Sexual Orientation Identity, Race/Ethnicity, and Lifetime HIV Testing in a National Probability Sample of U.S. Women and Men: An Intersectional Approach

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Abstract

Purpose: We examined differences in lifetime human immunodeficiency virus (HIV) testing in relation to both sexual orientation identity and race/ethnicity among U.S. women and men.

Methods: We used 2013–2017 National Health Interview Survey data and multivariable logistic regression to assess the distribution of lifetime HIV testing across and within sexual orientation identity and racial/ethnic groups of U.S. women ($n=60,867$) and men ($n=52,201$) aged 18–64 years.

Results: Among women, Black lesbian (74.1%) and bisexual (74.0%) women had the highest prevalence whereas Asian lesbian women (32.5%) had the lowest prevalence of lifetime HIV testing. Among men, the prevalence of lifetime HIV testing was the highest among Latino gay men (92.6%) and the lowest among Asian heterosexual men (32.0%). In most cases, Black women and Black and Latino men had significantly higher adjusted odds whereas Asian women and men had lower adjusted odds of lifetime HIV testing compared with their White counterparts within sexual orientation identity groups. In many instances, bisexual women and gay men had significantly higher adjusted odds of lifetime HIV testing relative to their heterosexual counterparts within racial/ethnic groups. Compared with White heterosexual individuals, most sexual orientation identity and racial/ethnic subgroups had significantly higher adjusted odds whereas Asian heterosexual, bisexual, and lesbian women and Asian heterosexual and bisexual men may have lower adjusted odds of lifetime HIV testing.

Conclusion: Culturally relevant, linguistically appropriate, and structurally competent programs and practices are needed to facilitate lifetime HIV testing among diverse sexual orientation identity and racial/ethnic subgroups of women and men, including multiply marginalized subgroups that are undertested or disproportionately affected by HIV/AIDS.

Keywords: HIV testing, intersectionality, men, race/ethnicity, sexual orientation, women

Introduction

HUMAN IMMUNODEFICIENCY VIRUS (HIV) remains a significant public health problem in the United States. In 2016, 32,131 U.S. men and 7529 U.S. women aged 13 years and older were newly diagnosed with HIV.¹ In 2017, gay and bisexual men and other men who have sex with

men (MSM) accounted for the majority of new HIV diagnoses among U.S. individuals in general (66%) and U.S. men in particular (82%).² Although, to our knowledge, no data exist on new HIV diagnoses among women in relation to sexual orientation, studies suggest that some subgroups of sexual minority women (SMW)—namely, bisexual women and women with both male and female sexual partners—may

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have higher levels of HIV risk factors, including sexually transmitted infections, total number of sexual partners, and sexual victimization, compared with non-SMW.^{3–5} Moreover, in 2010, Black men accounted for most (39%) new HIV infections among U.S. men⁶ and, in 2017, Black women accounted for the majority (59%) of new HIV diagnoses among U.S. women.⁷ At the intersection of sexual orientation and race/ethnicity, Black and Latino MSM had the highest number of new HIV diagnoses among U.S. MSM in 2016.¹ Surveillance data are not collected in relation to both social categories among U.S. women; however, researchers have identified elevated levels of HIV risk factors, including incarceration, intimate partner violence, and transactional sex, among Black and Latina SMW.^{8,9}

HIV testing is critical to informing individuals of their HIV status and preventing HIV/AIDS morbidity and mortality¹⁰ and HIV transmission.¹¹ The Centers for Disease Control and Prevention (CDC) recommend HIV testing at least once in a lifetime for individuals aged 13–64 years¹⁰ and at least annually for people at high risk of HIV infection, including MSM.¹² Research has shown that gay or lesbian and bisexual U.S. men and women were significantly more likely than their heterosexual counterparts to have received an HIV test in their lifetime.^{13,14} Moreover, studies also indicate that Black and Latinx U.S. adults have a significantly higher prevalence of lifetime HIV testing relative to their White and Asian counterparts.^{15,16} At the intersection of sexual orientation and race/ethnicity, researchers have found that White, Latino, and Black gay and bisexual men were significantly more likely to have ever received an HIV test compared with their heterosexual counterparts and White heterosexual men.¹⁷ Moreover, they also found that Black SMW were significantly more likely to have obtained an HIV test in their lifetime relative to White heterosexual women.¹⁷ In a similar analysis that included Asian individuals, White, Black, Latinx, and Asian sexual minority adults had significantly higher adjusted odds of lifetime HIV testing compared with their nonsexual minority counterparts.^{16,17}

Although several studies have examined HIV testing in relation to both sexual orientation and race/ethnicity among U.S. men^{17–20} and one has specifically investigated this issue among U.S. women,¹⁷ prior research has been limited to subnational geographic areas,^{21,22} restricted to convenience samples,^{23,24} included only White, Black, and (less frequently) Latinx individuals,^{17–20} combined gay or lesbian and bisexual people into a single sexual orientation group,^{17,23,25} and/or aggregated women and men into one category.^{16,17} Thus, using a national probability sample of U.S. women and men, we designed a quantitative study to assess the distribution of lifetime HIV testing in relation to both sexual orientation identity, with gay or lesbian and bisexual individuals categorized separately, and race/ethnicity, including among White, Black, Latinx, and Asian individuals.

