Sociodemographic Characteristics and Health Outcomes Among Lesbian, Gay, and Bisexual U.S. Adults Using *Healthy People 2020* Leading Health Indicators

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Abstract

Purpose: This study aimed to characterize the sociodemographic characteristics of sexual minority (i.e., gay, lesbian, bisexual) adults and compare sexual minority and heterosexual populations on nine *Healthy People 2020* leading health indicators (LHIs).

Methods: Using a nationally representative, cross-sectional survey (National Health Interview Survey 2013–2015) of the civilian, noninstitutionalized population (228,893,944 adults), nine *Healthy People 2020* LHIs addressing health behaviors and access to care, stratified using a composite variable of sex (female, male) and sexual orientation (gay or lesbian, bisexual, heterosexual), were analyzed individually and in aggregate.

Results: In 2013–2015, sexual minority adults represented 2.4% of the U.S. population. Compared to heterosexuals, sexual minorities were more likely to be younger and to have never married. Gays and lesbians were more likely to have earned a graduate degree. Gay males were more likely to have a usual primary care provider, but gay/lesbian females were less likely than heterosexuals to have a usual primary care provider and health insurance. Gay males received more colorectal cancer screening than heterosexual males. Gay males, gay/lesbian females, and bisexual females were more likely to be current smokers than their sex-matched, heterosexual counterparts. Binge drinking was more common in bisexuals compared to heterosexuals. Sexual minority females were more likely to be obese than heterosexual females; the converse was true for gay males. Sexual minorities underwent more HIV testing than their heterosexual peers, but bisexual males were less likely than gay males to be tested. Gay males were more likely to meet all eligible LHIs than heterosexual males. Overall, more sexual minority adults met all eligible LHIs compared to heterosexual adults. Similar results were found regardless of HIV testing LHI inclusion.

Conclusion: Differences between sexual minorities and heterosexuals suggest the need for targeted health assessments and public health interventions aimed at reducing specific negative health behaviors.

Keywords: demographics, epidemiology, health outcomes, sexual minorities

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Introduction

SEXUAL AND GENDER MINORITIES (SGMs), including the lesbian, gay, bisexual, transgender, and queer (LGBTQ) communities, experience significant healthcare inequities.^{1,2} Prior studies have identified increased incidence of sexually transmitted infections,^{3,4} mood and anxiety disorders,⁵ and intimate partner violence⁶ among SGMs compared to their heterosexual and cisgender (i.e., not transgender) counterparts. Moreover, people in same-sex relationships have more unmet medical needs and lower rates of insurance coverage than individuals in opposite-sex relationships.⁷ The lack of sexual orientation and gender identity (SOGI) data collected in electronic health records and national surveys (including the U.S. census) limits the assessment, comparison, and estimation of population-based health outcomes among SGMs.

The National Institutes of Health recently charged the Institute of Medicine (IOM) (now National Academy of Medicine) with (1) identifying research gaps in SGM health outcomes and (2) formulating an SGM research agenda.¹ As part of this effort, the IOM recommended collecting SOGI data on federally funded surveys. Sexual orientation questions were subsequently added to the National Health Interview Survey (NHIS) in 2013, providing the first national sample of sexual minority people and their health.⁸ This inclusion has enabled researchers to begin analysis of sexual minority (i.e., not heterosexual) demographics, deleterious health behaviors, and preventive health measures.^{9–12}

Founded in 1979, *Healthy People* is a federal, science-based, national, health promotion and disease prevention initiative that aims to improve American health.¹³ The 2020 version (released in 2010) included “LGBT Health” as a topic area for the first time. *Healthy People 2020* contains more than 1200 objectives with 26 of them denoted as “Leading Health Indicators,” defined as “high-priority health issues.”¹⁴

Our aims were to characterize the sociodemographic characteristics of the U.S. sexual minority population and to compare various U.S. sexual minority populations to each other and to heterosexual populations on selected leading health indicators (LHIs) identified by *Healthy People 2020* using NHIS data.

Methods

Study design

The NHIS is an annual, cross-sectional, household interview survey of the civilian, noninstitutionalized population in all 50 U.S. states and the District of Columbia. Details about the NHIS design are reported elsewhere.¹⁵ NHIS uses a multistage area probability sampling design with face-to-face personal interviews to produce nationally representative estimates of the health and access to healthcare of the U.S. population. One adult (i.e., ≥18 years old) per sampled household is randomly selected and invited to participate in the Sample Adult component of the survey. Respondents provided oral consent before participation. We analyzed combined NHIS Sample Adult data from all years (2013–2015) in which sexual orientation was assessed and accounted for the complex NHIS design. The Centers for Disease Control and Prevention (CDC) National Center for Health Statistics

(NCHS) has legal authority to collect information about health, illness, and disability under the National Health Survey Act of 1956. NHIS was approved by the NCHS Research Ethics Review Board, and the CDC Institutional Review Board (IRB) gave approval to collect these data. IRB review for this analysis was deemed unnecessary because the data are deidentified with no ability to identify respondents.

