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Characteristics of Black men who have sex with men in Baltimore, Philadelphia, and Washington, D.C.: Geographic diversity in socio-demographics and HIV transmission risk

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Abstract

Background—Baltimore, Philadelphia, and Washington, DC are geographically proximate cities with high HIV prevalence, including among black men who have sex with men (BMSM). Using data collected among BMSM in CDC's National HIV Behavioral Surveillance project, we compared socio-demographic characteristics, HIV risk behaviors and service utilization to explore similarities and differences that could inform local and regional HIV intervention approaches.

Methods—BMSM were recruited through venue time location sampling, June–December, 2011. Participants completed identical socio-behavioral surveys and voluntary HIV testing. Analyses were conducted among the full sample and those aged 18–24.

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Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study.

Preliminary findings from this study were presented at the National HIV Prevention Conference in Atlanta on December 8, 2015.

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Findings—Participants included 159 (DC), 364 (Baltimore), and 331 (Philadelphia) eligible BMSM. HIV prevalence was 23.1% (DC), 48.0% (Baltimore), 14.6% (Philadelphia) with 30.6%, 69.0%, 33.3% unrecognized HIV infection, respectively. Among BMSM 18–24, HIV prevalence was 11.1% (DC), 38.9% (Baltimore), 9.6% (Philadelphia) with unrecognized HIV infection 0.0%, 73.8%, 60.0% respectively. Compared to the other two cities, Baltimore participants were less likely to identify as gay/homosexual; more likely to report unemployment, incarceration, homelessness, sex exchange; and least likely to use the internet for partners. DC participants were more likely to have a college degree and employment. Philadelphia participants were more likely to report gay/homosexual identity, receptive condomless anal sex, having only main partners, and bars/clubs as partner meeting places. Sexually transmitted disease testing was universally low.

Conclusion—Analyses showed especially high HIV prevalence among BMSM in Baltimore including among young BMSM. Socio-demographic characteristics and HIV infection correlates differed across cities but unrecognized HIV infection and unknown partner status were universally high.

Keywords

HIV/AIDS; MSM; Regional differences; Social determinants

Introduction

Recent CDC estimates suggest that half of black men who have sex with men (BMSM) will acquire HIV in their lifetime. [1] Nationwide, nearly 30% of all BMSM are living with HIV compared to 16% among white MSM and a large proportion are not aware of their status[2,3]. Many BMSM face a combination of socio-economic and psychosocial factors known to contribute to HIV transmission and care disparities[4,5]. At the same time, population differences at multiple levels as well as local context influence lifetime risk of HIV exposure and transmission risk among BMSM.[5,6,1] There is a lack of understanding of the complex interplay between prevailing and local factors in the HIV epidemic among BMSM and a dearth of comprehensive HIV interventions for BMSM[7]. These gaps undermine municipal ability to effectively address regional and local HIV transmission.

Washington, DC, Baltimore, and Philadelphia are three mid-Atlantic cities with high HIV prevalence located along the Interstate 95 corridor. The three cities have similar poverty rates with approximately 20% of residents living at or below the federal poverty line and a similarly high proportion of residents who are African-American (55%, 64%, and 43% in Washington, DC, Baltimore, and Philadelphia, respectively) [8]. Newly diagnosed HIV cases in each city are disproportionately concentrated among African-Americans [9–11]. At the time of this study, the ratio of proportion new HIV cases among African-Americans to proportion African-American of the total population in each city was 80:55 in Washington, DC, 84:64 in Baltimore, and 66:43 in Philadelphia [8,12–14]. Approximately one-third of new HIV cases in each city were among MSM and one-third were among those under 29 years of age.

Each city participates in the CDC-funded National HIV Behavioral Surveillance (NHBS) System, designed to monitor prevalence and trends in HIV infection and risk behaviors among populations at high risk for HIV, including MSM, in jurisdictions with high HIV

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prevalence. This analysis was motivated by a shared concern among researchers, community leaders, constituents, and health department officials in these three cities about HIV acquisition among BMSM and young BMSM in particular. The analysis aims to maximize the use of existing data resources to inform local and regional HIV planning in the three cities using NHBS data by: 1) comparing characteristics of BMSM, including socio-demographics, sexual and substance use behaviors, service utilization, HIV infection and unrecognized HIV infection; and 2) examining demographic and behavioral correlates of HIV infection for all MSM and those 18–24 years old.

Methods

Data collection

Data were from the 2011 NHBS MSM cycle, described in detail elsewhere.[2,15–17] Sites followed a standardized national protocol for venue-based time location sampling. Formative research identified locations and day/time periods where at least 50% of attendees were likely to be adult MSM and informed locally specific operational considerations such as recruitment and marketing. Potential venue day/time periods were randomly selected for recruitment on a monthly basis.

Recruitment took place in 4-hour time blocks during which recruiters sequentially approached potential participants and invited them to participate. Potential participants completed an eligibility screener and informed consent. Eligible MSM were over 18 years, lived in the participating area, born male and currently identified as male, and had not previously participated in the current NHBS round. Trained interviewers administered an anonymous 45-minute interviewer-administered socio-behavioral survey and optional HIV test. Survey procedures were available in English and Spanish, but no participants in any site used the Spanish-language option. Whole blood or oral fluid specimens were collected for either conventional laboratory HIV testing (Baltimore) or rapid testing using OraQuick Advance Rapid HIV-1/2 Antibody Test (OraSure, Bethlehem, PA; done in Washington, DC and Philadelphia) followed by laboratory confirmation by Western Blot testing. Participants received $25 remuneration for the survey and between $10–25 for the HIV test, depending on the city of sampling. All participants screening newly HIV reactive via rapid testing were immediately referred to care.

All procedures were reviewed and approved by the Institutional Review Boards at the Departments of Health and relevant academic partners (Baltimore, DC) in each city.