This study was guided by intersectionality, an analytic framework with roots in Black feminism^{26–29} that focuses on how the lived experiences of multiply marginalized groups are shaped by the mutually influencing effects of multiple social categories at the individual level (e.g., gender, race/ethnicity, sexual orientation) and related forms of discrimination at the interpersonal and structural levels (e.g., sexism, racism, heterosexism).^{30–32} In line with intersectionality, we conceptualized sexual orientation identity and

race/ethnicity as individual-level social categories linked to not only individuals' social identity but also their position in the social hierarchy.^{30–32} Methodologically, we assessed the simultaneous effect of sexual orientation identity and race/ethnicity on lifetime HIV testing among U.S. women and men in multiple ways. Specifically, we examined differences in lifetime HIV testing in relation to race/ethnicity among sexual orientation identity groups and in relation to sexual orientation identity among racial/ethnic groups. We also ascertained the distribution of lifetime HIV testing among sexual orientation identity and racial/ethnic subgroups by using an interaction model.^{33–35}

This study contributes to the scientific literature by identifying previously unanalyzed differences in lifetime HIV testing in relation to both sexual orientation identity and race/ethnicity among U.S. women and men using an intersectional lens. Our findings will also help assess progress toward meeting the *Healthy People 2020* lifetime HIV testing objective (i.e., 73.6% prevalence)³⁶ among diverse sexual orientation identity and racial/ethnic subgroups of women and men, including those who face the greatest HIV/AIDS burden as a result of heterosexism and racism. Further, our study results will help identify multiply marginalized subgroups with especially low levels of lifetime HIV testing. Thus, this study may help inform the development of tailored interventions that facilitate lifetime HIV testing among multiply marginalized sexual orientation identity and racial/ethnic subgroups that are undertested and, along with HIV prevention and treatment promotion efforts, help reduce the burden of HIV/AIDS among those who are the most at risk of developing the disease.

Methods

Study participants

We analyzed 2013–2017 data from the annual National Health Interview Survey (NHIS), which uses a stratified, multistage sampling design to generate a national probability sample of the civilian, non-institutionalized U.S. population.³⁷ Our analyses were restricted to adults aged 18–64 years as only participants aged 18 years and older were asked about lifetime HIV testing, and lifetime HIV testing is recommended for individuals aged 13–64 years.¹⁰ Individuals who responded “something else” ($n = 425$; 0.36%) or “I don’t know” ($n = 713$; 0.57%) or did not respond to the sexual orientation identity question ($n = 3514$; 3.0%) were excluded from our sample. Further, we also excluded Native American (namely, Indian American and Alaska Native individuals; $n = 1036$; 0.67%) and multiracial ($n = 2272$; 1.63%) individuals and those from other racial/ethnic backgrounds ($n = 293$; 0.16%) due to their small numbers in this study, which prevented reliable subgroup analyses. Individuals who did not provide data on lifetime HIV testing ($n = 5634$; 4.84%) were also excluded. Thus, our final analytic sample included 113,068 White, Black, Latinx, and Asian U.S. women ($n = 60,867$) and men ($n = 52,201$) who self-identified as heterosexual, bisexual, or gay or lesbian with no missing data on lifetime HIV testing.

Measures

Sexual orientation identity was assessed by asking participants, “Which of the following best represents how you

think of yourself?” Study participants were categorized as follows in terms of sexual orientation identity: “gay/lesbian,” “straight, that is, not gay” (henceforth, heterosexual), and “bisexual.” Participants self-reported both Hispanic ethnicity and race and were then categorized based on their race/ethnicity as Hispanic (namely, Puerto Rican, Cuban/Cuban American, Dominican, Mexican, Mexican American, Central or South American, “other” Latin American, and “other” Hispanic/Latino/Spanish individuals; henceforth, Latinx), non-Hispanic White (henceforth, White), non-Hispanic Black/African American (henceforth, Black), and non-Hispanic Asian (namely, Indian, Chinese, Filipino/a, Japanese, Korean, Vietnamese, and “other” Asian individuals; henceforth, Asian). Sex was ascertained through a self-reported measure with two response categories: male or female. The outcome of interest, lifetime HIV testing (yes/no), was assessed by using the following item: “Except for tests you may have had as part of blood donations, have you ever been tested for HIV?” Covariates (shown in Table 1 with their categorization) included demographic (i.e., age, nativity, geographic region, and relationship status), socioeconomic (i.e., educational attainment and employment status), and health care (i.e., health insurance status, usual place of care, and number of health care visits in the past year) factors. The proportion of missing data for covariates was small and ranged from 0.03% ($n=36$) for nativity to 0.18% ($n=190$) for relationship status. NHIS staff imputed race/ethnicity for those missing data on this variable by using hot-deck imputation.³⁸

Statistical analysis

We assessed the percentage distribution of covariates and lifetime HIV testing overall and in relation to sexual orientation identity and race/ethnicity among U.S. women (i.e., those who selected “female”) and men (i.e., those who selected “male”) aged 18–64 years. Distributions were age standardized by using direct standardization based on the 2010 U.S. Census.^{39,40} Using the adjusted Wald test, we assessed differences in the prevalence of lifetime HIV testing both across and within sexual orientation identity and racial/ethnic groups among women and men. We then tested for a statistical interaction between sexual orientation identity and race/ethnicity in relation to lifetime HIV testing among women and men on the multiplicative scale using logistic regression modeling (adjusting for survey year only).

Moreover, we estimated stratified multivariable logistic regression models to assess differences in the odds of lifetime HIV testing by race/ethnicity (reference: White) among sexual orientation identity groups and by sexual orientation identity (reference: heterosexual) among racial/ethnic groups.

Further, we used a 12-category variable that combined sexual orientation identity and race/ethnicity and multivariable logistic regression to assess difference in the odds of having ever received an HIV test among sexual orientation identity and racial/ethnic subgroups (reference: White heterosexual). We first estimated these models adjusting for survey year only and then added age followed by other demographic factors (selected a priori based on the scientific literature and conceptualized as potential confounders) into the models. All analyses were conducted in Stata 15

(StataCorp LLC, College Station, TX) and adjusted for the NHIS’s complex survey design. This study, which relied on the analysis of publicly available, de-identified data, was deemed to be exempt from Institutional Review Board (IRB) review by the Office of Human Research Administration at Harvard Longwood Medical Area.

