J Urban Health (2017) 94:666–675
DOI 10.1007/s11524-017-0169-7

Are Partner Race and Intimate Partner Violence Associated with Incident and Newly Diagnosed HIV Infection in African-American Men Who Have Sex with Men?

Matthew R. Beymer · Nina T. Harawa · Robert E. Weiss · Chelsea L. Shover · Brian R. Toynes · Steven Meanley · Robert K. Bolan

Published online: 14 June 2017

Abstract Black gay, bisexual, and other men who have sex with men (BMSM) experience a disparate rate of HIV infections among MSM. Previous analyses have determined that STI coinfection and undiagnosed HIV infection partly explain the disparity. However, few studies have analyzed the impact of partner-level variables on HIV incidence among BMSM. Data were analyzed for BMSM who attended the Los Angeles LGBT Center from August 2011 to July 2015 (n = 1974) to identify risk factors for HIV infection. A multivariable logistic regression was used to analyze predictors for HIV prevalence among all individuals at first test (n = 1974; entire sample). A multivariable survival analysis was used to analyze predictors for HIV incidence (n = 936; repeat tester subset). Condomless receptive anal intercourse at last sex, number of sexual partners in the last 30 days, and intimate partner violence (IPV) were significant partner-level predictors of HIV prevalence and incidence. Individuals who reported IPV had 2.39 times higher odds (CI 1.35–4.23) and 3.33 times higher hazard (CI 1.47–7.55) of seroconverting in the prevalence and incidence models, respectively. Reporting Black partners only was associated with increased HIV prevalence, but a statistically significant association was not found with incidence. IPV is an important correlate of both HIV prevalence and incidence in BMSM. Further studies should explore how IPV affects HIV risk trajectories among BMSM. Given that individuals with IPV history may struggle to negotiate safer sex, IPV also warrants consideration as a qualifying criterion among BMSM for pre-exposure prophylaxis (PrEP).

Keywords Black MSM · HIV · Intimate partner violence · Partner-level factors

M. R. Beymer (✉) · C. L. Shover · B. R. Toynes · R. K. Bolan
Los Angeles LGBT Center, McDonald/Wright Building, 1625 N Schrader Blvd, Room 205, Los Angeles, CA 90028-6213, USA
e-mail: mbeymer@lalgbtcenter.org
M. R. Beymer
Division of Infectious Diseases, Department of Medicine, University of California, Los Angeles, Los Angeles, CA, USA

N. T. Harawa
Department of Medicine, David Geffen School of Medicine at University of California, Los Angeles, Los Angeles, CA, USA

N. T. Harawa
College of Medicine, Charles R Drew University of Medicine and Science, Los Angeles, CA, USA

R. E. Weiss
Department of Biostatistics, Fielding School of Public Health, University of California, Los Angeles, Los Angeles, CA, USA

S. Meanley
Department of Behavioral and Community Health Sciences, University of Pittsburgh, Pittsburgh, PA, USA

Introduction

Black gay, bisexual, and other men who have sex with men (MSM) have a higher incidence and prevalence of HIV when compared to White MSM [1–3] despite consistent evidence of similar or lower rates of sexual risk and

drug risk behaviors [1, 2, 4–8]. The only consistent correlates of Black MSM's increased HIV infection risk compared to other MSM in meta-analyses have been a higher prevalence of sexually transmitted infections (STIs) and a greater proportion of undiagnosed HIV infection [4, 5]. However, research has increasingly focused on the possibility that confined sexual networks and psychosocial factors may also contribute to the disparities in HIV incidence and prevalence.

Segregation and sexual racism have led to a greater insularity of sexual networks among Black MSM [9–11]. Millett et al. found that Black MSM had 11.5 times greater odds of reporting Black sex partners when compared to other MSM [12]. Studies in Atlanta [13], New York [14], and San Francisco [9] have also shown that Black MSM are more likely than non-Black MSM to have Black sex partners. A study by Hernandez-Romieu et al. found that HIV prevalence among Black MSM sexual networks was 36% compared to only 4% among White MSM sexual networks [15].

Previous studies have used these findings to propose that higher HIV incidence and prevalence among Black MSM may be explained by same race [1, 3, 16–19] or older partners [1, 7, 16, 20, 21]. However, other analyses have contested the relationship between HIV incidence and partner race [22] or partner age [22, 23]. An analysis of the National HIV Behavioral Surveillance System found that sexual networks were not influential in explaining the HIV disparity between White and Black MSM. More specifically, the only significant difference was that Black MSM newly diagnosed with HIV were more likely to report that their last male partner had an unknown HIV status when compared to White MSM who were newly diagnosed [24]. However, the previous analyses mainly analyzed between-group differences between White and Black MSM as opposed to determining within-group differences for HIV infection among Black MSM.