Sociodemographic variables

To assess sexual orientation, respondents were asked, “Which of the following best represents how you think of yourself?” Responses included gay (or lesbian); straight, that is, not gay (or lesbian); bisexual; something else; or I don’t know the answer. Respondents who answered “straight, that is, not gay (or lesbian)” were considered heterosexual. Respondents who answered “something else” or “I don’t know the answer” were not included in this analysis because their sexual orientations were unknown. Sex was self-identified as male or female. Gender identity was not assessed in NHIS. As such, a composite variable using sex (female, male) and sexual orientation (gay or lesbian, bisexual, heterosexual) was created for additional analyses: heterosexual females, heterosexual males, gay/lesbian females, bisexual females, gay males, and bisexual males.

Age was grouped as 18–29, 30–39, 40–49, 50–64, or ≥65 years. Ethnicity and race were self-identified and categorized as Hispanic or non-Hispanic and as White, Black, or other. Marital status was grouped into married/living with partner, separated/divorced/widowed, and never married. Educational level was categorized as high school graduate or less, some college (no degree), college degree, or graduate degree. Individual annual earned income was categorized as \$0, \$1–\$19,999; \$20,000–\$34,999; \$35,000–\$54,999; \$55,000–\$74,999; or ≥\$75,000. If annual earned income was not reported, it was imputed using multiple-imputation methodology if the respondent worked for pay last year or had an employment status that was imputed to be employed for pay.¹⁶

Outcomes

Healthy People 2020, a national health promotion and disease prevention initiative, identified 26 LHIs to communicate high-priority health issues.¹⁴ For this study, all LHIs were reviewed to determine which indicators could be assessed. Nine indicators were selected and grouped into two categories: health behaviors (having a body mass index [BMI] <30, meeting physical activity guidelines, not being a smoker, not being a binge drinker) and access to care (having health insurance, having a primary care provider, seeing a dentist within the past 12 months, being tested for HIV infection, and receiving colorectal cancer screening) (Table 1).

Eligibility for some LHIs depended on age (i.e., the BMI outcome applied to those ≥20 years old; the colorectal cancer screening outcome applied to those 50–75 years old; and the health insurance outcome applied to those <65 years due to almost universal Medicare eligibility in older persons). Therefore, 18–19-year-old respondents were eligible for seven of the nine LHIs; 20–49-year olds were eligible for eight LHIs; 50–64-year olds were eligible for nine LHIs; 65–75-year olds were eligible for eight LHIs; and those 76 years or older were eligible for seven LHIs.

TABLE 1. NINE LEADING HEALTH INDICATORS FROM *HEALTHY PEOPLE 2020*

Number	Indicator	Description/original survey questions
1	Insurance coverage	Defined as having any type of health insurance or healthcare plan, including those obtained by employment, direct purchase, and government programs such as Medicare, Medigap, Medicaid, military healthcare/VA, CHAMPUS/TRICARE/CHAMPVA, Children's Health Insurance Program, and other state-sponsored or government-sponsored health plans.
2	Primary care provider	During the past 12 months, have you seen or talked to any of the following healthcare providers about your own health? ...A nurse practitioner, physician assistant, or midwife? ...A general doctor who treats a variety of illnesses (a doctor in general practice, family medicine, or internal medicine)? ...A doctor who specializes in women's health (an obstetrician/gynecologist)?
3	Colorectal cancer screening	During the past 12 months, have you had any test done for colon cancer? [Instruction to Interviewer: Read if necessary... Colon cancer tests include blood stool tests, colonoscopy, and sigmoidoscopy. A blood stool test is a test that may use a special kit at home to determine whether the stool contains blood. A sigmoidoscopy and colonoscopy are examinations in which a tube is inserted in the rectum to view the colon for signs of cancer or other health problems.]
4	BMI	How tall are you without shoes? How much do you weigh without shoes?
5	Dental care	About how long has it been since you last saw a dentist? Include all types of dentists, such as orthodontists, oral surgeons, and all other dental specialists, as well as dental hygienists.
6	HIV testing	The next question is about the test for HIV, the virus that causes AIDS. Except for tests you may have had as part of blood donations, have you ever been tested for HIV?
7	Current smoking	Have you smoked at least 100 cigarettes in your entire life? Do you now smoke cigarettes every day, some days, or not at all?
8	Physical activity	How often do you do light or moderate leisure-time physical activities for at least 10 minutes that cause only light sweating or a slight to moderate increase in breathing or heart rate? How often do you do vigorous leisure-time physical activities for at least 10 minutes that cause heavy sweating or large increases in breathing or heart rate? How often do you do leisure-time physical activities specifically designed to strengthen your muscles such as lifting weights or doing calisthenics? (Include all such activities even if you have mentioned them before.)
9	Binge drinking	In the past year, on how many days did you have (5 or more [for males]/4 or more [for females]) drinks of any alcoholic beverage?