Measures

The outcome measure was a Western Blot-confirmed HIV test result. All other variables were derived from the NHBS core survey for 2011 NHBS MSM cycle. Unrecognized HIV infection was defined as having a positive laboratory HIV test result and no self-reported prior diagnosis of HIV. We assessed a variety of socio-demographic and behavioral characteristics hypothesized to be associated with HIV infection in order to compare BMSM across the three cities. Socio-demographic characteristics included race/ethnicity, age, sexual identity, educational attainment, employment status, insurance status and type, incarceration

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history, and incarceration and homelessness during the past year. Sexual behaviors reported for the 12 months prior to interview included number of partners, partner status (main, i.e., "committed to above anyone else," or casual), exchange sex, characteristics of last partnership (meeting location, HIV status knowledge), condomless anal sex in the past year and during last sex, and testing and diagnosis of specific sexually transmitted diseases. Substance use behaviors reported over the past year included ever and recent injection drug use, any non-injection drug use, use of specific non-injection drugs, and frequency of binge drinking defined as having 5 or more drinks in one sitting.

Analyses

The analytic sample was limited to participants who identified as black or African-American and non-Hispanic with complete, valid survey responses and reported at least one male sex partner in the past year. A total of 44 participants (Baltimore: 25; Philadelphia: 9; DC: 10) who reported ever having sex with a man but not having a male partner in the past year were excluded from this analysis. Participants who were screened and eligible but did not complete the full survey (Baltimore: n=3; Philadelphia: n=0; DC: n=0) were also excluded. No substantive differences were observed between these participants and those who did complete the full survey. Descriptive analyses were conducted with the full analytic sample and with those aged 18–24 to examine possible differences and inform targeted interventions for young BMSM. Analyses of HIV status excluded those without a valid positive or negative HIV test result (Baltimore: n=41; Philadelphia: n=25; DC: n=11). Socio-demographic and behavioral variables calculated for BMSM in each city were compared across cities using Pearson's chi-square test and in bivariate models on the outcome of HIV status. Variables associated with HIV status at $p<0.05$ and with sufficient cell size for any site were retained for inclusion in the multivariable logistic regression model, run separately for each city. SAS software version 9.3 (Cary, NC) was used for all analyses.

Findings

The total sample of eligible BMSM with a male sex partner in the past year who completed valid surveys was n=159 in Washington, DC, n=364 in Baltimore, and n=331 in Philadelphia. Of these, 23%, 36%, and 18% were aged 18–24 years old in each city, respectively. Washington DC had the largest number of locations where BMSM were successfully recruited (DC n=36; B n=27; P n=28). Approximately two-thirds of all BMSM across cities were recruited from bars and clubs (DC: 57%; B: 70%; P: 64%); proportion recruited from sex, park, and street environments ranged from 14% in Baltimore to 27% in Philadelphia ($p<0.001$, $\chi^2=35.9$).

Table 1 describes socio-demographic characteristics of the study sample in each city for all BMSM and those aged 18–24. Baltimore BMSM were significantly younger and less likely to identify as gay or homosexual compared to BMSM in both other cities. BMSM in Baltimore were also more likely to have less than college education and report unemployment, incarceration, and homelessness, and these differences were not attributable to age (data not shown). BMSM in Washington, DC were more likely to have at least a college degree, employment, and health insurance. BMSM in Philadelphia were more likely

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to report gay/homosexual identity and comparable insurance status to Baltimore MSM. Characteristics of young BMSM were similar to older BMSM in each city, except that young BMSM in Baltimore and Washington, DC were most likely to report public health insurance compared to young BMSM in Philadelphia.

Table 1 also describes sexual behaviors, substance use, and service utilization of BMSM in each city. Compared to the other two cities, a significantly greater proportion of BMSM in Baltimore reported any sexual exchange partners and least likely to meet partners online; and a greater proportion of Philadelphia BMSM reported only main partners, meeting partners in bars or clubs, and receptive condomless anal sex. Almost half of BMSM in all three cities (DC: 44%; B: 46%; P: 40%) reported not knowing their last partner's HIV status and at least 1 in 10 reported condomless anal sex with a partner of unknown HIV status at last sex. Condom use during last anal sex was common across cities, however, reported by approximately 70% of all respondents.

The proportion of sexually transmitted disease testing was similarly low across cities, and a greater proportion of BMSM in Washington, DC reported recent syphilis diagnosis compared to both other citied. Only receptive condomless anal sex differed significantly among young BMSM, with lowest proportion in Baltimore and highest proportion in Philadelphia.

Substance use was common across cities, but differed by type. Baltimore had the highest proportion BMSM reporting ever injecting drugs and any non-injection drug use. Among those reporting non-injection drug use, compared to other cities, a higher proportion of Baltimore BMSM reported crack cocaine and ecstasy use, while poppers and amphetamines were more commonly used in DC, and marijuana was more common in Philadelphia. Only amphetamine and alcohol use differed significantly among young BMSM, with highest proportion reporting any use in DC and lowest proportion reporting weekly binge drinking in Philadelphia. Use of prevention services differed across cities, with a higher proportion reporting access to free condoms in DC, a slightly higher proportion reported using free condoms in Baltimore, and fewer reporting individual-level interventions in Philadelphia.

Among participating MSM, 7% in DC, 11% in Baltimore, and 8% in Philadelphia did not complete HIV testing as part of survey procedures. We found no significant demographic differences between those who tested and those who did not in DC and Philadelphia, but Baltimore participants who did not test for HIV through NHBS were significantly younger with higher education and employment (data not shown). Among participants who completed HIV testing, HIV prevalence was 23% in Washington, DC, 48% in Baltimore, and 15% in Philadelphia; of those who tested HIV-positive, 31%, 69%, and 33% had unrecognized HIV infection in each city, respectively. Among BMSM 18–24, HIV prevalence was 11% in Washington, DC, 39% in Baltimore, and 10% in Philadelphia, and unrecognized HIV infection among young HIV-positive BMSM was 0%, 74%, and 60% in each city, respectively. Overall, 60% of participants reported an HIV test in the past year. Table 2 shows characteristics associated with HIV in each of the three cities. In DC, HIV-positive BMSM were more likely to be aged 45 or above, have public insurance, and report past incarceration, and less likely to have college education and employment. In Baltimore,

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HIV-positive BMSM were more likely to be aged 25–34 compared to 18–24 and more likely to identify as gay or homosexual, while all other characteristics were similar between HIV-positive and negative BMSM. In Philadelphia, HIV-positive BMSM were more likely to be aged 45 or above, report public insurance.