Psychosocial risk factors like intimate partner violence (IPV) may also play a role in HIV risk behavior. A meta-analysis by Buller et al. found that IPV among MSM was associated with an increased risk of substance use and engagement in condomless anal intercourse (CAI) [25]. Among a sample of YMSM, Stults et al. found that IPV was associated with between a 1.8 and 2.5 greater odds of using stimulants [26] and a twofold greater odds of condomless receptive anal sex [27]. In contrast, Williams et al. found that Black MSM experienced both high rates of childhood sexual abuse (41%) as well as IPV (52%), but they did not find a significant association between IPV and HIV risk behaviors [28]. However, no other studies to our knowledge have explored the specific relationship between IPV and HIV incidence. In addition, few studies have followed HIV-negative, Black MSM over time to determine what predicts HIV seroconversion within this racial subgroup. The objective of this study is to determine the impact of partner race and IPV on HIV incidence and prevalence among Black MSM while controlling for well-established predictors of HIV infection such as STI history and condom use [4, 5].

Methods

The Los Angeles LGBT Center (the Center) is a federally qualified health center headquartered in the Hollywood neighborhood of Los Angeles, California. Free HIV/STI testing and treatment are provided at both the main location as well as a satellite facility located in West Hollywood, California.

Between January 2011 and July 2015, each HIV/STI testing client was administered an 82-item risk assessment in a face-to-face interview that asked questions on demographics, substance use, sexual risk behavior, and partner characteristics. Partner characteristics included age of the last two sexual partners, race/ethnicity of the last two sex partners, and whether the client had ever experienced intimate partner violence (never, ever, past year, or past 3 months).

Following this questionnaire, all clients were offered testing for STIs including gonorrhea, chlamydia, and syphilis in addition to HIV screening. Clients who elected for STI screening were instructed to self-collect urine and rectal samples for gonorrhea and chlamydia testing. Following self-collection, a laboratory technician swabbed the throat for gonorrhea testing and administered a blood test for both syphilis testing (rapid plasma regain) and HIV testing. The primary HIV test was used to determine presence of HIV antibody (OraQuick ADVANCE® Rapid HIV-1/2 Antibody Test, OraSure Technologies, Inc., Bethlehem, PA). For individuals who tested antibody-negative, the blood sample was used to test for acute infection (presence of virus but absence of antibody which is indicative of a recent HIV infection) via nucleic acid amplification testing (Aptima HIV-1 RNA Qualitative Assay, Hologic, Inc., Bedford, MA). For individuals who tested antibody-positive, a second rapid test was used to confirm infection (Uni-

Gold™ Recombigen® HIV-1/2 antibody test, Trinity Biotech, Wicklow, Ireland). If the second rapid was positive, the individual was referred to an internal linkage-to-care specialist who facilitated the transition to HIV care. If the second rapid was discordant from the first positive, the client was advised that their result was indeterminate and that they would be subsequently contacted once the nucleic acid amplification test (NAAT) result was received. Individuals who were antibody-negative and NAAT-positive were also referred to a linkage-to-care specialist to initiate HIV care.

Individuals were included in this analysis if they met the following inclusion/exclusion criteria: (1) birth gender and current gender identity of male (cisgender males); (2) gay or bisexual identity or ever reported sex with a man (MSM or MSMW) or transgender person (men who have sex with transgender persons, or MST) (all subsequently referred to as MSM); (3) racial identity of Black or African-American (subsequently referred to as Black), regardless of concurrent identification with another race or ethnicity; (4) self-report at their baseline visit that their last HIV test result was negative; and (5) received at least one HIV test at either the main location or West Hollywood satellite location during the analysis period.

Statistical Methods

We analyzed two distinct groups of data/subjects. The first analysis group included all individuals who tested for HIV during the analysis period (entire population, $n = 1947$). The second group is a subset, comprising all individuals who tested for HIV two or more times during the analysis period (repeat testers subset, $n = 936$). All predictors used in our analyses were assessed at the client's first visit in the analysis period (baseline visit).

For the entire sample at their baseline visit, chi-square tests of association and multivariable logistic regressions were used to determine characteristics that distinguished newly diagnosed HIV-positives from those testing HIV-negative. For the repeat tester subset, bivariate and multivariable survival analyses were used to determine baseline predictors that distinguished individuals who later tested HIV-positive from those who tested HIV-negative through their final testing visit in the analysis period.

The multivariable logistic and survival models were built in one step and included predictors significant in the bivariate models at an alpha level less than or equal to 0.05. Any predictor significant in either the bivariate logistic or the bivariate survival model was retained for both multivariable models. All analyses were performed using SAS version 9.4 (SAS Institute, Cary, NC).

Ethics

The study received approval from the University of California, Los Angeles South General Institutional Review Board (SGIRB) (IRB Number: 00004474; Project Number: 16-000654).

Results

Of the 1947 individuals included in the analysis, 135 were HIV+ at their first test for a positivity rate of 6.9% (SE = 0.58%; 95% CI = 5.8%–8.1%). Another 41 out of 936 in the repeat tester subset were diagnosed as HIV-positive within the study period over 1585.03 person-years of follow-up for an HIV positivity rate of 2.59 HIV infections per 100 person-years. Of the 176 HIV infections in the entire sample, 155 HIV infections (88%) were non-acute infections.