Results

Tables 1 and 2 show that, overall, most U.S. women and men were born in the United States, living in the South, married, working for pay, and insured, had at least some college education and a usual place of care, and received one to five health care visits in the past year—with variation across sexual orientation identity and racial/ethnic subgroups of women and men. Further, Table 3 indicates that a total of 49.8% of women and 41.4% of men had received an HIV test at some point in their lives. Among women, Black lesbian (74.1%) and bisexual (74.0%) women had the highest age-standardized prevalence whereas Asian lesbian women (32.5%) had the lowest age-standardized prevalence of lifetime HIV testing (Table 3 and Figure 1A). Moreover, among men, the age-standardized prevalence of lifetime HIV testing was the highest among Latino gay men (92.6%), followed by Black (86.7%) and White (85.1%) gay men, and the lowest among Asian heterosexual men (32.0%; Table 3 and Figure 1B).

We found a statistically significant interaction between sexual orientation identity and race/ethnicity in relation to lifetime HIV testing among both U.S. women ($p=0.04$) and men ($p=0.01$) on the multiplicative scale (adjusting for survey year only). Table 4 indicates that, among heterosexual women, Black (odds ratio [OR]=2.68; 95% confidence interval [CI]: 2.50–2.88) and Latina (OR=1.28; 95% CI: 1.19–1.37) women had significantly higher odds whereas Asian women (OR=0.71; 95% CI: 0.64–0.78) had significantly lower odds of ever receiving an HIV test compared with White women, adjusting for survey year, age, and other demographic factors (Model 3, Table 4). Further, Black bisexual (OR=3.40; 95% CI: 1.97–5.87) and lesbian (OR=3.08; 95% CI: 1.94–4.88) women had significantly higher adjusted odds of ever receiving an HIV test relative to their White counterparts. In contrast, we observed no statistically significant difference between Latina and White women among bisexual or lesbian women. Although Asian women had appreciably lower adjusted odds of lifetime HIV testing than White women among bisexual and lesbian women, this difference was not statistically significant. Moreover, White bisexual (OR=1.85; 95% CI: 1.50–2.29) and lesbian (OR=1.37; 95% CI: 1.11–1.70) women and Black bisexual women (OR=1.71; 95% CI: 1.06–2.76) had significantly higher adjusted odds of lifetime HIV testing compared with their heterosexual counterparts.

In contrast, we observed no statistically significant sexual orientation identity-related differences among Latina women. Although bisexual and lesbian women had appreciably lower adjusted odds of lifetime HIV testing than their heterosexual counterparts among Asian women, these differences were not statistically significant. Lastly, compared with White heterosexual women, Black (OR=2.69; 95% CI: 2.50–2.88) and Latina (OR=1.28; 95% CI: 1.20–1.38) heterosexual women, White (OR=1.80; 95% CI: 1.46–2.22) and Black

TABLE 1. AGE-STANDARDIZED PERCENTAGE DISTRIBUTION OF DEMOGRAPHIC, SOCIOECONOMIC, AND HEALTH CARE FACTORS IN RELATION TO SEXUAL ORIENTATION IDENTITY AND RACE/ETHNICITY AMONG U.S. WOMEN AGED 18–64 YEARS (N=60,867)

Variable (%)	Total (n = 35,966)	White heterosexual (n = 8844)	Black heterosexual (n = 10,705)	Asian heterosexual (n = 3424)	White bisexual (n = 638)	Black bisexual (n = 123)	Latina bisexual (n = 126)	Asian bisexual (n = 21)	White lesbian (n = 662)	Black lesbian (n = 169)	Latina lesbian (n = 158)	Asian lesbian (n = 31)
Age (years)												
18–29	24.0	21.7	25.5	28.0	26.8	49.4	61.7	63.9	66.4	21.4	37.8	21.5
30–39	22.0	19.7	23.0	28.7	26.8	26.0	18.6	22.6	3.1	20.3	18.8	40.1
40–49	19.9	19.7	19.9	20.9	11.3	10.3	11.0	25.4	20.3	17.6	19.3	18.3
50–64	34.1	38.9	31.6	22.3	13.3	9.4	2.5	5.2	38.0	14.6	24.1	20.1
U.S.-born: yes	82.8	94.8	89.2	44.8	96.5	97.8	57.8	41.9	97.1	96.5	60.8	37.0
Geographic region												
Northeast	17.0	17.7	15.0	15.3	16.6	9.0	12.7	21.8	18.0	10.7	17.6	32.0
Midwest	22.9	28.4	16.7	9.2	24.3	27.2	8.1	25.2	23.5	24.5	8.6	11.0
South	38.3	34.2	61.5	38.4	31.9	57.5	30.5	9.8	34.2	54.7	30.6	20.5
West	21.8	19.7	6.9	37.1	27.2	6.3	48.7	43.2	24.3	10.1	43.2	36.5
Relationship status												
Never married	28.2	23.8	48.2	25.5	33.1	62.2	36.1	48.8	42.4	70.1	42.2	42.0
Married	44.1	48.9	21.3	44.7	22.9	4.6	33.0	28.8	23.1	9.6	18.0	18.2
Living with a partner	7.5	7.8	5.0	8.1	14.3	6.8	12.5	7.4	25.8	8.4	25.6	26.2
Divorced, widowed, or separated	20.1	19.4	25.5	21.6	29.6	26.4	18.4	15.0	8.7	11.9	14.3	13.6
Educational attainment												
Less than high school degree	10.1	5.5	13.2	29.0	6.6	16.6	38.7	3.9	5.0	15.8	17.6	9.1
High school diploma or GED	21.1	19.8	25.4	24.5	16.2	33.1	19.5	3.8	14.3	24.8	18.9	6.2
Some college or associate's degree	33.9	34.9	37.7	29.5	38.7	35.7	26.4	16.9	33.1	39.4	34.2	38.0
Bachelor's degree or more	34.8	39.9	23.6	16.9	38.5	14.6	15.4	75.5	47.6	20.1	29.3	46.7
Working for pay: yes	67.4	70.1	64.6	60.7	71.4	56.1	64.7	74.3	75.1	62.3	70.9	62.9
Uninsured: yes	12.5	9.0	13.9	26.0	11.8	20.7	25.7	0.0	12.5	19.3	18.3	14.3
Has usual place of care: yes	87.9	89.2	90.2	82.7	84.9	85.4	83.3	91.3	84.3	80.8	81.0	77.1
No. of health care visits in the past year												
None	13.8	11.3	13.6	21.4	11.7	12.8	15.4	8.4	16.7	21.6	22.6	23.1
1–5	60.2	60.2	63.7	57.2	49.3	56.4	62.9	32.0	52.5	53.2	52.9	63.1
6–12	16.7	18.0	16.1	14.0	21.4	26.8	11.0	5.1	17.0	18.5	10.3	11.7
13 or more	9.3	10.5	6.6	7.4	17.5	4.0	10.7	54.4	13.8	6.7	14.3	2.0