In adjusted models (Table 3), HIV-positive BMSM in DC were older than 18–24 and almost four times as likely to have public health insurance compared to private insurance (adjusted odds ratio[AOR]: 3.9; 95% confidence interval [C.I.]: 1.0, 15.0). HIV-positive BMSM in Baltimore were older than 18–24 and four times as likely to report gay or homosexual identity compared to those who report bisexual or heterosexual identity (AOR: 4.2; 95% C.I.: 2.4, 7.5). HIV positive BMSM in Philadelphia were older than 18–24, more likely to report public health insurance (AOR: 6.7, 95% C.I. 2.4, 18.4), and more likely to be recruited from venues other than bars/clubs or parks/streets/sex environments.

Discussion

In this study, we found high HIV prevalence among BMSM in Washington, DC, Baltimore, and Philadelphia. These findings suggest that the challenge of historically high HIV prevalence among BMSM in Baltimore[18–22], expanding epidemic among BMSM in Philadelphia[10] and disproportionate HIV burden among BMSM in D.C.[23] continue to present a regional public health crisis for BMSM. At the same time, our research revealed, notable and instructive differences across cities. Almost half of Baltimore BMSM were HIV-positive (48%), twice the prevalence of Washington D.C. (23%) and more than three times that of Philadelphia (15%). This disparity was even more pronounced among young adult BMSM where almost 40% were positive in Baltimore, nearly four times higher than D.C. (11%) and Philadelphia (10%).

Socio-demographic characteristics among BMSM also differed across the three cities. In Baltimore, low educational attainment, unemployment, homelessness, incarceration, sex exchange, and crack cocaine use were starkly higher than in other cities despite similar population-level poverty across cities. BMSM in Baltimore were most likely to identify as non-gay and least likely to seek partners on the Internet. In DC, use of amphetamine type drugs, Internet partner seeking, and recent syphilis diagnoses were higher while in Philadelphia, meeting sex partners in venues and receptive, condomless anal intercourse, were more common. These findings make clear that there are important local, structural differences that may support variations in the impact of the HIV epidemic among BMSM in each city.

At the same time, our study revealed behavioral commonalities across cities such as high prevalence of unrecognized HIV infection, relatively low recent HIV and STD testing, low knowledge of partner's HIV status, and inconsistent condom use with a partner of unknown HIV status at last sex. These shared behavioral factors may be amenable to coordinated, regional, socio-behavioral, structural, and health systems interventions with attention to awareness of and partner communication about HIV status among Black MSM [7,24] as well as shared social marketing or social network approaches[24]. There were important structural similarities across the three cities as well. In Baltimore where socioeconomic disadvantage

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and social instability were highest, HIV prevalence was also highest. In DC, HIV prevalence was significantly higher among those with lower education, unemployment, and incarceration history and in both DC and Philadelphia, those with public insurance were substantially more likely to be HIV-positive. These findings support previous research that shows a connection between high poverty, low education and elevated HIV prevalence among BMSM[6] and make clear .the importance of employing a social determinants perspective in HIV planning for BMSM, as others have noted.[4,25]

There are several important limitations to this work. The socio-behavioral data shared here is self-reported and may be subject to social desirability. This bias is not likely to have operated differentially across sites, however, and may be less likely overall as NHBS staff receive extensive training to build participant rapport and enhance validity of self-reported data. It is also possible that our findings related to HIV status were affected by the proportion of BMSM who declined to test with NHBS; and particularly may have underestimated the relationships of age and socio-economic status on HIV status in Baltimore. Because NHBS is a serial cross-sectional study, we cannot infer the temporal ordering of exposures and outcomes (e.g., gaining insurance may result from HIV diagnosis). In addition, because this research is venue based, we cannot assume generalizability beyond those who attend MSM-identified venues or even agree to participate. Analyses were not adjusted for potential venue clustering or sampling probability, which may have underestimated standard errors, or for venue characteristics that may shape sample characteristics in each city. Statistical power may be limited for some comparisons with small cell sizes (such as for sexual orientation) and Baltimore's high HIV prevalence, warranting future research to better understand the resonance of these factors in each city, particularly among young BMSM.

We were not able to examine partnership characteristics or the extent of population mixing or HIV transmission across the three cities although we suspect this may be an important factor in our regional epidemic. We know, anecdotally, that it is not unusual for residents to travel to any of the other cities for socialization, house balls, social and health services, and sex partners, especially with Internet assistance. Future analysis of social network and HIV phylogenetic data may provide insight into geographic transmission patterns which could improve the effectiveness of HIV planning.

Efforts to address gaps in the care and treatment cascade among BMSM are ongoing in each of the three cities and hold promise for addressing many of the findings highlighted here. These cities are looking to expand HIV testing, facilitate immediate linkage to care such as DC's "Red Carpet Entry" program that provides expedited HIV care strategies, and increase capacity for and utilization of PrEP for MSM of color. Cities are also pursuing several initiatives designed to address contextual factors in their own epidemics. In Baltimore, the Baltimore City Health Department has initiated an award winning collaboration with the House/Ball community, has adopted a "no wrong door" approach to service integration that encourages close relationships with providers and a new anti-stigma campaign called Baltimore in Conversation. In Philadelphia, the Philadelphia health department is focusing on condom promotion and on providing MSM of color with behavioral and social services such as job training, and health insurance navigation. In DC, the health department is

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building on an existing multidisciplinary coalition that is providing comprehensive care for MSM of color at risk to include expanded HIV and STD partner services and retention and treatment adherence interventions.

Our research underscores the importance of community-level factors in HIV transmission and prevention. Public health infrastructure, funding capacity and priorities, community activism, access to quality healthcare, condom access, community disease prevalence, and venue context and composition can all influence HIV transmission efficiency. Social determinants including racism, housing, residential segregation, stigma, policing, harm reduction, economic opportunities, sex education, and LGBT inclusive policies are also critical foundations for sustained and effective HIV prevention among MSM of color. Others have observed the importance of geographic and spatial contributors to HIV risk among MSM[5,26] and how interactions between race, poverty, and stigma influence HIV risk at a neighborhood level[5]. This analysis reveals the necessity of understanding the interplay of regional socio-economic and psychosocial factors with local socio-demographics and behavioral norms when identifying intervention targets across these three mid-Atlantic cities.