Entire Sample Baseline Testing Analysis

Among the entire sample at baseline, individuals were more likely to test HIV-positive if they were under the age of 30 in bivariate analyses (Table 1). A self-reported history of STIs either in the past year or more than a year ago was significantly associated with testing HIV-positive (Table 2). Reporting insertive anal sex at last sex was not associated with testing HIV-positive, but reporting receptive anal sex at last sex was associated with testing HIV-positive, regardless of reported condom use (Table 3). Approximately 15% of all individuals who reported that their last two sex partners were Black tested HIV-positive compared to only 6% who reported at least one non-Black sex partner in their last two sexual experiences. Approximately 20% of individuals who reported a lifetime history of IPV tested HIV-positive compared to only 8% of individuals who did not report a history of IPV. The only substances that were significantly associated with testing HIV-positive among the entire sample were methamphetamine use in the past 12 months and alcohol use before/during sex (Table 4).

Younger age, testing positive for any STI at baseline, condomless receptive anal intercourse at last sex, Black race of last two sex partners, number of sex partners in the

Table 1 Bivariate logistic regressions for entire sample at baseline ($n = 1947$) and survival analyses ($n = 936$) for the repeat tester subset of demographic factors for HIV seroconversion, January 2011–July 2015[a]

	Entire sample				Repeat tester subset[a]			
	HIV-negatives ($n = 1771$)		HIV-positives ($n = 176$)		HIV-negatives ($n = 895$)		HIV-positives ($n = 41$)	
	n	%	*n*	%	*n*	%	*n*	%
Orientation				$p = 0.11$				$p = 0.94$
Bisexual	378	91.5%	35	8.5%	161	95.8%	7	4.2%
Gay/homosexual	1250	90.3%	134	9.7%	676	95.6%	31	4.4%
Other	143	95.3%	7	4.7%	58	95.1%	3	4.9%
Partner types reported at last assessment				$p = 0.68$				$p = 0.97$
Men only	696	91.7%	63	8.3%	376	95.9%	16	4.1%
Women only	19	95.0%	1	5.0%	11	100.0%	0	0.0%
Trans only	2	100.0%	0	0.0%	1	100.0%	0	0.0%
Men and women only	905	90.3%	97	9.7%	452	95.0%	24	5.0%
Men and trans only	11	91.7%	1	8.3%	6	100.0%	0	0.0%
Women and trans only	20	100.0%	0	0.0%	7	100.0%	0	0.0%
Men, women, and trans	79	92.9%	6	7.1%	23	95.8%	1	4.2%
Unknown	39	69.6%	17	30.4%	19	67.9%	9	32.1%
Age group				$p = 0.0003$				$p = 0.08$
< 30	1017	89.3%	122	10.7%	531	94.7%	30	5.3%
30–39	399	90.9%	40	9.1%	208	96.3%	8	3.7%
40+	355	96.2%	14	3.8%	156	98.1%	3	1.9%
Total	1771	91.0%	176	9.0%	895	100.0%	41	100.0%

[a] Data from the first visit are presented

last 30 days, IPV, and alcohol use before/during sex were associated with testing HIV-positive for the entire sample in the multivariable analysis (Table 5). When compared to individuals who reported only non-Black sex partners for their last two sexual experiences, individuals with two Black sex partners had a 2.57 (95% CI 1.67–3.93) increased odds of testing HIV-positive. Similarly, individuals who reported a history of IPV had a 2.39 (95% CI 1.35–4.23) increased odds of testing HIV-positive when compared to individuals who did not report a history of IPV.

Repeat Tester Subset

Sexual orientation, partner type, and age group at baseline were not significantly associated with seroconversion at follow-up for the repeat tester subset in bivariate analyses. There was no significant relationship between self-reported history of STIs and HIV incidence for the repeat tester subset, but individuals who tested positive for an STI at baseline had a higher hazard of testing HIV-positive at follow-up. The only substances significantly associated with HIV seroconversion were ecstasy and nitrate use in the 12 months prior to the baseline visit.

The only variables associated with seroconversion in a multivariable model were condomless receptive anal sex, number of sexual partners in the last 30 days, and reporting a history of IPV. The hazard of seroconversion increased by 7% for each additional sexual partner reported in 30 days prior to the baseline visit (95% CI 1.02–1.12). Individuals with a history of IPV had a factor of 3.33 (95% CI 1.47–7.55) greater hazard of testing HIV-positive at follow-up compared to individuals without a history of IPV.