All prevalence estimates (%) account for the complex survey design and may not add to 100.0% due to rounding error. Distributions of all covariates other than age are age-standardized based on the 2010 U.S. Census.

TABLE 2. AGE-STANDARDIZED PERCENTAGE DISTRIBUTION OF DEMOGRAPHIC, SOCIOECONOMIC, AND HEALTH CARE FACTORS IN RELATION TO SEXUAL ORIENTATION
IDENTITY AND RACE/ETHNICITY AMONG U.S. MEN AGED 18–64 YEARS (N=52,201)

Variable (%)	Total (n = 32,685)	White heterosexual (n = 6011)	Black heterosexual (n = 8733)	Latino heterosexual (n = 3168)	White bisexual (n = 243)	Black bisexual (n = 36)	Latino bisexual (n = 60)	Asian bisexual (n = 18)	White gay (n = 859)	Black gay (n = 130)	Latino gay (n = 208)	Asian gay (n = 50)
Age (years)												
18–29	25.0	23.3	26.0	29.1	28.4	47.1	31.9	37.6	31.8	37.6	31.7	50.2
30–39	21.2	19.6	20.7	27.1	26.3	14.9	28.0	25.0	31.9	21.1	20.9	28.9
40–49	20.6	20.1	20.3	22.4	23.3	10.5	16.7	15.2	20.0	20.9	25.2	11.4
50–64	33.2	36.9	32.9	21.4	22.0	27.5	23.3	22.1	36.2	20.4	22.3	9.4
U.S.-born: yes	82.0	94.7	85.0	42.7	24.0	97.3	82.7	45.9	95.6	96.5	53.6	52.5
Geographic region												
Northeast	16.7	17.4	14.6	13.6	20.6	15.7	23.8	13.0	17.6	23.8	18.6	17.4
Midwest	24.3	29.5	19.3	10.2	13.7	29.5	31.6	19.9	22.6	15.5	8.4	4.9
South	36.0	32.7	57.8	38.3	24.7	26.2	39.3	38.8	32.5	48.8	35.6	18.6
West	22.9	20.4	8.2	37.8	41.1	28.6	5.4	28.3	27.3	11.9	37.5	59.1
Relationship status												
Never married	32.7	31.2	40.4	27.8	32.7	53.6	63.5	45.5	59.3	73.5	53.1	83.6
Married	44.8	46.3	32.0	49.4	57.1	19.1	16.4	18.9	15.7	8.6	17.5	15.9
Living with a partner	7.6	7.3	8.4	9.0	2.3	7.9	9.9	7.6	18.5	8.5	18.1	0.6
Divorced, widowed, or separated	14.9	15.3	19.2	13.8	7.9	19.4	10.2	28.0	6.5	9.5	11.3	0.0
Educational attainment												
Less than high school degree	11.0	7.1	12.2	30.6	6.4	6.1	16.6	19.9	2.9	9.1	10.8	1.2
High school diploma or GED	24.9	24.1	33.5	27.4	12.3	17.6	26.6	23.9	13.8	25.6	19.8	9.6
Some college or associate's degree	31.3	33.1	32.3	26.4	20.4	39.6	26.2	29.2	30.4	38.6	31.1	13.7
Bachelor's degree or more	32.8	35.7	21.9	15.6	60.9	36.7	30.6	27.0	52.9	26.7	38.3	75.5
Working for pay: yes	77.4	78.5	68.2	79.6	79.5	72.3	44.9	74.2	76.2	63.0	80.0	86.9
Uninsured: yes	15.7	11.7	20.2	31.0	10.0	15.7	30.2	10.4	9.5	16.8	22.6	6.3
Has usual place of care: yes	78.4	80.2	78.7	69.6	78.1	78.9	79.4	71.2	86.3	83.4	80.6	84.6
No. of health care visits in the past year												
None	27.6	25.3	29.4	37.5	29.0	24.1	25.7	24.0	13.8	19.5	20.4	16.5
1–5	57.5	58.9	56.9	51.1	62.1	49.4	54.7	46.1	60.8	65.5	49.8	75.5
6–12	9.9	10.5	9.7	7.8	6.5	14.8	15.3	23.0	13.9	10.0	20.3	3.7
13 or more	5.0	5.4	4.0	3.5	2.5	11.7	4.4	6.9	11.5	4.9	9.5	4.3

All prevalence estimates (%) account for the complex survey design and may not add to 100.0% due to rounding error. Distributions of all covariates other than age are age-standardized based on the 2010 U.S. Census.