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Table 1

Socio-demographic characteristics, sexual behavior, substance use, and service utilization of Black men who have had sex with men in the past 12 months from Washington, DC, Baltimore, Maryland, and Philadelphia, Pennsylvania, NHBS 2011.

Variable	Washington, DC		Baltimore		Philadelphia		x^2 test statistic, *p*-value	
	18–24 years N=36 (%)	Total N=159 (%)	18–24 years N=130 (%)	Total N=364 (%)	18–24 years N=61 (%)	Total N=331 (%)	18–24 years	Total
HIV-positive (NHBS testing)	4 (11.1)	36/156 (23.1)	42/108 (38.9)	155/323 (48.0)	5/52 (9.6)	45/308 (14.6)	17.02, <.001	75.28, <.001
If positive, newly identified?	0 (0.0)	11/36 (30.6)	31/42 (73.8)	107/155 (69.0)	3/5 (60.0)	15/45 (33.3)	19.22, <.001	92.64, <.001
Race/ethnicity					n=57	n=326	0.09, 0.954	0.52, 0.771
Black, non-Hispanic	35 (97.2)	150 (69.4)	125 (96.2)	343 (94.2)	55 (96.5)	309 (94.8)		
Multi-race (non-Hispanic)	1 (2.8)	11 (30.6)	5 (3.9)	21 (5.8)	2 (3.5)	17 (5.2)		
Age 18–24	36 (100.0)	36 (22.6)	130 (100.0)	130 (35.7)	61 (100.0)	61 (18.4)	0.91, 0.636	44.95, <.001
25–34	-	57 (35.9)	-	99 (27.2)	-	149 (45.0)		
35–44	-	38 (23.9)	-	58 (15.9)	-	73 (22.1)		
45+	-	28 (17.6)	-	77 (21.2)	-	48 (14.5)		
Sexual Identity		n=158				n=328	1.73, 0.785	37.70, <.001
Gay/Homosexual	29 (80.6)	125 (79.1)	100 (77.5)	229 (63.1)	51 (83.6)	271 (82.6)		
Bisexual	7 (19.4)	32 (20.3)	26 (20.2)	125 (34.4)	9 (14.8)	52 (15.9)		
Heterosexual	0 (0.0)	1 (0.6)	3 (2.3)	9 (2.5)	1 (1.6)	5 (1.5)		
Highest level of education							8.17, 0.085	123.18, <.001
≤High School/GED	17 (47.2)	40 (25.1)	87 (66.9)	223 (61.3)	35 (57.4)	162 (48.9)		
Some college	13 (36.1)	44 (27.7)	37 (28.5)	114 (31.3)	20 (32.8)	110 (33.2)		
≥Bachelor's degree	6 (16.7)	75 (47.2)	6 (4.6)	27 (7.4)	6 (9.8)	59 (17.8)		

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Variable	Washington, DC		Baltimore		Philadelphia		x^2 test statistic, *p*-value	
	18–24 years N=36 (%)	Total N=159 (%)	18–24 years N=130 (%)	Total N=364 (%)	18–24 years N=61 (%)	Total N=331 (%)	18–24 years	Total
Current employment							5.83, 0.054	41.29, <.001
Employed (FT, PT, student, retired)	31 (86.1)	131 (82.4)	85 (65.4)	211 (58.0)	41 (67.2)	243 (73.4)		
Unemployed (unable/disabled, unemployed, other)	5 (13.9)	28 (17.6)	45 (34.6)	152 (41.8)	20 (32.8)	88 (26.6)		
Currently have insurance	28 (77.8)	138 (86.8)	95 (73.1)	263 (72.3)	38 (62.3)	236 (71.3)	3.31, 0.191	15.43, <.001
Type of Insurance			n=127	n=361			12.46, 0.014	60.54, <.001
Private	12 (33.3)	87 (54.7)	35 (27.6)	91 (25.2)	26 (42.6)	145 (43.8)		
Public	16 (44.4)	51 (32.1)	57 (44.9)	169 (46.8)	12 (19.7)	91 (27.5)		
Uninsured	8 (22.2)	21 (13.2)	35 (27.6)	101 (28.0)	23 (37.7)	95 (28.7)		
Ever been incarcerated	8 (22.2)	27 (17.0)	47 (36.2)	180 (49.5)	13 (21.3)	80 (24.2)	5.58, 0.062	73.86, <.001
Incarcerated in past 12 months	3 (8.3)	7 (4.4)	22 (16.9)	54 (14.8)	5 (8.2)	21 (6.3)	3.65, 0.162	20.48, <.001
Been homeless in past 12 months	5 (13.9)	14 (8.8)	19 (14.6)	64 (17.6)	6 (9.8)	40 (12.1)	0.84, 0.656	8.52, 0.014
Sexual behaviors								
Number male partners (oral/anal sex) past year, median (IQR)	3 (2–6)	4 (2–7)	3 (2–5)	3 (1–4)	2 (1–3)	2 (1–4)		
Type of male partners in past 12 months		n=158					16.31, 0.003	36.80, <.001
Only main partner(s)	6 (16.7)	32 (20.3)	32 (24.6)	101 (27.8)	26 (42.6)	140 (42.3)		
Only casual partner(s)	10 (27.8)	49 (31.0)	30 (23.1)	131 (36.0)	20 (32.8)	103 (31.1)		
Both main and casual partner(s)	20 (55.6)	77 (48.7)	68 (52.3)	132 (36.3)	15 (24.6)	88 (26.6)		
Any male exchange partner(s)	5 (13.9)	19 (11.9)	20 (15.4)	105 (28.9)	7 (11.5)	40/330 (12.1)	0.53, 0.769	38.02, <.001
Where first met most recent male partner (if in past 3 years)	n=34	n=137	n=118	n=303	n=58	n=261	4.41, 0.621	54.56, <.001