For the original sources of the descriptions/survey questions, please refer to: U.S. Department of Health and Human Services: *Healthy People 2020* Leading Health Indicators. Available at www.healthypeople.gov/2020/leading-health-indicators/2020-LHI-Topics Accessed May 25, 2017. BMI, body mass index.

Statistical analysis

Weighted percentages of sociodemographic groups, stratified by sex (female, male) and sexual orientation (gay or lesbian, bisexual, heterosexual), were calculated with 95% confidence intervals (95% CIs). For each LHI, the unadjusted and adjusted (accounting for age, ethnicity, race, marital status, education level, and individual annual income) weighted proportion and 95% CI of those achieving the outcome were calculated and stratified by sex and sexual orientation. The adjusted weighted proportion meeting all eligible LHIs was also calculated and stratified by sex and sexual orientation.

Using the composite variable of sex (female, male) and sexual orientation (gay or lesbian, bisexual, heterosexual), adjusted multivariate logistic regression was used to estimate predicted marginal probabilities for each sex/sexual orientation group that met the following: (1) each eligible LHI; (2) all eligible LHIs, including HIV testing; and (3) all eligible LHIs, excluding HIV testing. Because HIV testing rates were hypothesized to be higher in sexual minority males, the third model was included to determine if HIV testing was the primary driver for sexual minority males meeting

all eligible LHIs. Point estimates were reported as adjusted prevalence ratios (APRs) with 95% CI. The average numbers of eligible and met LHIs were calculated for each covariate.

All statistical analyses were performed in SAS-callable SUDAAN (version 9.3; RTI International, Research Triangle Park, NC) to account for the complex survey design. *P* values ≤ 0.05 were considered statistically significant. In accordance with NCHS guidelines, estimates were deemed unreliable and denoted with an asterisk (*) if the relative standard error was $\geq 20\%$ but $< 30\%$. Estimates with relative standard error $> 30\%$ were suppressed/not reported.

Results

Demographic characteristics for lesbian, gay, and bisexual U.S. adults

From 2013 to 2015, the final (unconditional) response rate for the NHIS sample adult component ranged from 55.2% to 61.2%.¹⁷ These data were used to generate a representative sample of 104,175 Sample Adults, representative of 228,893,944 people. We excluded 1463 adults who could

not respond to survey questions because of a physical or mental condition; 738 adults who reported having limitations caused by senility; and 3835 adults with unknown sexual orientation. Data from 98,139 respondents, representative of 223,695,314 people, were available for analysis.

In our sample, 48.1% were male and 51.9% were female; 2.4% (95% CI, 2.3%–2.5%) identified as sexual minorities, representing 5,356,759 people (Tables 2 and 3). Among sexual minorities, 46.6% (95% CI, 45.2%–47.9%) were male and 53.4% (95% CI, 52.1%–54.8%) were female. Compared to heterosexual adults, sexual minority adults were more likely overall to be younger (median age with interquartile range, 38 (26–52) years vs. 47 (32–61) years) and to never have married: 46.9% (95% CI, 43.9%–50.0%) for gay/lesbian people and 49.7% (95% CI, 44.5%–54.9%) for bisexual people compared with 21.3% (95% CI, 20.7%–21.8%) for heterosexual people. Compared to heterosexual people, gay/lesbian people (but not bisexuals) were more likely to have earned a graduate degree (16.5% [95% CI, 14.1%–19.3%] vs. 11.1% [95% CI, 10.7%–11.5%]). Bisexual individuals were less likely to report an average earned income of \$75,000 or more: 5.9% (95% CI, 3.9%–8.6%) compared to 11.4% (95% CI, 9.5%–13.7%) for gay/lesbian people and 9.1% (95% CI, 8.8%–9.5%) for heterosexual people. This was primarily driven by income inequities by sexual orientation among females. Otherwise, a similar pattern was observed when examining demographic differences stratified by sexual orientation and sex (Tables 2 and 3). No differences in ethnicity or race were observed.