TABLE 3. AGE-STANDARDIZED PREVALENCE OF EVER RECEIVING AN HIV TEST IN RELATION TO SEXUAL ORIENTATION IDENTITY AND RACE/ETHNICITY AMONG U.S. WOMEN AND MEN AGED 18–64 YEARS (N=113,068)

Variable (%)	Women (n=60,867)			Men (n=52,201)		
	Total % (95% CI)	Heterosexual (n=58,939) % (95% CI)	Bisexual (n=908) % (95% CI)	Lesbian (n=1020) % (95% CI)	Total % (95% CI)	Heterosexual (n=50,597) % (95% CI)
Bisexual (n=357) % (95% CI)						
Gay (n=1247) % (95% CI)						
Total	49.8 (49.2–50.4)	49.5 (48.9–50.1)	66.6 (62.0–70.9)*	55.9 (52.4–59.5)*	41.4 (40.7–42.1)	40.1 (39.4–40.8)
Race/ethnicity						
White	46.1 (45.3–46.8)	45.7 (44.9–46.4)	66.0 (60.7–70.8)*	52.1 (47.4–56.7)*	38.3 (37.5–39.0)	36.9 (36.1–37.7)
Black	68.0 (66.7–69.2)**	67.8 (66.4–69.0)**	74.0 (61.9–83.2)	74.1 (65.9–80.8)**	61.9 (60.4–63.4)**	61.2 (59.7–62.7)**
Latino	53.0 (51.7–54.3)**	52.9 (51.5–54.2)**	67.8 (54.6–78.7)*	57.0 (47.9–65.7)	42.9 (41.4–44.3)**	41.5 (40.0–42.9)**
Asian	37.2 (35.4–39.0)**	37.3 (35.4–39.2)**	63.5 (52.8–73.0)*	32.5 (18.1–51.2)**	32.6 (30.4–34.8)**	32.0 (29.9–34.2)**

Prevalence estimates (%) and 95% CIs account for the complex sampling design and are age-standardized based on the 2010 U.S. Census.

*p-Value <0.05 for comparisons between heterosexual (reference), bisexual, and lesbian/gay women and men using adjusted Wald tests.

**p-Value <0.05 for comparisons between White (reference), Black, Latino, and Asian women and men using adjusted Wald tests. CI, confidence interval.

(OR=5.24; 95% CI: 3.20–8.58) bisexual women, and White (OR=1.34; 95% CI: 1.08–1.66) and Black (OR=3.84; 95% CI: 2.60–5.65) lesbian women had significantly higher adjusted odds whereas Asian heterosexual women (OR=0.71; 95% CI: 0.65–0.79) had significantly lower adjusted odds of lifetime HIV testing. Although Latina bisexual and lesbian women appeared to have higher adjusted odds whereas Asian bisexual and lesbian women appeared to have lower fully adjusted odds of lifetime HIV testing than White heterosexual women, these differences were not statistically significant (Model 3, Table 4).

Table 4 also shows that Black heterosexual men (OR=2.74; 95% CI: 2.55–2.94) had significantly higher adjusted odds whereas Asian heterosexual men (OR=0.72; 95% CI: 0.64–0.80) had significantly lower adjusted odds of obtaining an HIV test in their lifetime compared with their White counterparts (Model 3). Among bisexual men, Black (OR=2.67; 95% CI: 1.14–6.29) and Latino (OR=2.63; 95% CI: 1.17–5.91) men had significantly higher adjusted odds of lifetime HIV testing relative to White men. Although the adjusted odds of lifetime HIV testing were appreciably lower among Asian compared with White bisexual men, this difference was not statistically significant. Further, among gay men, Latino men (OR=2.26; 95% CI: 1.19–4.29) had significantly higher adjusted odds whereas Asian men (OR=0.45; 95% CI: 0.21–0.99) had significantly lower adjusted odds of ever receiving an HIV test compared with White men. Although Black men appeared to have higher adjusted odds of lifetime HIV testing than White men among gay men, this difference was not statistically significant. In addition, bisexual (OR=2.04; 95% CI: 1.47–2.82) and gay (OR=10.10; 95% CI: 8.09–12.62) men had significantly higher adjusted odds of lifetime HIV testing relative to heterosexual men among White men; we observed similar differences between Latino bisexual (OR=2.89; 95% CI: 1.55–5.38) and gay (OR=17.92; 95% CI: 10.29–31.19) men and their heterosexual counterparts.

Among Black men, bisexual and gay men appeared to have higher adjusted odds of lifetime HIV testing relative to heterosexual men; however, the difference was only statistically significant for gay men (OR=4.86; 95% CI: 2.74–8.62). Among Asian men, we observed no appreciable difference between bisexual and heterosexual men but found that gay men had significantly higher adjusted odds of lifetime HIV testing relative to their heterosexual counterparts (OR=6.43; 95% CI: 3.46–11.94). Lastly, compared with White heterosexual men, Black heterosexual men (OR=2.74; 95% CI: 2.55–2.94), White (OR=2.03; 95% CI: 1.48–2.80), Black (OR=4.98; 95% CI: 2.14–11.61), and Latino (OR=3.09; 95% CI: 1.70–5.64) bisexual men, and White (OR=10.13; 95% CI: 8.11–12.64), Black (OR=12.91; 95% CI: 7.36–22.64), Latino (OR=19.19; 95% CI: 11.01–33.44), and Asian (OR=5.14; 95% CI: 2.76–9.56) gay men had significantly higher adjusted odds whereas Asian heterosexual men (OR=0.72; 95% CI: 0.64–0.81) had significantly lower adjusted odds of lifetime HIV testing. In contrast, we observed no appreciable difference between Latino and White heterosexual men. Although Asian bisexual men appeared to have lower adjusted odds of lifetime HIV testing than White heterosexual men, this difference was not statistically significant (Model 3, Table 4).

FIG. 1. Age-standardized prevalence of lifetime HIV testing among sexual orientation identity and racial/ethnic subgroups of U.S. women (A) and men (B) aged 18–64 years ($N=113,068$). HIV, human immunodeficiency virus.