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Variable	Washington, DC		Baltimore		Philadelphia		x^2 test statistic, *p*-value	
	18–24 years N=36 (%)	Total N=159 (%)	18–24 years N=130 (%)	Total N=364 (%)	18–24 years N=61 (%)	Total N=331 (%)	18–24 years	Total
Internet (internet/chat)	10 (29.4)	36 (26.3)	28 (23.7)	46 (15.2)	20 (34.5)	80 (30.7)		
Bar/club/party/private sex party	10 (29.4)	37 (27.0)	37 (31.4)	109 (36.0)	18 (31.0)	112 (42.9)		
Cruising area/bath house/sex club/	1 (2.9)	8 (5.8)	5 (4.2)	25 (8.3)	4 (6.9)	21 (8.1)		
Somewhere else	13 (38.2)	56 (40.9)	48 (40.7)	123 (40.6)	16 (27.6)	48 (18.4)		
Knew last male partner's status	20 (55.6)	89 (56.0)	79 (60.8)	196 (53.9)	32 (52.5)	197/330 (59.7)	1.26, 0.534	2.28, 0.319
Condomless anal sex (CAS) with a man In past 12 months	22 (61.1)	90 (56.6)	67 (51.5)	186/363 (51.2)	27 (44.3)	179 (54.1)	2.57, 0.109	0.28, 0.600
CAS with a man at last sex	12 (33.3)	48 (30.2)	30 (23.1)	103 (28.3)	23 (37.7)	120/330 (36.3)	4.81, 0.090	5.28, 0.071
CAS with a man who was serodiscordant/ unknown status	5 (13.9)	21 (13.2)	16 (12.3)	64 (17.6)	10 (16.4)	61/330 (18.5)	0.59, 0.745	2.17, 0.338
Condomless receptive anal sex at last sex	8 (22.2)	22/158 (13.9)	11 (8.5)	44 (12.1)	15 (25.0)	78/329 (23.7)	10.24, 0.006	17.56, 0.002
Condomless insertive anal sex at last sex	5 (13.9)	30 (18.9)	22 (16.9)	77 (21.2)	12 (19.7)	80/330 (24.2)	0.55, 0.761	1.97, 0.374
HIV/STI service use								
Participated in ILI in past 12 months	8 (22.2)	30 (18.9)	30 (23.3)	83 (22.9)	12 (19.7)	45 (13.6)	0.28, 0.869	9.76, 0.007
Participated in GLI in past 12 months	8 (22.2)	19 (12.0)	17 (13.1)	46 (12.6)	6 (9.8)	29 (8.8)	3.03, 0.220	2.836, 0.242
Received free condoms in past 12 months	23 (63.9)	108 (67.9)	80 (62.0)	193 (53.6)	30 (49.2)	139 (42.1)	3.11, 0.211	29.48, <.001
Used free condoms	16 (44.4)	81 (50.9)	72 (55.8)	169 (46.9)	25 (41.0)	104 (31.4)	5.919, 0.052	11.05, 0.004
HIV test ever	34 (94.4)	155 (97.5)	123 (94.6)	331 (90.9)	44 (72.1)	281 (84.9)	22.16, <.001	19.48, <.001
HIV test last 12 months	28 (77.8)	106 (66.7)	96 (73.9)	218 (59.9)	37 (60.7)	199 (60.1)	4.47, 0.107	2.43, 0.297
Tested for any STDs in the past 12 months	16 (44.4)	63 (39.6)	59 (43.1)	124 (34.1)	27 (44.3)	116 (35.1)	0.03, 0.987	1.54, 0.464
Gonorrhea	16 (44.4)	54/158 (34.2)	56 (43.1)	107 (29.4)	23 (37.7)	100 (30.2)	0.61, 0.737	6.92, 0.031

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Variable	Washington, DC		Baltimore		Philadelphia		x^2 test statistic, *p*-value	
	18–24 years N=36 (%)	Total N=159 (%)	18–24 years N=130 (%)	Total N=364 (%)	18–24 years N=61 (%)	Total N=331 (%)	18–24 years	Total
Chlamydia	15 (41.7)	54/158 (34.2)	56 (43.1)	107 (29.4)	23 (37.7)	99 (29.9)	0.50, 0.781	1.27, 0.529
Syphilis	15 (41.7)	56/158 (35.4)	53 (40.8)	108 (29.7)	22 (36.1)	98 (29.6)	3.58, 0.167	2.04, 0.361
Told by doctor/health care provider have STD in past year	6 (16.7)	26 (16.4)	24 (17.5)	49 (13.5)	6 (9.8)	21 (6.3)	2.34, 0.311	13.92, 0.001
Gonorrhea	4 (11.1)	9 (5.7)	13 (9.5)	22 (6.0)	3 (4.9)	12 (3.6)	1.62, 0.446	2.28, 0.320
Chlamydia	2 (5.6)	9 (5.7)	8 (5.8)	20 (5.5)	4 (6.6)	12 (3.6)	3.49, 0.174	1.64, 0.440
Syphilis	2 (5.6)	13 (8.2)	6 (4.4)	16 (4.4)	0 (0.0)	2 (0.6)	3.12, 0.210	18.67, <.001
Drug and alcohol use								
Ever inject drugs	1 (2.8)	9 (5.7)	0 (0.0)	32/362 (8.8)	0 (0.0)	7 (2.1)	5.33, 0.070	14.57, 0.001
Injected drugs in past 12 months	1 (2.8)	4/158 (2.5)	-	9/362 (2.5)	-	1 (0.3)	-	6.02, 0.049
Used non-injection drugs in past 12 months	20 (55.6)	68 (42.8)	67 (51.5)	190 (52.2)	23 (37.7)	130/330 (39.4)	4.04, 0.132	12.24, 0.002
Marijuana	19 (52.8)	55 (34.6)	67 (51.5)	168 (46.2)	23 (37.7)	126 (38.2)	5.96, 0.051	7.88, 0.020
Crack	0 (0.0)	2 (1.3)	3 (2.3)	52 (14.3)	0 (0.0)	11 (3.3)	2.27, 0.322	40.84, <.001
Cocaine (powdered)	5 (13.9)	21 (13.2)	7 (5.4)	42 (11.5)	2 (3.3)	42 (12.7)	4.73, 0.094	0.37, 0.834
Meth/amphetamines, GHB, Special K, Hallucinogens	3 (8.3)	10 (6.3)	0 (0.0)	9 (2.5)	0 (0.0)	5 (1.5)	16.13, <.001	9.25, 0.010
Smoked/snorted Heroin, painkillers, downers	3 (8.3)	10 (6.3)	10 (7.7)	39 (10.7)	6 (9.8)	25 (7.6)	0.27, 0.873	3.58, 0.167
Poppers	3 (8.3)	22 (13.8)	4 (3.1)	15 (4.1)	0 (0.0)	1 (0.3)	5.26, 0.072	46.44, <.001
Ecstasy	5 (13.9)	13 (8.2)	25 (19.2)	47 (12.9)	5 (8.2)	18 (5.5)	3.95, 0.139	11.88, 0.003
Binge drinking (5 or more drinks in one sitting) in past year			n=129	n=359			21.05, 0.002	16.99, 0.009