Discussion

We conducted two analyses on data from Black MSM to determine the circumstances associated with newly

Table 2 Bivariate logistic regressions for the entire sample at baseline ($n = 1947$) and survival analyses ($n = 936$) for repeat testers subset of biological risk factors for HIV seroconversion, January 2011–July 2015*

	Entire sample				Repeat tester subset*			
	HIV-negatives $n = 1771$)		HIV-positives ($n = 176$)		HIV-negatives ($n = 895$)		HIV-positives ($n = 41$)	
	n	%	*n*	%	*n*	%	*n*	%
Self-reported history of chlamydia				$p = 0.68$				$p = 0.88$
Never	1332	91.4%	126	8.6%	651	95.7%	29	4.3%
Ever	353	90.1%	39	9.9%	199	95.2%	10	4.8%
Past year	60	92.3%	5	7.7%	34	94.4%	2	5.6%
Missing	26	81.3%	6	18.8%	11	100.0%	0	0.0%
Self-reported history of gonorrhea				$p = 0.02$				$p = 0.63$
Never	1286	92.2%	109	7.8%	632	95.9%	27	4.1%
Ever	380	88.4%	50	11.6%	203	95.3%	10	4.7%
Past year	77	87.5%	11	12.5%	48	92.3%	4	7.7%
Missing	28	82.4%	6	17.6%	12	100.0%	0	0.0%
Self-reported history of syphilis				$p = 0.43$				$p = 0.61$
Never	1608	91.4%	152	8.6%	817	95.4%	39	4.6%
Ever	101	87.8%	14	12.2%	51	96.2%	2	3.8%
Past year	31	91.2%	3	8.8%	14	100.0%	0	0.0%
Missing	31	81.6%	7	18.4%	13	100.0%	0	0.0%
History of herpes simplex type II				$p = 0.62$				$p = 0.88$
Never	1576	91.3%	151	8.7%	781	95.5%	37	4.5%
Ever	54	91.5%	5	8.5%	22	95.7%	1	4.3%
Past year	17	85.0%	3	15.0%	13	92.9%	1	7.1%
Missing	124	87.9%	17	12.1%	79	97.5%	2	2.5%
Self-reported history of chlamydia, gonorrhea and/or syphilis				$p = 0.05$				$p = 0.99$
Never	1006	92.5%	82	7.5%	490	95.7%	22	4.3%
Ever	599	89.1%	73	10.9%	314	95.4%	15	4.6%
Past year	140	90.3%	15	9.7%	81	95.3%	4	4.7%
Missing	26	81.3%	6	18.8%	10	100.0%	0	0.0%
Chlamydia testing result				$p < 0.0001$				$p = 0.09$
Negative	1403	92.9%	107	7.1%	722	95.9%	31	4.1%
Positive	188	80.3%	46	19.7%	105	92.9%	8	7.1%
Missing	180	88.7%	23	11.3%	68	97.1%	2	2.9%
Gonorrhea testing result				$p = 0.0004$				$p = 0.003$
Negative	1357	92.3%	114	7.7%	697	96.3%	27	3.7%
Positive	239	85.7%	40	14.3%	131	91.0%	13	9.0%
Missing	175	88.8%	22	11.2%	67	98.5%	1	1.5%
Syphilis testing result				$p < 0.0001$				$p = 0.47$
Negative	1457	92.9%	111	7.1%	759	95.4%	37	4.6%
Positive	18	64.3%	10	35.7%	11	100.0%	0	0.0%
Missing	296	84.3%	55	15.7%	125	96.9%	4	3.1%
Tested positive for any STI				$p < 0.0001$				$p = 0.007$
Negative	1112	94.7%	62	5.3%	566	96.4%	21	3.6%
Positive	397	84.5%	73	15.5%	220	92.4%	18	7.6%
Missing	262	86.5%	41	13.5%	109	98.2%	2	1.8%
Total	1771	100.0%	176	100.0%	895	100.0%	41	100.0%

* Data from the first visit are presented

Table 3 Bivariate logistic regressions for entire sample at baseline ($n = 1947$) and survival analyses ($n = 936$) for the repeat tester subset of behavioral risk factors for HIV seroconversion, January 2011–July 2015[a]