Discussion

Using intersectionality^{30–35} as an analytic framework allowed us to address many of the conceptual and methodological limitations of prior studies on sexual orientation, race/ethnicity, and lifetime HIV testing among U.S. women and men. Indeed, unlike prior research,^{16,17} our study examined not only sexual orientation identity-related differences in lifetime HIV testing within racial/ethnic groups but also race/ethnicity-related differences within sexual orientation identity groups of women and men separately. Moreover, this study also compared the prevalence of ever receiving an HIV test among sexual orientation identity and racial/ethnic subgroups of women and men relative to their White heterosexual counterparts. In addition, these analyses included Asian women and men, who have been excluded from most prior research on HIV testing, and disaggregated gay or lesbian and bisexual individuals, who have been combined into single categories in several previous studies.^{16,17} Therefore, our study provides a more comprehensive assessment of the mutually influencing effects of sexual orientation identity and race/ethnicity on lifetime HIV testing among U.S. women and men, which will help inform the development of tailored culturally relevant and structurally competent interventions.

By using an intersectional approach and a large national probability sample, this study identified previously unanalyzed, nationally representative prevalence estimates and patterns in lifetime HIV testing related to both sexual orientation identity and race/ethnicity among U.S. women and men. Specifically, we found that the prevalence of lifetime HIV testing was below the *Healthy People 2020* objective of 73.6%³⁶ among most sexual orientation identity and racial/ethnic subgroups of women and men, with the exception of Black lesbian and bisexual women and White, Black, and Latino gay men. Further, our study extends the findings of prior research^{16,17} by identifying a statistically significant interaction between sexual orientation identity and race/ethnicity on the multiplicative scale in relation to the odds of lifetime HIV testing among both women and men and indicating that social factors related to being a Black woman, a Black or Latino man, a bisexual woman, or a gay man in U.S. society may independently or simultaneously be associated with higher adjusted odds of lifetime HIV testing whereas social factors linked to being Asian may be associated with lower odds of ever receiving an HIV test.

Specifically, we found that the adjusted odds of lifetime HIV testing may be higher among Black women and Black (and in some cases Latino) men and lower among Asian women and men compared with their White counterparts across all sexual orientation identity groups. In addition,

TABLE 4. ADJUSTED ODDS OF EVER RECEIVING AN HIV TEST IN RELATION TO SEXUAL ORIENTATION IDENTITY AND RACE/ETHNICITY AMONG U.S. WOMEN AND MEN AGED 18–64 YEARS (N= 113,068)

Variable	Women (n = 60,867)			Men (n = 52,201)		
	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)
Sexual Orientation Identity-Stratified Models						
Heterosexual	1.00	1.00	1.00	1.00	1.00	1.00
White (reference)						
Black	2.63 (2.47–2.81)	2.60 (2.43–2.78)	2.68 (2.50–2.88)	2.71 (2.53–2.90)	2.77 (2.58–2.97)	2.74 (2.55–2.94)
Latina/o	1.50 (1.42–1.60)	1.33 (1.25–1.41)	1.28 (1.19–1.37)	1.23 (1.15–1.31)	1.20 (1.12–1.28)	1.05 (0.97–1.13)
Asian	0.80 (0.73–0.87)	0.69 (0.64–0.76)	0.71 (0.64–0.78)	0.82 (0.74–0.91)	0.80 (0.72–0.89)	0.72 (0.64–0.80)
Bisexual						
White (reference)	1.00	1.00	1.00	1.00	1.00	1.00
Black	2.38 (1.46–3.88)	2.71 (1.60–4.57)	3.40 (1.97–5.87)	2.47 (1.02–5.98)	2.21 (0.90–5.41)	2.67 (1.14–6.29)
Latina/o	0.80 (0.51–1.26)	0.88 (0.55–1.40)	0.97 (0.61–1.54)	1.83 (0.95–3.54)	1.67 (0.83–3.33)	2.63 (1.17–5.91)
Asian	0.27 (0.10–0.73)	0.33 (0.12–0.90)	0.41 (0.14–1.20)	0.46 (0.14–1.55)	0.41 (0.11–1.47)	0.65 (0.17–2.42)
Lesbian/gay						
White (reference)	1.00	1.00	1.00	1.00	1.00	1.00
Black	2.97 (1.92–4.58)	3.03 (1.95–4.71)	3.08 (1.94–4.88)	1.15 (0.64–2.06)	1.30 (0.69–2.46)	1.43 (0.75–2.73)
Latina/o	1.11 (0.73–1.68)	1.16 (0.75–1.79)	1.10 (0.67–1.81)	2.09 (1.15–3.78)	2.21 (1.22–4.01)	2.26 (1.19–4.29)
Asian	0.48 (0.20–1.15)	0.42 (0.17–1.06)	0.40 (0.15–1.08)	0.54 (0.28–1.04)	0.64 (0.33–1.23)	0.45 (0.21–0.99)
Race/Ethnicity-Stratified Models						
White	1.00	1.00	1.00	1.00	1.00	1.00
Heterosexual (reference)						
Bisexual	2.11 (1.73–2.57)	1.96 (1.60–2.40)	1.85 (1.50–2.29)	1.81 (1.33–2.46)	2.10 (1.53–2.87)	2.04 (1.47–2.82)
Lesbian/gay	1.36 (1.12–1.65)	1.37 (1.11–1.67)	1.37 (1.11–1.70)	9.96 (8.01–12.40)	10.38 (8.35–12.89)	10.10 (8.09–12.62)
Black						
Heterosexual (reference)	1.00	1.00	1.00	1.00	1.00	1.00
Bisexual	1.82 (1.15–2.88)	1.63 (1.02–2.60)	1.71 (1.06–2.76)	1.71 (0.73–4.00)	1.73 (0.75–4.00)	1.81 (0.76–4.28)
Lesbian/gay	1.48 (1.01–2.18)	1.28 (0.87–1.89)	1.29 (0.87–1.91)	4.27 (2.47–7.39)	4.59 (2.62–8.05)	4.86 (2.74–8.62)
Latina/o						
Heterosexual (reference)	1.00	1.00	1.00	1.00	1.00	1.00
Bisexual	1.11 (0.75–1.66)	1.09 (0.73–1.63)	1.03 (0.68–1.55)			
Lesbian/gay	1.02 (0.70–1.50)	1.09 (0.73–1.61)	1.02 (0.70–1.50)	2.62 (1.44–4.76)	2.79 (1.53–5.11)	2.89 (1.55–5.38)
Asian				16.94 (9.69–29.63)	17.91 (10.31–31.12)	17.92 (10.29–31.19)
Heterosexual (reference)	1.00	1.00	1.00	1.00	1.00	1.00
Bisexual	0.78 (0.30–2.05)	0.90 (0.33–2.42)	0.79 (0.30–2.12)	1.05 (0.35–3.15)	1.07 (0.33–3.46)	0.98 (0.32–3.03)
Lesbian/gay	0.86 (0.37–1.97)	0.76 (0.31–1.86)	0.64 (0.25–1.68)	6.14 (3.21–11.78)	6.82 (3.72–12.53)	6.43 (3.46–11.94)