Leading health indicators in lesbian, gay, and bisexual U.S. adults

In adjusted analyses (see Supplementary Table S1 for unadjusted; Supplementary Data are available online at www.liebertpub.com/lgbt), gay males, gay/lesbian females, and bisexual females were more likely to be current smokers than their heterosexual counterparts: 25.3% (95% CI, 21.2%–29.8%) for gay males versus 18.9% (95% CI, 18.3%–19.4%) for heterosexual males; 23.8% (95% CI, 19.9%–28.1%) for gay/lesbian females, and 21.4% (95% CI, 17.2%–26.2%) for bisexual females versus 14.5% (95% CI, 14.0%–15.1%) for heterosexual females (Table 4). Binge drinking was significantly more common in bisexuals of each sex compared to their heterosexual peers: 53.8% (95% CI, 44.2%–63.1%) versus 39.6% (95% CI, 38.6%–40.6%) for males, and 35.3% (95% CI, 29.5%–41.5%) versus 23.1% (95% CI, 22.3%–23.9%) for females. There were no significant differences in binge drinking between gay/lesbian individuals and heterosexuals. Only gay males (35.4%; 95% CI, 28.6%–42.9%) were more likely to have received appropriate colorectal cancer screening than heterosexual males (25.5%; 95% CI, 24.6%–26.5%); no significant difference was found among females. All sexual minorities underwent more HIV testing than their sex-matched, heterosexual peers. In addition, gay males (80.1%; 95% CI, 75.8%–83.7%) were more likely than bisexual males (53.3%; 95% CI, 44.3%–62.0%) to be tested for HIV. A smaller percentage of sexual minority females had a BMI <30 (61.6%; 95% CI, 56.6%–66.4% for gay/lesbian females, and 57.4%; 95% CI, 51.4%–63.1% for bisexual females) than heterosexual females (70.3%; 95% CI, 69.6%–70.9%). Conversely, more gay males (74.3%;

95% CI, 70.3%–77.9%) had a BMI <30 than heterosexual males (69.5%; 95% CI, 68.9%–70.2%). Compared to heterosexual males, gay males were more likely to have a usual primary care provider (73.6%; 95% CI, 69.2%–77.6% vs. 66.4%; 95% CI, 65.7%–67.2%), whereas gay and lesbian females were less likely to have a usual primary care provider (79.6%; 95% CI, 75.4%–83.2% vs. 84.0%; 95% CI, 83.5%–84.5%). Gay and lesbian females were also less likely than their heterosexual peers to have health insurance (80.7%; 95% CI, 76.4%–84.4% vs. 85.2%; 95% CI, 84.7%–85.6%). There were no statistically significant differences for visiting a dentist in the prior 12 months.

When analyzing the proportion meeting all eligible LHIs, a significantly higher percentage of gay males (2.24%; 95% CI, 0.87%–5.61%) met all eligible LHIs than heterosexual males (0.42%; 95% CI, 0.29%–0.62%). There were no statistically significant differences between gay/lesbian (0.19%; 95% CI, 0.04%–0.83%), bisexual (0.76%; 95% CI, 0.18%–3.19%), and heterosexual (0.23%; 95% CI, 0.16%–0.32%) females. Due to small sample size, estimates of meeting all eligible LHIs among bisexual males were suppressed. As a whole, more sexual minorities (1.04%; 95% CI, 0.48%–2.23%) met all eligible LHIs than heterosexuals (0.31%; 95% CI, 0.24%–0.41%).

After excluding HIV testing from the analysis, more individuals met all eligible LHIs, and there remained a significantly higher percentage of gay males (2.65%; 95% CI, 1.16%–5.93%) who met all eligible LHIs compared to heterosexual males (0.74%; 95% CI, 0.57%–0.97%). There remained no significant differences between gay/lesbian (0.44%; 95% CI, 0.16%–1.23%), bisexual (0.75%; 95% CI, 0.18%–3.13%), and heterosexual (0.74%; 95% CI, 0.57%–0.97%) females. Again, more sexual minorities (1.26%; 95% CI, 0.66%–2.43%) met all eligible LHIs than their heterosexual peers (0.50%; 95% CI, 0.41%–0.61%).

Table 5 presents weighted APRs for each LHI using a composite sex/sexual orientation variable. Bisexual females were more likely than bisexual males, heterosexual females, and heterosexual males to not be a binge drinker (APR 1.21; 95% CI, 1.10–1.34). Bisexual females were also more likely to not be a smoker (APR 1.09; 95% CI, 1.03–1.16) compared to heterosexual females. Gay males were more likely to have been tested for HIV (APR 1.43; 95% CI, 1.28–1.61) compared to heterosexual females, whereas bisexual males (APR 0.62; 95% CI, 0.56–0.69) and bisexual females (APR 0.72; 95% CI, 0.64–0.80) were less likely to have been tested for HIV. All sex/sexual orientation groups except bisexual females were less likely to have a primary care provider than heterosexual females, with bisexual males being statistically significantly different from gay/lesbian females. All groups except gay/lesbian females were more likely than heterosexual females to have a BMI <30. There were no notable differences in colorectal cancer screening, seeing a dentist in the past year, or meeting federal physical activity guidelines.