	Entire sample				Repeat tester subset[a]			
	HIV-negatives ($n = 1771$)		HIV-positives ($n = 176$)		HIV-negatives ($n = 895$)		HIV-positives ($n = 41$)	
	n	%	*n*	%	*n*	%	*n*	%
Insertive anal at last sex				$p = 0.36$				$p = 0.25$
No	889	91.6%	81	8.4%	435	96.9%	14	3.1%
Yes with condom	411	91.3%	39	8.7%	220	93.6%	15	6.4%
Yes without condom	459	89.5%	54	10.5%	233	95.1%	12	4.9%
Missing	12	85.7%	2	14.3%	7	100.0%	0	0.0%
Receptive anal at last sex				$p < 0.0001$				$p = 0.002$
No	1208	93.5%	84	6.5%	582	96.7%	20	3.3%
Yes with condom	276	88.2%	37	11.8%	164	95.3%	8	4.7%
Yes without condom	274	83.8%	53	16.2%	141	91.6%	13	8.4%
Missing	13	86.7%	2	13.3%	8	100.0%	0	0.0%
Vaginal at last sex				$p = 0.14$				$p = 0.36$
No	1610	90.7%	165	9.3%	824	95.8%	36	4.2%
Yes with condom	46	95.8%	2	4.2%	16	100.0%	0	0.0%
Yes without condom	87	95.6%	4	4.4%	36	92.3%	3	7.7%
Missing	28	84.8%	5	15.2%	19	90.5%	2	9.5%
Venue for meeting partners				$p = 0.87$				$p = 0.51$
In person	426	91.6%	39	8.4%	214	95.5%	10	4.5%
Internet	217	90.4%	23	9.6%	114	92.7%	9	7.3%
Many	452	91.3%	43	8.7%	237	94.4%	14	5.6%
Missing	676	90.5%	71	9.5%	330	97.6%	8	2.4%
Race of last two sex partners				$p < 0.0001$				$p = 0.63$
Non-Black only	1016	93.0%	77	7.0%	552	95.7%	25	4.3%
Black only	400	85.3%	69	14.7%	176	94.6%	10	5.4%
Black and other	321	93.6%	22	6.4%	151	96.2%	6	3.8%
Missing	34	81.0%	8	19.0%	16	100.0%	0	0.0%
Number of older sex partners				$p = 0.74$				$p = 0.91$
Both partners within 5 years or younger	1062	91.7%	96	8.3%	507	95.3%	25	4.7%
1 Partner more than 5 years older	350	90.4%	37	9.6%	196	95.6%	9	4.4%
2 Partners more than 5 years older	198	91.2%	19	8.8%	122	96.1%	5	3.9%
Missing	161	87.0%	24	13.0%	70	97.2%	2	2.8%
Number of partners in the past 30 days[a]				$p = 0.03$				$p = 0.002$
Mean		2.04		2.53		2.17		3.80
Median		1		1		1		2
Number of partners in the past 3 months[a]				$p = 0.007$				$p = 0.0002$
Mean		4.12		5.71		4.39		8.98
Median		2		2		3		3
Intimate partner violence				$p < 0.0001$				$p = 0.0002$
Never	1628	92.0%	141	8.0%	824	96.3%	32	3.7%
Ever, past year, past 3 months	104	80.0%	26	20.0%	51	85.0%	9	15.0%
Missing	39	81.3%	9	18.8%	20	100.0%	0	0.0%
Total	1771	100.0%	176	100.0%	895	100.0%	41	100.0%

[a] Data from the first visit are presented

Table 4 Bivariate logistic regressions for the entire sample at baseline ($n = 1947$) and survival analyses ($n = 936$) for the repeat tester subset of substance use risk factors for HIV seroconversion, January 2011–July 2015[a]

	Entire sample				Repeat tester subset[a]			
	HIV-negatives ($n = 1771$)		HIV-positives ($n = 176$)		HIV-negatives ($n = 895$)		HIV-positives ($n = 41$)	
Drug use in the past 12 months	*n*	%	*n*	%	*n*	%	*n*	%
Ecstasy				$p = 0.27$				$p = 0.03$
No	1628	91.5%	152	8.5%	821	96.0%	34	4.0%
Yes	108	88.5%	14	11.5%	57	89.1%	7	10.9%
Missing	35	77.8%	10	22.2%	17	100.0%	0	0.0%
Methamphetamine				$p = 0.0002$				$p = 0.36$
No	1636	91.9%	144	8.1%	830	95.6%	38	4.4%
Yes	102	82.3%	22	17.7%	48	94.1%	3	5.9%
Missing	33	76.7%	10	23.3%	17	100.0%	0	0.0%
Nitrates				$p = 0.11$				$p = 0.03$
No	1572	91.6%	144	8.4%	785	96.1%	32	3.9%
Yes	164	88.2%	22	11.8%	91	91.0%	9	9.0%
Missing	35	77.8%	10	22.2%	19	100.0%	0	0.0%
Erectile dysfunction drugs				$p = 0.62$				$p = 0.62$
No	1687	91.3%	160	8.7%	848	95.6%	39	4.4%
Yes	51	89.5%	6	10.5%	30	93.8%	2	6.3%
Missing	33	76.7%	10	23.3%	17	100.0%	0	0.0%
Cocaine				$p = 0.18$				$p = 0.11$
No	1608	91.5%	149	8.5%	810	95.9%	35	4.1%
Yes	128	88.3%	17	11.7%	67	91.8%	6	8.2%
Missing	35	77.8%	10	22.2%	18	100.0%	0	0.0%
Drug count[b]				$p = 0.003$				$p = 0.01$
0	1347	92.4%	111	7.6%	681	96.5%	25	3.5%
1	275	89.3%	33	10.7%	136	94.4%	8	5.6%
2	85	80.2%	21	19.8%	38	84.4%	7	15.6%
3	14	100.0%	0	0.0%	9	100.0%	0	0.0%
4	9	90.0%	1	10.0%	8	88.9%	1	11.1%
5	3	0.0%	0	0.0%	3	100.0%	0	0.0%
Missing	38	79.2%	10	20.8%	20	100.0%	0	0.0%
Alcohol use before/during sex				$p = 0.001$				$p = 0.65$
No	1325	92.5%	108	7.5%	639	96.4%	24	3.6%
Yes	413	87.7%	58	12.3%	240	93.4%	17	6.6%
Missing	33	76.7%	10	23.3%	16	100.0%	0	0.0%
Total	1771	100.0%	176	100.0%	895	100.0%	41	100.0%

