2)	349 (32.2)	
I don't know/refuse	104 (2.5)	22 (1.9)	22 (21.2)	60 (57.7)	
Among HIV-positive by self-report (N=294)					0.04
HIV status disclosure by participant to partner in last 3 months					
Yes	661 (65.4)	204 (62.6)	274 (41.5)	183 (27.7)	
No	339 (33.5)	121 (35.7)	149 (44.0)	69 (20.4)	
I don't know/refuse	11 (1.1)	1 (9.1)	3 (27.3)	7 (63.6)	
Among HIV-negative by self-report (N=920)					<0.01
HIV status disclosure by participant to partner in last 3 months					
Yes	2236 (74.6)	518 (23.2)	694 (31.0)	1024 (45.8)	
No	675 (22.5)	207 (30.7)	200 (29.6)	268 (39.7)	
I don't know/refuse	87 (2.9)	20 (23.0)	18 (20.7)	49 (56.3)	
HIV seroconcordance/serodiscordance of partner in last 3 months					<0.01
Same as participant	2630 (64.7)	633 (57.0)	829 (61.4)	1168 (72.9)	
Different from participant	452 (11.1)	144 (13.0)	183 (13.6)	125 (7.8)	
Unknown	982 (24.2)	333 (30.0)	339 (25.1)	310 (19.3)	
Perceived partner concurrency in last 3 months ^a					0.42
Yes	2536 (60.8)	682 (59.5)	854 (62.0)	1000 (60.8)	
No	1634 (39.2)	465 (40.5)	523 (38.0)	646 (39.3)	

^aPerceived partner concurrency was defined as the participant answering yes to the following question for each partner: "Did you believe [name] had other sexual partners while you were sexually involved with [name] in the past 3 months?"

drawn from a partner pool with a high background HIV prevalence.²² We found that, compared with having only black sex partners, having only non-black partners was associated with decreased odds of having self-reported HIV status. Black MSM in one study were found to have more black sex partners compared with Latino/Hispanic and white partners in the last 12 months.²³ In another study, black MSM were nearly 11 times more likely to have black sex partners compared with MSM of other races/ethnicities, with 45% of sexual encounters among black MSM to be with black partners.²⁴

Black and Hispanic men in our study were more likely to report that their sex partners had a different HIV serostatus from their own, as well as more likely to report unknown

status of sex partners compared with white MSM. Interestingly, HIV status disclosure by the men to their partners was higher among black MSM compared with Hispanic and white MSM. These data suggest that HIV serostatus discussion and disclosure, particularly disclosure of HIV serostatus by sex partners to the men, are less likely to occur among black MSM compared with white MSM.

This finding is consistent with several studies, including a study which showed that black MSM were less likely to be able to discuss their HIV status with their sex partners.²⁵ This underscores the need for development of culturally sensitive programs to encourage discussion and disclosure of HIV serostatus to sex partners and reduce HIV stigma among black and

TABLE 4. BIVARIABLE AND MULTIVARIABLE LOGISTIC REGRESSION MODELS TO EXAMINE FACTORS ASSOCIATED WITH SELF-REPORTED HIV-POSITIVE STATUS (VS. SELF-REPORTED HIV-NEGATIVE STATUS) AMONG MSM IN THE LAST 3 MONTHS, NYC M2M STUDY (N=1267)