A number of sociodemographic factors were associated with each LHI (Table 5). Noteworthy associations included the following: people with more education were more likely to achieve each LHI, and increasing annual income was largely associated with increased likelihood of meeting each LHI except for not being a binge drinker. In addition, having health insurance, having a primary care provider,

TABLE 2. SOCIODEMOGRAPHIC CHARACTERISTICS BY SEXUAL ORIENTATION AND SEX: SAMPLE ADULTS IN THE 2013–2015 NATIONAL HEALTH INTERVIEW SURVEY

	Male						Female					
	Gay			Bisexual			Heterosexual			Gay/lesbian		
	n	N	Weighted% (95% CI)	n	N	Weighted% (95% CI)	n	N	Weighted% (95% CI)	n	N	Weighted% (95% CI)
Total	915	2009	100.00 (–)	233	485	100.00 (–)	42,716	105,209	100.00 (–)	776	1,678	100.00 (–)
Age (years)												
18–29	199	561	27.93 [†] (23.42–32.94)	80	191	39.35 [†] (30.56–48.88)	8053	23,249	22.10 (21.35–22.87)	192	460	27.39 [†] (23.43–31.75)
30–39	172	352	17.51 (14.28–21.28)	45	94	19.47 (13.28–27.62)	7246	18,046	17.15 (16.63–17.69)	139	290	17.31 (13.94–21.29)
40–49	197	427	21.24 (17.86–25.07)	29	52	10.66 [†] (6.61–16.75)	7082	18,605	17.68 (17.16–18.22)	150	300	17.87 (14.87–21.34)
50–64	247	485	24.13 (20.66–27.98)	50	89	18.43 (12.72–25.93)	11,256	27,406	26.05 (25.46–26.65)	214	483	28.79 (24.40–33.62)
65 and above	100	185	9.19 [†] (7.10–11.81)	29	59	12.10 [†] (6.96–20.21)	9079	17,903	17.02 (16.49–17.56)	81	145	8.64 [†] (6.51–11.38)
Ethnicity												
Hispanic	153	315	15.66 (12.26–19.79)	34	60	12.44 [†] (7.65–19.60)	7102	16,814	15.98 (15.24–16.76)	110	213	12.67 (9.71–16.37)
Non-Hispanic	762	1695	84.34 (80.21–87.74)	199	424	87.56 (80.40–92.35)	35,614	88,395	84.02 (83.24–84.76)	666	1465	87.33 (83.63–90.29)
Race												
White	738	1626	80.93 (77.04–84.30)	186	394	81.31 (73.50–87.22)	33,544	85,485	81.25 (80.59–81.90)	571	1295	77.20 (72.94–80.96)
Black	118	270	13.43 (10.47–17.06)	25	38	7.85 [†] (4.83–12.50)	5655	12,112	11.51 (11.01–12.04)	154	278	16.58 (13.36–20.41)
Other	59	113	5.64 (3.95–8.00)	22	53	10.84 [†] (6.16–18.40)	3537	7613	7.24 (6.84–7.65)	51	104	6.22 (4.31–8.90)
Marital status												
Married/life with partner	267	802	40.00 [†] (35.62–44.54)	59	149	30.76 [†] (23.08–39.67)	23,416	67,663	64.37 (63.67–65.07)	320	878	52.44 [†] (47.91–56.92)
Widowed/ ^a divorced/ ^a separated	79	128	6.36 [†] (4.73–8.50)	41	65	13.34 [†] (8.71–19.88)	8534	12,995	12.36 (11.98–12.76)	100	146	8.73 [†] (6.75–11.22)
Never married	567	1076	53.65 [†] (49.39–57.84)	133	271	55.91 [†] (47.26–64.21)	10,713	24,456	23.27 (22.56–23.99)	352	650	38.84 [†] (34.48–43.38)
Education level												
High school graduate or less	219	484	24.15 [†] (20.06–28.76)	65	146	30.06 (21.47–40.32)	17,574	41,830	39.92 (39.06–40.78)	212	460	27.42 [†] (23.22–32.05)
Some college, no degree	181	454	22.66 (18.16–27.91)	59	127	26.19 (18.96–34.98)	8106	20,094	19.18 (18.59–19.77)	175	345	20.59 (16.89–24.85)
College degree	346	734	36.64 [†] (32.17–41.36)	79	135	27.85 (21.01–35.90)	12,301	31,193	29.77 (29.10–30.45)	266	595	35.49 (30.98–40.28)
Associate's (Bachelor's)												
Graduate degree (Master's/Doctoral)	168	332	16.55 [†] (13.36–20.33)	30	77	15.91 [†] (10.23–23.89)	4593	11,668	11.14 (10.59–11.71)	122	277	16.50 [†] (12.95–20.79)
Individual income												
\$0	218	517	26.95 (23.06–31.23)	70	157	33.10 (24.22–43.36)	12,773	28,393	28.03 (27.35–28.73)	219	523	31.73 [†] (27.04–36.83)
\$1–\$19,999	140	350	18.22 (14.79–22.24)	56	120	25.18 (17.75–34.43)	7370	18,450	18.22 (17.59–18.86)	160	313	19.02 (15.31–23.38)
\$20,000–\$34,999	160	356	18.56 (15.26–22.39)	39	68	14.25 [†] (8.75–22.36)	6263	14,949	14.76 (14.20–15.34)	133	290	17.59 [†] (13.53–22.55)
\$35,000–\$54,999	131	265	13.83 (11.24–16.91)	26	57	11.91 [†] (6.94–19.68)	6554	16,354	16.15 (15.64–16.67)	112	218	13.26 (10.55–16.54)
\$55,000–\$74,999	93	172	8.95 (6.62–11.99)	15	32	6.76 [†] (3.45–12.83)	3798	9848	9.72 (9.30–10.17)	75	155	9.43 [†] (7.05–12.52)
\$75,000 or more	132	259	13.48 (10.72–16.82)	21	42	8.80 [†] (4.94–15.21)	4692	13,284	13.12 (12.57–13.68)	61	148	8.96 [†] (6.43–12.35)