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Variable	Washington, DC		Baltimore		Philadelphia		x^2 test statistic, p-value	
	18–24 years N=36 (%)	Total N=159 (%)	18–24 years N=130 (%)	Total N=364 (%)	18–24 years N=61 (%)	Total N=331 (%)	18–24 years	Total
Never drinks	1 (2.8)	22 (13.8)	33 (25.6)	91 (25.4)	22 (36.1)	90 (27.3)		
Drinks, but never binges	8 (22.2)	38 (23.9)	21 (16.3)	63 (17.6)	11 (18.0)	69 (20.9)		
Infrequent binge drinker (Less than once per week)	12 (33.3)	53 (33.3)	45 (34.9)	96 (26.7)	22 (36.1)	97 (29.4)		
Heavy binge drinker (1 or more times per week)	15 (41.7)	46 (28.9)	30 (23.3)	109 (30.4)	6 (9.8)	74 (22.4)		
Venue where recruited							6.71, 0.152	35.85, <.001
Bar/Club	24 (66.7)	91 (57.2)	101 (77.7)	254 (69.8)	38 (62.3)	212 (64.0)		
Sex Environment/Street location/Park	8 (22.2)	28 (17.6)	16 (12.3)	50 (13.7)	16 (26.2)	88 (26.6)		
Other	4 (11.1)	40 (25.2)	13 (10.0)	60 (16.5)	7 (11.5)	31 (9.4)		

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Table 2

Demographic Characteristics and Sexual and Substance Use Behaviors by HIV status among Black Men Who Have Sex with Men from CDC National Behavioral Surveillance Cycle 3 from Washington, DC, Baltimore, Maryland, and Philadelphia, Pennsylvania, 2011.

Variable	Washington, DC			Baltimore			Philadelphia		
	HIV-negative N=112 (%)	HIV-positive N=36 (%)	O.R. (95% C.I.)	HIV-negative N=168 (%)	HIV-positive N=155 (%)	O.R. (95% C.I.)	HIV-negative N=261 (%)	HIV-positive N=45 (%)	O.R. (95% C.I.)
Race/ethnicity							N=256		
Black, non-Hispanic	104 (92.9)	35 (97.2)	2.69 (0.33–22.28)	159 (94.6)	145 (93.6)	0.82 (0.32–2.08)	243 (94.9)	44 (97.8)	2.35 (0.30–18.45)
Multi-race (non-Hispanic)	8 (7.1)	1 (2.8)	REF	9 (5.4)	10 (6.5)	REF	13 (5.1)	1 (2.2)	REF
Age									
18–24	31 (27.7)	4 (11.1)	**0.23 (0.06–0.86)**	66 (39.3)	42 (27.1)	0.62 (0.34–1.13)	47 (18.0)	5 (11.1)	**0.23 (0.07–0.70)**
25–34	41 (36.6)	13 (36.1)	0.56 (0.20–1.58)	42 (25.0)	50 (32.3)	1.16 (0.63–2.14)	124 (47.5)	15 (33.3)	**0.26(0.11–0.60)**
35–44	24 (21.4)	10 (27.8)	0.74 (0.25–2.23)	24 (14.3)	26 (16.8)	1.05 (0.51–2.17)	60 (22.9)	11 (24.4)	**0.39(0.16–0.97)**
45+	16 (14.3)	9 (25.0)	REF	36 (21.4)	37 (23.9)	REF	30 (11.5)	14 (31.1)	REF
Sexual Identity	n=111						n=259	n=44	
Gay/Homosexual	89 (80.2)	25 (69.4)	0.56 (0.24–1.31)	83 (49.7)	116 (74.8)	**3.01 (1.88–4.83)**	215 (83.0)	36 (81.8)	0.92 (0.40–2.12)
Bisexual/Heterosexual	22 (19.8)	11 (30.6)	REF	84 (50.0)	39 (25.2)	REF	44 (17.0)	8 (18.2)	REF
Highest level of education									
≤High School/GED	23 (20.5)	16 (44.4)	REF	112 (66.7)	93 (60.0)	REF	128 (49.0)	26 (57.8)	REF
Some college	26 (23.2)	12 (33.3)	**0.18 (0.07–0.48)**	47 (28.0)	51 (32.9)	1.31 (0.81–2.12)	86 (32.9)	15 (33.3)	0.86 (0.43–1.72)
≥Bachelor's degree	63 (56.3)	8 (22.2)	0.66 (0.26–1.69)	9 (5.4)	11 (7.1)	1.47 (0.59–3.70)	47 (18.0)	4 (8.9)	0.42 (0.14–1.26)
Current employment									