Characteristic, n (%)	OR ^a Bivariable	AOR ^b Multivariable
Age (years)		
18–24	Ref	Ref
25–29	1.72 (1.10, 2.68)	2.68 (1.61, 4.47)
30–40	2.53 (1.64, 3.90)	3.78 (2.28, 6.29)
≥41	5.30 (3.47, 8.08)	7.64 (4.54, 12.87)
Education		
Less than high school graduate	Ref	Ref
High school graduate	0.48 (0.26, 0.87)	0.65 (0.31, 1.60)
Some college	0.43 (0.26, 0.72)	0.55 (0.29, 1.06)
College graduate or more	0.20 (0.12, 0.33)	0.27 (0.14, 0.53)
Race/ethnicity		
Black, non-Hispanic	3.38 (2.37, 4.82)	2.53 (1.59, 4.02)
Hispanic	2.74 (1.94, 3.88)	2.74 (1.77, 4.25)
White, non-Hispanic	Ref	Ref
Sexual identity		
Exclusively homosexual/gay	1.04 (0.41, 2.64)	–
Exclusively bisexual	0.76 (0.27, 2.11)	–
Straight/other	Ref	–
Married/registered domestic partner with a man	1.85 (1.05, 3.25)	–
Heavy alcohol use in last 3 months	0.46 (0.33, 0.64)	0.56 (0.39, 0.81)
Any drug use in last 3 months	1.32 (0.98, 1.77)	2.14 (1.44, 3.18)
Sexual network size last 3 months		
1 partner	Ref	–
2	0.96 (0.65, 1.42)	–
3	1.08 (0.74, 1.58)	–
≥4	1.11 (0.79, 1.56)	–
Social network size		
0–4 partners	Ref	–
5–6	0.82 (0.56, 1.14)	–
7–8	0.68 (0.46, 1.01)	–
9–10	0.51 (0.35, 0.75)	–
Sexual partner with same race/ethnicity		
Black only	Ref	Ref
Non-black only	0.34 (0.24, 0.48)	0.51 (0.32, 0.80)
Black and non-black	0.60 (0.41, 0.89)	0.85 (0.52, 1.37)
Sexual partner in last 3 months with ≥10 years age difference	0.83 (0.43, 1.59)	–
Any overlap of social and sexual networks	0.76 (0.58, 1.00)	–
Individual concurrency in last 3 months	1.07 (0.82, 1.41)	–
Sexual network density (10% increase) (N=869)	1.00 (0.99, 1.01)	–

^aOR, odds ratio; ^bAOR, adjusted odds ratio.

Hispanic MSM. For example, in one study, culturally-tailored media intervention was shown to increase HIV knowledge and reduce HIV stigma among black adolescents.²⁶

Our study did not show any significant difference by race/ethnicity in having sex partners with at least 10 years age difference. Additional analysis examining having sex partners with at least 5 years age difference found similar results (data not shown). Past studies have examined the role of age difference in sex partnerships in potentiating HIV transmission, with bridging of younger and older networks with different background HIV prevalence. Some, although not all,^{27–29} studies have shown that black MSM are more likely to have older sex partners, in particular those with more than 5 or 10 years age difference.^{13,14,20,21,30} In a study among MSM between 16–40 years, older age of sex partner was

associated with unprotected sex among black MSM, but not among MSM of other races and ethnicities. Additionally, the study showed that young black MSM in particular were most likely to report having unprotected sex with older partners.²⁴

Concurrency, in addition to number of sex partners, has the potential to increase the rate and efficiency in which HIV and other STIs propagate within and across sexual networks.³¹ Our study, as previously published,¹⁶ did not find any significant difference in individual or perceived partner concurrency prevalence by race/ethnicity. This is similar to a study that did not find any difference by race/ethnicity in the prevalence of partner concurrency and concurrent unprotected anal sex.³² Another National HIV Behavioral Surveillance study showed no difference in concurrency prevalence between black and white MSM.²⁸ Our finding

contrasts with a study in which black MSM were noted to have fewer sex partners but were more likely to report concurrency compared with non-blacks.⁹

This study has several limitations. Study findings may not be generalizable to all MSM living in NYC and other U.S. urban areas. The systematic sampling scheme should minimize selection bias, though bias may still exist among those who decided to not participate. Information on sex partners collected via interviewers may be subject to reporting bias. Because this study employs an egocentric network design in which the participants were asked information about their partners and their partners were not directly interviewed, the men might have inaccurate knowledge of details about their sexual network members.

Conclusions

This analysis among MSM in NYC provides insights into key differences in sexual network characteristics by race/ethnicity. Specific network structural and composition characteristics may explain racial disparities in HIV among MSM, including high prevalence of HIV-positive and unknown status sex partners in networks and limited social network overlap with sexual networks. Other network structural characteristics such as sexual network size, partner concurrency, and sexual network density do not appear to have such an impact. Future studies should explore other network structural factors, such as partnership gaps and lengths³³ and network stability over time to determine whether and how networks change after HIV seroconversion and whether these changes differ by race/ethnicity.

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