Sample sizes (n) for marital status, education level, and individual income may not sum to column totals due to missing data. Weighted sample sizes (N) may not sum precisely to column totals due to missing data and rounding.

^aUnreliable estimate because the relative standard error <30% and ≥20%.

[†]P ≤ 0.05 for comparison between heterosexual and gay/lesbian or between heterosexual and bisexual.

[‡]P ≤ 0.05 for comparison between bisexual and gay/lesbian.

95% CI, 95% confidence interval; n, sample size; N, weighted sample size in 1000.

TABLE 3. SOCIODEMOGRAPHIC CHARACTERISTICS BY SEXUAL ORIENTATION: SAMPLE ADULTS IN THE 2013–2015
NATIONAL HEALTH INTERVIEW SURVEY

	<i>All</i>					
	<i>Gay/lesbian</i>			<i>Bisexual</i>		
	<i>n</i>	<i>N</i>	<i>Weighted%</i> (95% <i>CI</i>)	<i>n</i>	<i>N</i>	<i>Weighted%</i> (95% <i>CI</i>)
Total	1691	3687	100.00 (–)	775	1670	100.00 (–)
Age (years)						
18–29	391	1021	27.69 (24.63–30.97)	329	827	49.56 ^{†‡} (44.35–54.77)
30–39	311	642	17.42 (14.99–20.14)	183	354	21.19 [†] (17.66–25.22)
40–49	347	727	19.71 (17.43–22.20)	102	184	11.00 ^{†‡} (8.53–14.07)
50–64	461	968	26.25 (23.38–29.34)	112	216	12.92 ^{†‡} (9.79–16.88)
65 and above	181	330	8.94 [†] (7.41–10.74)	49	89	5.33 ^{‡†} (3.49–8.06)
Ethnicity						
Hispanic	263	527	14.30 (11.83–17.18)	108	198	11.89 (9.17–15.27)
Non-Hispanic	1428	3160	85.70 (82.82–88.17)	667	1471	88.11 (84.73–90.83)
Race						
White	1309	2921	79.23 (76.33–81.86)	605	1339	80.18 (75.80–83.93)
Black	272	548	14.86 (12.66–17.37)	118	211	12.61 (10.01–15.77)
Other	110	218	5.90 (4.49–7.73)	52	120	7.21 (4.91–10.46)
Marital status						
Married/live with partner	587	1680	45.66 [†] (42.51–48.84)	236	602	36.17 ^{†‡} (31.19–41.46)
Widowed/divorced/separated	179	274	7.44 [†] (6.01–9.17)	165	235	14.12 [‡] (11.40–17.36)
Never married	919	1726	46.91 [†] (43.85–49.99)	371	827	49.71 [†] (44.53–54.90)
Education level						
High school graduate or less	431	944	25.64 [†] (22.52–29.03)	245	584	35.00 [‡] (30.22–40.11)
Some college, no degree	356	799	21.72 (18.93–24.79)	204	430	25.75 [†] (21.37–30.68)
College degree (Associate's/Bachelor's)	612	1330	36.12 [†] (33.06–39.29)	228	464	27.78 [†] (24.07–31.82)
Graduate degree (Master's/Doctoral)	290	608	16.53 [†] (14.10–19.29)	98	191	11.46 (8.71–14.94)
Individual income						
\$0	437	1040	29.16 [†] (26.17–32.34)	231	559	34.31 (29.17–39.84)
\$1–\$19,999	300	663	18.59 (16.08–21.39)	249	527	32.36 ^{†‡} (27.65–37.45)
\$20,000–\$34,999	293	646	18.11 [†] (15.33–21.27)	103	179	10.97 [†] (8.44–14.13)
\$35,000–\$54,999	244	484	13.57 (11.53–15.91)	98	207	12.70 (9.65–16.53)
\$55,000–\$74,999	168	327	9.17 (7.45–11.25)	34	62	3.83 ^{‡†} (2.29–6.32)
\$75,000 or more	193	406	11.39 (9.46–13.67)	44	95	5.85 ^{†‡} (3.94–8.59)

Sample sizes (*n*) for marital status, education level, and individual income may not sum to column totals due to missing data. Weighted sample sizes (*N*) may not sum precisely to column totals due to missing data and rounding.