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Variable	Washington, DC			Baltimore			Philadelphia		
	HIV-negative N=112 (%)	HIV-positive N=36 (%)	O.R. (95% C.I.)	HIV-negative N=168 (%)	HIV-positive N=155 (%)	O.R. (95% C.I.)	HIV-negative N=261 (%)	HIV-positive N=45 (%)	O.R. (95% C.I.)
Employed (FT, PT, student, retired)	101 (90.2)	22 (61.1)	**0.17 (0.07–0.43)**	91 (54.2)	87 (56.1)	1.08 (0.70–1.68)	199 (76.3)	24 (53.3)	**0.36 (0.19–0.68)**
Unemployed (unable to work/disabled, unemployed, other)	11 (9.8)	14 (38.9)	REF	77 (45.9)	68 (43.9)	REF	62 (23.7)	21 (46.6)	REF
Currently have insurance	96 (85.7)	31 (86.1)	1.03 (0.35–3.05)	111 (66.1)	119 (76.8)	1.70 (1.04–2.77)	182 (69.7)	32 (71.1)	1.07 (0.53–2.14)
Type of Insurance				n=167	n=154				
Private	73 (65.2)	9 (25.0)	REF	40 (24.0)	32 (20.8)	REF	120 (45.9)	8 (17.8)	REF
Public	23 (20.5)	22 (61.1)	**7.76 (3.14–19.20)**	70 (41.9)	86 (55.8)	1.54 (0.88–2.69)	62 (23.8)	24 (53.3)	**5.80 (2.46–13.7)**
Uninsured	16 (14.3)	5 (13.9)	2.53 (0.75–8.58)	57 (34.1)	36 (23.4)	0.79 (0.42–1.47)	79 (30.3)	13 (28.9)	2.46 (0.98–6.22)
Ever been incarcerated	13 (11.6)	11 (30.6)	**3.35 (1.34–8.37)**	89 (53.0)	80 (51.6)	0.95 (0.61–1.47)	68 (26.1)	9 (20.0)	0.71 (0.33–1.55)
Incarcerated in past 12 mo.	3 (2.7)	4 (11.1)	4.54 (0.97–21.35)	31 (18.5)	21 (13.6)	0.69 (0.38–1.27)	18 (6.9)	1 (2.2)	0.31 (0.04–2.36)
Been homeless in past 12 mo	7 (6.3)	6 (16.7)	3.00 (0.94–9.60)	36 (21.4)	24 (15.5)	0.67 (0.38–1.19)	31 (11.9)	7 (15.6)	1.37 (0.56–3.33)
Sexual behaviors among MSM with male partner in past 12 months									
Number of male sex partners past 12 mo, median (IQR)	3 (2–6)	4 (2–10)	-	3 (2–5)	3 (1–5)	-	2 (1–3)	2 (1–4)	-
Type of male partners in past 12 months	n=111								
Only main partner(s)	25 (22.5)	5 (13.9)	REF	44 (26.2)	45 (29.0)	REF	112 (42.9)	21 (46.7)	REF
Only casual partner(s)	36 (32.4)	11 (30.6)	2.00 (0.67–5.96)	72 (42.9)	48 (31.0)	0.65 (0.38–1.13)	83 (31.8)	14 (31.1)	0.90 (0.43–1.87)
Both main and casual partner(s)	50 (45.0)	20 (55.6)	1.53 (0.47–4.94)	52 (31.0)	62 (40.0)	1.17 (0.67–2.03)	66 (25.3)	10 (22.2)	0.81 (0.36–1.82)
Any male exchange partner(s)	10 (8.9)	7 (19.4)	2.46 (0.86–7.04)	53 (31.6)	47 (30.3)	0.94 (0.59–1.52)	30 (11.5)	6 (13.3)	1.18 (0.46–3.02)
If most recent relationship was less than 3 years, where first met most recent male partner	n=97	n=31		n=149	n=123		n=215	n=26	
Internet (internet/chat)	23 (23.7)	8 (25.8)	REF	21 (14.1)	19 (15.5)	REF	65 (30.2)	9 (34.6)	REF

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Variable	Washington, DC			Baltimore			Philadelphia		
	HIV-negative N=112 (%)	HIV-positive N=36 (%)	O.R. (95% C.I.)	HIV-negative N=168 (%)	HIV-positive N=155 (%)	O.R. (95% C.I.)	HIV-negative N=261 (%)	HIV-positive N=45 (%)	O.R. (95% C.I.)
Bar/club/party/private sex party	26 (26.8)	10 (32.3)	1.11 (0.37–3.27)	47 (31.5)	51 (41.5)	1.20 (0.57–2.50)	97 (45.1)	10 (38.5)	0.75 (0.29–1.93)
Cruising area/bath house/sex club/	4 (4.1)	3 (9.7)	2.16 (0.39–11.80)	16 (10.7)	8 (6.5)	0.55 (0.19–1.58)	16 (7.4)	3 (11.5)	1.35 (0.33–5.58)
Somewhere else	44 (45.4)	10 (32.3)	0.65 (0.23–1.88)	65 (43.6)	45 (36.6)	0.77 (0.37–1.58)	37 (17.2)	4 (15.4)	0.78 (0.23–2.71)
Knew last male partner's status	66 (58.9)	15 (41.7)	0.50 (0.23–1.07)	92 (54.8)	72 (46.5)	0.72 (0.46–1.11)	155 (59.6)	28 (62.2)	1.12 (0.58–2.14)
Condomless anal sex with a man							n=260		
in past 12 months	57 (50.9)	24 (66.7)	1.93 (0.88–4.23)	87 (51.8)	83/154 (53.9)	1.09 (0.70–1.69)	142 (54.4)	27 (60.0)	1.26 (0.66–2.39)
at last sex	29 (25.9)	13 (36.1)	1.62 (0.73–3.60)	52 (31.0)	43 (27.7)	0.86 (0.53–1.38)	95 (36.4)	21 (46.7)	1.52 (0.80–2.88)
who was serodiscordant or had unknown status	10 (8.9)	7 (19.4)	2.46 (0.86–7.04)	140 (83.3)	124 (80.0)	1.25 (0.71–2.20)	50 (19.2)	10 (22.2)	1.20 (0.56–2.59)
receptive anal sex at last sex	13/111 (11.7)	6 (16.7)	1.51 (0.53–4.31)	16 (9.5)	23 (14.8)	1.66 (0.84–3.27)	64/259 (24.7)	10 (22.2)	0.87 (0.41–1.86)
insertive anal sex at last sex	20 (17.9)	7 (19.4)	1.11 (0.43–2.89)	44 (26.2)	30 (19.4)	0.68 (0.40–1.15)	61 (23.5)	16 (35.6)	1.80 (0.92–3.53)
Tested for any STDs in the past 12 months	40 (34.7)	16 (44.4)	1.44 (0.67–3.09)	49 (29.2)	55 (35.5)	1.34 (0.84–2.13)	81 (31.0)	19 (42.2)	1.62 (0.85–3.10)
Been told by doctor or other health care provider have STD in past 12 months	14 (12.5)	10 (27.8)	**2.69 (1.07–6.75)**	25 (14.9)	22 (14.2)	0.95 (0.51–1.76)	14 (5.4)	6 (13.3)	2.71 (0.98–7.48)
Drug and alcohol use									
Used non-injection drugs in past 12 months	47 (42.0)	14 (38.9)	0.88 (0.41–1.90)	89 (53.0)	80 (51.6)	0.95 (0.61–1.47)	105/260 (40.4)	18 (40.0)	0.98 (0.52–1.88)
Used non-injection cocaine, crack, heroin, or methamphetamine in past 12 months	19 (17.0)	9 (25.0)	1.63 (0.66–4.02)	44 (26.2)	39 (25.2)	0.95 (0.58–1.56)	43 (16.5)	8 (17.8)	1.09 (0.48–2.52)
If drank alcohol in past 12 months, binge drinking (5 or more drinks in one sitting) in past 12 months				n=167	n=153		n=260		
Never drinks	13 (11.6)	7 (19.4)	2.08 (0.60–7.17)	46 (27.5)	38 (24.8)	0.93 (0.46–1.84)	73 (28.1)	12 (26.7)	0.70 (0.29–1.68)
Drinks, but never binges	27 (24.1)	7 (19.4)	REF	28 (16.8)	25 (16.3)	REF	51 (19.6)	12 (26.7)	REF
Infrequent binge drinker (Less than once per week)	41 (36.6)	9 (25.0)	0.85 (0.28–2.54)	47 (28.1)	36 (23.5)	0.86 (0.43–1.71)	75 (28.9)	11 (24.4)	0.62 (0.26–1.52)