[a] Data from the first visit are presented

[b] Does not include alcohol

diagnosed HIV infection (HIV prevalence) among the entire HIV testing population and with incident HIV infection among repeat testers who subsequently tested positive. Condomless receptive anal intercourse, number of sex partners in the last 30 days, and IPV were consistent predictors of HIV infection in both the entire population and the repeat tester subset. Additional risk factors were identified for the entire population,

Table 5 Multivariable logistic regression for entire sample at baseline ($n = 1947$) and survival analysis ($n = 936$) for the repeat tester subset for HIV seroconversion, January 2011–July 2015[a]

	Logistic regression results ($n = 1947$)				Survival analysis results ($n = 936$)			
	Est	SE	*p* value	OR (95% CI)	Est	SE	*p* value	HR (95% CI)
Age group (REF = 40+)				$p = 0.05$				$p = 0.31$
<30	0.87	0.36	0.01	2.39 (1.19–4.80)	0.97	0.64	0.13	2.65 (0.76–9.22)
30–39	0.85	0.39	0.03	2.33 (1.09–5.02)	0.82	0.69	0.24	2.27 (0.59–8.76)
Testing positive for any STI (REF = negative for all STIs)	1.06	0.20	<.0001	2.89 (1.97–4.24)	0.47	0.35	0.17	1.60 (0.81–3.17)
Receptive anal sex at last sex (REF = no)				$p = 0.003$				$p = 0.04$
Yes with condom	0.49	0.26	0.06	1.63 (0.99–2.71)	0.41	0.44	0.35	1.50 (0.64–3.55)
Yes without condom	0.75	0.23	0.001	2.13 (1.36–3.33)	1.01	0.40	0.01	2.75 (1.25–6.03)
Race/ethnicity of last two sex partners				$p < 0.0001$				$p = 0.6$
Black only vs. non-Black only	0.94	0.22	<.0001	2.57 (1.67–3.93)	0.36	0.42	0.39	1.43 (0.63–3.25)
Black only vs. Black and other	0.84	0.29	0.004	2.32 (1.30–4.13)	0.03	0.55	0.96	1.03 (0.45–3.03)
Black and other vs. non-Black only	0.10	0.28	0.72	1.11 (0.63–1.93)	0.33	0.46	0.48	1.39 (0.56–3.46)
Number of partners in the last 30 days	0.05	0.02	0.03	1.05 (1.00–1.10)	0.07	0.02	0.002	1.07 (1.02–1.12)
Intimate partner violence (REF = never)	0.87	0.29	0.003	2.39 (1.35–4.23)	1.20	0.42	0.004	3.33 (1.47–7.55)
Methamphetamine use (REF = no)	0.46	0.33	0.17	1.58 (0.83–3.01)	0.30	0.64	0.64	1.36 (0.38–4.79)
Ecstasy use (REF = no)	0.07	0.35	0.85	1.07 (0.54–2.14)	0.35	0.49	0.48	1.42 (0.54–3.72)
Nitrates use (REF = no)	0.17	0.30	0.56	1.19 (0.67–2.12)	0.41	0.43	0.35	1.51 (0.64–3.52)
Alcohol use Before/during sex (REF = no)	0.60	0.20	0.003	1.82 (1.23–2.72)	−0.23	0.36	0.51	0.79 (0.40–1.59)

[a] Covariates from the first HIV testing visit in the analysis period were used for both analyses

including younger age, testing positive for an STI at baseline, Black race of last two sex partners, and alcohol use prior to sex.

Condomless receptive anal intercourse and number of sex partners are well-established predictors of HIV among Black MSM [4, 5]. However, the link between IPV and HIV among Black MSM is less clear. There has been inconsistent evidence linking IPV to sex- and drug-related risk factors for HIV in this group [25–28]. Our study is the first to find direct associations with HIV infection, including HIV incidence. The mechanism for the relationship between IPV and HIV is indirect. IPV can take many forms from physical violence to emotional manipulation to monitoring a partner's behavior. HIV risk could be hypothetically heightened through reduced self-efficacy in negotiating safer sex or a lack of power to suggest monogamy. For example, an individual may admit to IPV but not admit that they were forced to have unprotected receptive anal sex with a non-monogamous partner. Clinics serving Black MSM may consider adding IPV as an indicator for pre-exposure prophylaxis (PrEP) since victims may not have the agency to negotiate safer sex.

Individuals who were diagnosed with HIV infection were more likely to report that both of their last sex partners were Black when compared to their peers who reported non-Black partners only. In 2015, the CDC estimated that approximately 13% of all individuals with HIV were unaware of their infection [29], but studies among Black MSM have shown that this proportion can be between 18 and 25% [18, 30]. Given that HIV prevalence and rate of unknown infections are both high among Black MSM, it is not surprising that partner race is associated with HIV risk. What is surprising is that MSM in our study population with one Black and one other race partner experienced HIV risks similar to those who had non-Black partners in their last two sexual experiences. It is quite possible that Black MSM with multi-racial, rather than Black only, sexual partner networks are generally engaged with MSM whose HIV risk is relatively low, and for those who are HIV-positive, HIV care engagement is relatively high. However, this hypothesis warrants testing.