[†]Unreliable estimate because the relative standard error <30% and ≥20%.

[‡]*P* ≤ 0.05 for comparison between heterosexual and gay/lesbian or between heterosexual and bisexual.

^{†‡}*P* ≤ 0.05 for comparison between bisexual and gay/lesbian.

TABLE 4. WEIGHTED AND ADJUSTED PREVALENCE OF HEALTH OUTCOMES BY SEXUAL ORIENTATION, NATIONAL HEALTH INTERVIEW SURVEY 2013–2015

	Male						Female											
	Gay			Bisexual			Heterosexual			Gay/lesbian			Bisexual			Heterosexual		
	n	N	Weighted% (95% CI)	n	N	Weighted% (95% CI)	n	N	Weighted% (95% CI)	n	N	Weighted% (95% CI)	n	N	Weighted% (95% CI)	n	N	Weighted% (95% CI)
Has health insurance ^a	678	1525	83.00 (79.89–85.72)	165	323	78.03 (68.24–85.45)	26,787	70,923	81.15 (80.43–81.84)	584	1280	80.70 [†] (76.37–84.41)	427	959	84.68 (80.42–88.15)	33,126	76,940	85.16 (84.67–85.63)
Has usual primary care provider	677	1446	73.62 [†] (69.20–77.61)	144	298	64.77 (56.05–72.61)	28,594	70,401	66.44 (65.71–67.16)	626	1327	79.56 [†] (75.37–83.19)	458	982	85.45 (81.23–88.85)	44,410	95,148	84.02 (83.53–84.50)
Received colorectal cancer screening ^b	100	209	35.41 [†] (28.61–42.85)	16	35	26.41 [*] (14.14–43.89)	4313	10,126	25.53 (24.59–26.48)	58	141	23.60 (17.10–31.63)	21	37	24.21 [*] (13.97–38.59)	4525	9384	21.80 (20.94–22.69)
BMI <30 ^c	697	1500	74.29 [†] (70.27–77.93)	154	323	65.13 [†] (55.48–73.68)	29,095	70,001	69.54 (68.87–70.21)	458	968	61.62 [†] (56.63–66.38)	302	564	57.35 [†] (51.42–63.08)	34,434	73,779	70.27 (69.61–70.91)
Saw dentist in past 12 months	617	1334	62.26 (57.40–66.88)	143	313	63.09 (54.17–71.19)	24,005	62,083	58.38 (57.67–59.09)	510	1158	64.69 (60.32–68.82)	310	701	60.69 (54.26–66.76)	33,514	74,333	65.69 (65.00–66.38)
Been tested for HIV ever	770	1637	80.06 [†] (75.80–83.73)	128	255	53.26 [†] (44.34–61.97)	14,838	35,551	34.13 (33.39–34.88)	393	848	48.52 [†] (43.99–53.09)	351	715	52.67 [†] (46.78–58.49)	21,043	44,495	40.08 (39.36–40.80)
Current smoker	222	455	25.25 [†] (21.16–29.84)	63	126	25.48 (18.65–33.76)	8354	19,395	18.85 (18.27–19.43)	197	379	23.76 [†] (19.93–28.06)	160	304	21.38 [†] (17.21–26.23)	7912	16,267	14.53 (14.03–15.05)
Meets federal physical activity guidelines for aerobic activity and muscle strengthening	272	610	26.10 (22.33–30.26)	89	212	20.45 (15.00–27.24)	10,632	26,249	24.82 (24.19–25.47)	170	331	20.07 (16.54–24.13)	182	337	22.26 [†] (17.98–27.21)	6466	14,409	17.15 (16.57–17.73)
Binge drinker	293	651	38.97 (34.09–44.08)	63	125	53.78 [†] (44.24–63.05)	10,006	25,942	39.60 (38.63–40.57)	183	383	28.89 (23.72–34.68)	133	291	35.28 [†] (29.50–41.52)	8538	19,201	23.10 (22.33–23.89)

Excluding proxies and those reporting limitations due to senility or dementia. Model adjusted for age, ethnicity, race, marital status, education, and income.

^aRestricted to those aged <65 years.

^bRestricted to those aged 50–75 years.

^cRestricted to those aged ≥20 years.