(continued)

TABLE 4. (CONTINUED)

Variable	Women (n = 60,867)			Men (n = 52,201)		
	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)
Sexual Orientation Identity and Racial/Ethnic Subgroups						
White heterosexual (reference)	1.00	1.00	1.00	1.00	1.00	1.00
Black heterosexual	2.63 (2.47–2.81)	2.60 (2.43–2.79)	2.69 (2.50–2.88)	2.71 (2.53–2.90)	2.77 (2.59–2.97)	2.74 (2.55–2.94)
Latinx heterosexual	1.50 (1.42–1.60)	1.33 (1.25–1.41)	1.28 (1.20–1.38)	1.23 (1.15–1.31)	1.20 (1.12–1.28)	1.05 (0.97–1.14)
Asian heterosexual	0.80 (0.73–0.87)	0.70 (0.64–0.76)	0.71 (0.65–0.79)	0.82 (0.74–0.91)	0.80 (0.72–0.89)	0.72 (0.64–0.81)
White bisexual	2.10 (1.73–2.57)	1.92 (1.56–2.35)	1.80 (1.46–2.22)	1.81 (1.33–2.46)	2.08 (1.53–2.85)	2.03 (1.48–2.80)
Black bisexual	4.82 (3.03–7.68)	4.63 (2.87–7.47)	5.24 (3.20–8.58)	4.54 (1.91–10.78)	4.70 (2.00–11.00)	4.98 (2.14–11.61)
Latinx bisexual	1.69 (1.13–2.52)	1.49 (0.99–2.24)	1.39 (0.93–2.10)	3.20 (1.77–5.80)	3.41 (1.89–6.16)	3.09 (1.70–5.64)
Asian bisexual	0.63 (0.24–1.62)	0.60 (0.22–1.60)	0.57 (0.21–1.50)	0.85 (0.29–2.50)	0.85 (0.27–2.73)	0.77 (0.24–2.46)
White lesbian/gay	1.36 (1.12–1.64)	1.36 (1.11–1.67)	1.34 (1.08–1.66)	9.96 (8.00–12.39)	10.33 (8.31–12.83)	10.13 (8.11–12.64)
Black lesbian/gay	3.92 (2.67–5.75)	3.51 (2.40–5.13)	3.84 (2.60–5.65)	11.62 (6.73–20.06)	12.60 (7.22–21.96)	12.91 (7.36–22.64)
Latinx lesbian/gay	1.53 (1.05–2.22)	1.47 (0.99–2.20)	1.37 (0.91–2.06)	20.81 (11.85–36.57)	21.89 (12.57–38.11)	19.19 (11.01–33.44)
Asian lesbian/gay	0.68 (0.29–1.55)	0.53 (0.22–1.28)	0.49 (0.19–1.25)	5.14 (2.70–9.79)	5.73 (3.13–10.50)	5.14 (2.76–9.56)

Bolded values refer to ORs with 95% CIs that exclude 1. Model 1 is adjusted for survey year only. Model 2 adds age to Model 1. Model 3 adds other demographic factors (i.e., nativity, geographic region, and relationship status) to Model 2. All models account for the complex survey design.

OR, odds ratio.

bisexual women had higher adjusted odds of lifetime HIV testing relative to heterosexual women among Black and White women, and gay men had higher adjusted odds of lifetime HIV testing compared with heterosexual men among White, Black, Latino, and Asian men. Moreover, our results show that women who identified as both Black and bisexual had the highest adjusted odds of lifetime HIV testing among all subgroups of women relative to White heterosexual women. In addition, men who identified as both Black or Latino and gay had the highest adjusted odds of lifetime HIV testing among all subgroups of men relative to White heterosexual men. In contrast, Asian women and men from all sexual orientation identities (with the exception of Asian gay men) may have lower adjusted odds of lifetime HIV testing relative to their White heterosexual counterparts.

We used intersectionality to interpret observed differences in lifetime HIV testing in relation to sexual orientation identity and race/ethnicity among U.S. women and men. First, the higher adjusted odds of lifetime HIV testing among Black heterosexual, bisexual, and gay men and White and Latino bisexual and gay men (especially Black and Latino gay and bisexual men) relative to White heterosexual men may be due to the elevated prevalence of HIV/AIDS among Black and Latino men and bisexual and gay men in general and Black and Latino gay and bisexual men in particular.⁶ The high burden of HIV/AIDS in these populations may lead to increased health care provider recommendation of HIV testing (indeed, HIV testing is recommended annually for MSM as opposed to once in a lifetime¹²) as well as uptake of HIV tests in these groups compared with others with a lower prevalence of HIV/AIDS.^{17,41} Further, HIV testing and prevention campaigns tend to target Black and MSM communities in general⁴² and Black^{43,44} and Latino MSM^{45–47} in particular, which may facilitate awareness of, access to, and utilization of HIV tests in these populations. In addition, health care providers' stereotypes about Black and Latinx individuals' and gay and bisexual men's sexual behavior (e.g., multiple sexual partners, unprotected sex) may, both alone and together, lead them to assume that individuals from these groups (especially Black and Latino gay and bisexual men) are at high risk for HIV and encourage them to obtain HIV tests more frequently than their White and heterosexual counterparts, regardless of their personal HIV risk profile.^{48–52}