This analysis has a number of limitations. First, although an individual reported that they were HIV-negative at baseline, it is possible that some individuals who tested HIV-positive were already aware of their status. Los Angeles County surveillance data were used to determine if an individual tested positive at another publicly funded clinic prior to their first test in the study period. Individuals were dropped that had a prior positive result on file (n = 5). Although the remaining individuals in our study could have tested positive at a private site, in another county, or outside the state/country, it is unlikely that this affected more than one or two testers. Determining all individuals who are truly newly diagnosed HIV infections would only be possible with both State and Federal surveillance data that were not available for this analysis. Second, the Los Angeles LGBT Center and its satellite location are located in areas with low percentages of Black residents. For this reason, the risk factors of the individuals who tested positive may not be representative of the overall trends for Black men in either Los Angeles County or in other jurisdictions. Conversely, a potential advantage of being located out of these areas is that individuals may feel less stigma in coming to test. Third, we used a single question to ask about IPV due to time constraints of a risk assessment used in an STI/HIV testing clinic setting. Therefore, we were unable to distinguish between emotional, mental, and physical forms of IPV. Fourth, risk assessments were conducted in face-to-face interviews which may have introduced more social desirability bias than present in computer-assisted interview methods. Lastly, while the overall sample size for this analysis was large, there was only a modest number of seroconversions in the multiple tester category.

In 2015, Mustanski et al. opined, "racial disparities in HIV may be driven and/or maintained by a combination of racial differences in partner characteristics, assortativity by race, and increased sexual network density, rather than differences in individual's HIV risk behaviors." [31] Assortativity by race/ethnicity is common across racial/ethnic groups, and this finding does not provide much-needed, actionable public health strategies for reducing HIV risk in Black MSM. In contrast, the IPV association is intervenable and resources should be allocated to both assessment of IPV as well as programs that assist victims of IPV with prevention interventions like PrEP and other wrap-around services. By looking at partner- and network-level factors, instead of focusing on risk at the individual level, public health interventions will be able to better serve Black MSM in future HIV prevention efforts.

Compliance with Ethical Standards The study received approval from the University of California, Los Angeles South General Institutional Review Board (SGIRB) (IRB Number: 00004474; Project Number: 16-000654).

Sources of Support -MRB was supported by the UCLA Postdoctoral Fellowship Training Program in Global HIV Prevention Research (Currier and Gorbach, PIs); T32MH080634.
- NTH was supported by NIH grants 1R01DA039934-02, UL1TR000124, and P30 MH 58107. NTH was also supported by the California HIV Research Panel grant RP11-LA-020.
- REW was supported by the Center for HIV Identification, Prevention, and Treatment (CHIPTS) NIMH grant P30MH058107 and the UCLA Center for AIDS Research (CFAR) grant 5P30AI028697, Core H.

References

1. Bingham TA, Harawa NT, Johnson DF, et al. The effect of partner characteristics on HIV infection among African American men who have sex with men in the young men's survey, Los Angeles, 1999-2000. *AIDS Educ Prev*. 2003;15(1):39–52.
2. Harawa NT, Greenland S, Bingham TA, et al. Associations of race/ethnicity with HIV prevalence and HIV-related behaviors among young men who have sex with men in 7 urban centers in the United States. *JAIDS*. 2004;35(5):526–36.
3. Sullivan PS, Rosenberg ES, Sanchez TH, et al. Explaining racial disparities in HIV incidence in black and white men who have sex with men in Atlanta, GA: a prospective observational cohort study. *Ann Epidemiol*. 2015;25(6):445–54.
4. Millett GA, Peterson JL, Wolitski RJ, et al. Greater risk for HIV infection of black men who have sex with men: a critical literature review. *Am J Public Health*. 2006;96(6):1007–19.
5. Millett GA, Flores SA, Peterson JL, et al. Explaining disparities in HIV infection among black and white men who have sex with men: a meta-analysis of HIV risk behaviors. *AIDS*. 2007;21(15):2083–91.
6. Magnus M, Kuo I, Phillips G II, et al. Elevated HIV prevalence despite lower rates of sexual risk behaviors among black men in the District of Columbia who have sex with men. *AIDS Patient Care St*. 2010;24(10):615–22.
7. Newcomb ME, Mustanski B. Racial differences in same-race partnering and the effects of sexual partnership characteristics on HIV risk in MSM: a prospective sexual diary study. *JAIDS*. 2013;62(3):329–33.
8. Beer L, Oster AM, Mattson CL, et al. Disparities in HIV transmission risk among HIV-infected black and white men who have sex with men, United States, 2009. *AIDS*. 2014;28(1):105–14.