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Variable	Washington, DC			Baltimore			Philadelphia		
	HIV-negative N=112 (%)	HIV-positive N=36 (%)	O.R. (95% C.I.)	HIV-negative N=168 (%)	HIV-positive N=155 (%)	O.R. (95% C.I.)	HIV-negative N=261 (%)	HIV-positive N=45 (%)	O.R. (95% C.I.)
Heavy binge drinker (1 or more times per week)	31 (27.7)	13 (36.1)	1.62 (0.56–4.64)	46 (27.5)	54 (35.3)	1.32 (0.67–2.56)	61 (23.5)	10 (22.2)	0.70 (0.28–1.74)
Recruitment Venue									
Bar/Club	60 (53.6)	24 (66.7)	2.30 (0.72–7.36)	119 (70.8)	105 (67.7)	0.74 (0.41–1.33)	168 (65.6)	22 (48.9)	**0.23 (0.10–0.57)**
Sex Environment/Street location/Park	29 (25.9)	8 (22.2)	1.59 (0.42–5.93)	24 (14.3)	20 (12.9)	0.69 (0.31–1.54)	71 (27.7)	13 (28.9)	**0.33 (0.12–0.86)**
Other	23 (20.5)	4 (11.1)	REF	25 (14.9)	30 (19.4)	REF	17 (6.6)	10 (22.2)	REF

*Restricted to participants who completed HIV testing and tested HIV-positive or HIV-negative.

For all binary “Yes/No” variables, reference group for regression models are “No”.

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Table 3

Correlates of HIV infection among Black Men Who Have Sex with Men from CDC National Behavioral Surveillance Cycle 3 from Washington, DC, Baltimore, Maryland, and Philadelphia, Pennsylvania, 2011.

Variable	Washington, DC N=147 A.O.R. (95% C.I.)	Baltimore N=320 A.O.R. (95% C.I.)	Philadelphia N=301 A.O.R. (95% C.I.)
Age			
18–24	**0.04 (0.01–0.24)**	**0.45 (0.23–0.92)**	**0.17 (0.05–0.60)**
25–34	0.28 (0.06–1.19)	0.96 (0.49–1.90)	**0.23 (0.08–0.64)**
35–44	0.38 (0.09–1.74)	1.31 (0.60–2.85)	**0.32 (0.11–0.94)**
45+	REF	REF	REF
Sexual Identity			
Gay/Homosexual	0.61 (0.19–1.91)	**4.20 (2.37–7.46)**	0.82 (0.31–2.13)
Bisexual/Heterosexual	REF	REF	REF
Highest level of education			
≤High School/GED	REF	REF	REF
Some college	0.84 (0.24–2.96)	1.17 (0.67–2.02)	1.04 (0.44–2.42)
≥Bachelor's degree	**0.22 (0.06–0.82)**	1.14 (0.39–3.32)	0.38 (0.10–1.45)
Current employment			
Employed (FT, PT, student, retired)	0.71 (0.19–2.68)	0.97 (0.58–1.61)	0.65 (0.30–1.42)
Unemployed (unable to work/disabled, unemployed, other)	REF	REF	REF
Type of Insurance			
Private	REF	REF	REF
Public	**3.88 (1.01–14.96)**	1.84 (0.98–3.46)	**6.67 (2.43–18.42)**
Uninsured	2.07 (0.45–9.48)	1.17 (0.57–2.43)	**2.98 (1.01–8.77)**
Ever been incarcerated	2.33 (0.68–7.99)	1.24 (0.75–2.06)	0.41 (0.16–1.05)
Been told by doctor or other health care provider have STD in past 12 months	3.13 (0.91–10.76)	1.17 (0.58–2.36)	3.09 (0.78–12.26)
Recruitment Venue			
Bar/Club	1.72 (0.39–7.63)	0.81 (0.42–1.58)	**0.27 (0.08–0.83)**
Sex Environment/Street location/Park	0.66 (0.12–3.66)	1.22 (0.50–3.02)	**0.29 (0.08–0.98)**
Other	REF	REF	REF