Second, the higher adjusted odds of lifetime HIV testing among Black heterosexual, bisexual, and lesbian women and White bisexual and lesbian women (especially Black bisexual women) compared with White heterosexual women may be due to the high prevalence of HIV risk factors among Black^{53,54} and bisexual^{3–5} women in general and Black bisexual women in particular,^{8,9} which may lead to higher health care provider recommendation and patient uptake of HIV testing in these groups relative to others. Moreover, bias, assumptions, and stereotypes pertaining to Black and bisexual women's sexuality (e.g., erroneous and racist beliefs of promiscuity and hypersexuality) may lead health care providers to recommend HIV tests more frequently to women from these groups (especially Black bisexual women) than to White and heterosexual women, regardless of their individual sexual histories and HIV risk.^{48,49,51,52,55–58}

Third, the lower adjusted odds of lifetime HIV testing among Asian heterosexual women and men, and possibly

also Asian bisexual women and men and Asian lesbian women, relative to their White heterosexual counterparts may be due to HIV-related stigma,⁵⁹ low self-perceived HIV risk,^{60,61} immigration- and language-related barriers to health care,⁶² a lack of culturally relevant and linguistically appropriate HIV testing services and campaigns,^{63,64} and health care provider perceptions of low HIV risk and lack of HIV testing recommendation among these groups.⁶⁵

Limitations

Although our study relied on a large national probability sample and addressed several gaps in the scientific literature, our results should be interpreted in light of some limitations. First, analyses were based on self-reported, cross-sectional data such that HIV testing was not confirmed by using medical records and temporality and causality could not be established. Second, as a result of their small numbers in our study, estimates for Asian individuals often did not reach statistical significance, and we were not able to include Native American and multiracial individuals in the present analyses. Third, gender identity was not explicitly measured in the survey, and it is not possible to know whether participants responded to the survey's sex question based on their assigned sex at birth or current gender identity; thus, we were unable to categorize participants based on their self-reported gender identity or transgender status. Fourth, this study did not identify potential mechanisms of lifetime HIV testing differences at the intersection of sexual orientation identity and race/ethnicity among women and men, which would have helped identify potential interventions that may mitigate disparities and increase low levels of HIV testing. Lastly, although we conceptualized sexual orientation identity and race/ethnicity as individual-level social categories linked to both social identity and social inequality per intersectionality,^{30–32} we were unable to assess the effect of heterosexism or racism on lifetime HIV testing in this study.

Future research directions

Therefore, research that includes larger numbers of under- or un-represented sexual orientation identity, racial/ethnic, and gender identity subgroups, leverages longitudinal study designs, and examines the role of potential mechanisms is warranted. Moreover, studies that include measures of heterosexism, racism, sexism, and transphobia at the interpersonal and structural level are needed to further elucidate differences in lifetime HIV testing among sexual orientation identity, racial/ethnic, and gender identity subgroups from an intersectional perspective. Moreover, research that examines how other social categories (e.g., socioeconomic position, nativity) and related forms of discrimination (e.g., classism, xenophobia) intersect with sexual orientation identity and heterosexism, race/ethnicity and racism, and gender identity and sexism and transphobia to shape lifetime HIV testing in the United States is also warranted. Lastly, additional quantitative and qualitative research is needed to understand how social factors at the individual (e.g., HIV risk perceptions), interpersonal (e.g., patient-provider communication), institutional (e.g., access to health insurance), community (e.g., HIV testing norms), and structural (e.g., state health policies) levels contribute to differences in lifetime HIV testing across and within

social groups situated at the intersection of sexual orientation, race/ethnicity, gender identity, and other social categories.

Conclusion

Using an intersectional approach to design our study, conceptualize our variables, analyze our data, and interpret our study results allowed us to identify and begin to understand the previously unanalyzed distribution of lifetime HIV testing in relation to both sexual orientation identity and race/ethnicity among U.S. women and men, including among multiply marginalized subgroups that are undertested or disproportionately affected by HIV/AIDS. Our findings suggest that, among the vast majority of sexual orientation identity and racial/ethnic subgroups of women and men with a prevalence of lifetime HIV testing below the *Healthy People 2020* objective of 73.6%,³⁶ culturally relevant, linguistically appropriate, and structurally competent health care practices (e.g., health care provider recommendation^{66–69}) and public health initiatives (e.g., community-based programs^{70,71}) that facilitate awareness of, access to, and utilization of HIV tests according to CDC guidelines are needed.

In addition, our study results indicate that patient-centered lifetime HIV testing interventions that address and are tailored to the unique needs and experiences of Asian women and men from diverse sexual orientation identity backgrounds, among whom lifetime HIV testing tended to be particularly low, are especially warranted. Further, among sexual orientation identity and racial/ethnic subgroups of women and men with a prevalence of lifetime HIV testing that meets the *Healthy People 2020* lifetime HIV testing objective, including Black lesbian and bisexual women and White, Black, and Latino gay men, health care institutions and public health programs should ensure that testing services address individuals' lived experiences at the intersection of sexual orientation identity and heterosexism and race/ethnicity and racism, relevant and accessible HIV prevention information and counseling is provided, HIV stigma is addressed, and HIV-positive individuals are linked to high-quality care.^{66,72–76} Together, these efforts will help prevent HIV/AIDS among diverse sexual orientation identity and racial/ethnic subgroups of U.S. women and men, including multiply marginalized subgroups that are undertested or disproportionately affected by HIV/AIDS—which will, in turn, help promote not only population health but also health equity vis-à-vis HIV-related outcomes.

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