9. Raymond HF, McFarland W. Racial mixing and HIV risk among men who have sex with men. *AIDS Behav*. 2009;13(4):630–7.
10. Newcomb ME, Ryan DT, Garofalo R, et al. Race-based sexual stereotypes and their effects on sexual risk behavior in racially diverse young men who have sex with men. *Arch Sex Behav*. 2015;44(7):1959–68.
11. Phillips G, Birkett M, Hammond S, et al. Partner preference among men who have sex with men: potential contribution to spread of HIV within minority populations. *Lgbt Health*. 2016;3(3):225–32.
12. Millett GA, Peterson JL, Flores SA, et al. Comparisons of disparities and risks of HIV infection in black and other men who have sex with men in Canada, UK, and USA: a meta-analysis. *Lancet*. 2012;380(9839):341–8.
13. Sullivan PS, Peterson J, Rosenberg ES, et al. Understanding racial HIV/STI disparities in Black and White men who have sex with men: a multilevel approach. *PLoS One*. 2014;9(3): e90514.
14. Tieu H-V, Nandi V, Hoover DR, et al. Do sexual networks of men who have sex with men in New York City differ by race/ethnicity? *AIDS Patient Care St*. 2016;30(1):39–47.
15. Hernandez-Romieu AC, Sullivan PS, Rothenberg R, et al. Heterogeneity of HIV prevalence among the sexual networks of black and white men who have sex with men in Atlanta: illuminating a mechanism for increased HIV risk for young black men who have sex with men. *Sex Transm Dis*. 2015;42(9):505–12.
16. Berry M, Raymond HF, McFarland W. Same race and older partner selection may explain higher HIV prevalence among black men who have sex with men. *AIDS*. 2007;21(17): 2349–50.
17. Maulsby C, Sifakis F, German D, et al. Partner characteristics and undiagnosed HIV seropositivity among men who have sex with men only (MSMO) and men who have sex with men and women (MSMW) in Baltimore. *AIDS Behav*. 2012;16(3):543–53.
18. Neaigus A, Reilly KH, Jenness SM, et al. Multilevel risk factors for greater HIV infection of black men who have sex with men in New York City. *Sex Transm Dis*. 2014;41(7): 433–9.
19. Paz-Bailey G, Smith A, Masciotra S, et al. Early HIV infections among men who have sex with men in five cities in the United States. *AIDS Behav*. 2015;19(12):2304–10.
20. Joseph HA, Marks G, Belcher L, et al. Older partner selection, sexual risk behaviour and unrecognised HIV infection among black and Latino men who have sex with men. *Sex Transm Infect*. 2011;87(5):442–7.
21. Maulsby C, Jain K, Sifakis F, et al. Individual-level and partner-level predictors of newly diagnosed HIV infection among black and white men who have sex with men in Baltimore, MD. *AIDS Behav*. 2015;19(5):909–17.
22. Tieu H-V, Murrill C, Xu G, et al. Sexual partnering and HIV risk among black men who have sex with men: New York City. *J Urban Health*. 2010;87(1):113–21.
23. Grey JA, Rothenberg RB, Sullivan PS, et al. Disassortative age—mixing does not explain differences in HIV prevalence between young White and Black MSM: findings from four studies. *PLoS One*. 2015;10(6):e0129877.
24. Oster AM, Wiegand RE, Sionean C, et al. Understanding disparities in HIV infection between black and white MSM in the United States. *AIDS*. 2011;25(8):1103–12.
25. Buller AM, Devries KM, Howard LM, et al. Associations between intimate partner violence and health among men who have sex with men: a systematic review and meta-analysis. *PLoS Med*. 2014;11(3):e1001609.
26. Stults CB, Jaydani S, Greenbaum CA, et al. Intimate partner violence and substance use risk among young men who have sex with men: the P18 cohort study. *Drug Alcohol Depen*. 2015;154:54–62.
27. Stults CB, Javdani S, Greenbaum CA, et al. Intimate partner violence and sex among young men who have sex with men. *J Adolescent Health*. 2016;58(2):215–22.
28. Williams JK, Wilton L, Magnus M, et al. Relation of childhood sexual abuse, intimate partner violence, and depression to risk factors for HIV among black men who have sex with men in 6 US cities. *Am J Public Health*. 2015;105(12): 2473–81.
29. Centers for Disease Control and Prevention. Monitoring selected national HIV prevention and care objectives by using HIV surveillance data—United States and 6 dependent areas—2013. HIV Surveillance Supplemental Report 2015;20(No. 2). July 2015. Available at: http://www.cdc.gov/hiv/pdf/library/reports/surveillance/cdc-hiv-surveillancereport_vol20_no2.pdf. Accessed: January 9, 2017.
30. Millett GA, Ding H, Marks G, et al. Mistaken assumptions and missed opportunities: correlates of undiagnosed HIV infection among black and Latino men who have sex with men. *JAIDS*. 2011;58(1):64–71.
31. Mustanski B, Birkett M, Kuhns LM, et al. The role of geographic and network factors in racial disparities in HIV among young men who have sex with men: an egocentric network study. *AIDS Behav*. 2015;19(6):1037–47.