^{*}Unreliable estimate because the relative standard error <30% and ≥20%.

[†]P ≤ 0.05 for comparison between heterosexual and gay/lesbian or between heterosexual and bisexual.

[‡]P ≤ 0.05 for comparison between bisexual and gay/lesbian.

BMI, body mass index.

seeing a dentist, being a nonsmoker, and not being a binge drinker occurred more often with increasing age, while meeting the physical activity guidelines and being tested for HIV occurred more often with decreasing age.

Adjusted prevalence analysis of meeting all eligible LHIs revealed that all sexual minorities except gay males were less likely than heterosexual females to meet all eligible LHIs (Table 6). Gay males, however, were approximately twice more likely to meet all eligible LHIs (APR 2.18; 95% CI, 0.92–5.16) than heterosexual females. None of the adjusted sex/sexual orientation comparisons was statistically significant. Respondents were less likely to meet all eligible LHIs with increasing age. Respondents were more likely to meet all eligible LHIs if they were Black, better educated, and had a higher annual income (Table 6). In the adjusted model excluding HIV testing, no significant differences were observed between sex/sexual orientation groups although the comparison of gay males to heterosexual females approached statistical significance (APR 2.21; 95% CI, 1.00–4.92). Respondents were less likely to meet all eligible LHIs if they were older, Hispanic, or widowed/divorced/separated. As in the full model, increasing education and annual income were associated with being more likely to meet all eligible LHIs.

Discussion

Using NHIS data from 2013 to 2015, 2.4% of the U.S. adult population identified as lesbian, gay, or bisexual. Although we did not find differences among adjusted sex/sexual orientation comparisons for meeting all eligible LHIs, significant health concerns exist for sexual minorities. Gay males, gay/lesbian females, and bisexual females were more likely to be current smokers than their heterosexual counterparts. Binge drinking was more common in bisexuals compared to their heterosexual peers. Sexual minority females were more likely to be obese than heterosexual females. Bisexual males were less likely than gay males to be tested for HIV. Gay/lesbian females were also less likely than their heterosexual peers to have health insurance.

We found several notable inequities among bisexuals, suggesting, along with other studies that reported barriers to care¹⁸ and psychological distress,⁸ that bisexual people may be particularly disadvantaged. While these may indicate the need for specific interventions in addition to continued efforts at increasing healthy behaviors (e.g., diet, exercise), studies into the cause of these health disparities are warranted. In addition to increased LGBT-specific health professional training,¹⁹ minority stress—a stigma-related theory originally proposed by Meyer in 2003²⁰ that has been implicated in mental health status,^{21,22} physical health status,^{23–25} and deleterious health behaviors^{26,27}—may also be amenable to intervention.²⁸

Several positive outcomes were also discovered. Gay males were more likely to have received appropriate colorectal cancer screening, more likely to have a usual primary care provider, and more likely to not be obese than heterosexual males. All sexual minorities underwent more HIV testing than their sex-matched, heterosexual peers. The prevalence estimate of sexual minority adults (2.4%) identified in the 2013–2015 NHIS is lower than previous estimates from the National Health and Nutrition Examination Survey (4.4%), the National Survey of Family Growth (4.1%), the General

TABLE 5. WEIGHTED AND ADJUSTED PREVALENCE RATIOS (95% CONFIDENCE INTERVAL) FOR HEALTH OUTCOMES, NATIONAL HEALTH INTERVIEW SURVEY 2013–2015

APR (95% CI)									
	Has insurance ^a	Has PCP	Had CRC screen ^b	BMI <30 ^c	Saw dentist	Tested for HIV	Not a smoker	Meets activity guideline	Not a binge drinker
Sex and sexual orientation (Ref: Female, heterosexual)									
Male, gay	0.96 (0.91–1.01)	0.85 (0.80–0.91)	1.37 (0.80–2.34)	1.35 (1.20–1.52)	0.99 (0.88–1.12)	1.43 (1.28–1.61)	0.95 (0.87–1.04)	1.26 (0.97–1.65)	1.00 (0.89–1.12)
Female, gay/lesbian	0.96 (0.90–1.02)	0.92 (0.87–0.98)	0.97 (0.55–1.69)	1.09 (0.95–1.26)	1.08 (0.96–1.22)	0.87 (0.76–1.01)	0.97 (0.90–1.05)	0.98 (0.75–1.29)	1.11 (0.98–1.26)
Male, bisexual	0.94 (0.90–0.98)	0.77 (0.74–0.81)	1.02 (0.62–1.68)	1.24 (1.12–1.38)	0.93 (0.84–1.03)	0.62 (0.56–0.69)	1.03 (0.97–1.09)	1.17 (0.95–1.44)	0.98 (0.88–1.08)
Female, bisexual	1.00 (0.96–1.05)	0.97 (0.93–1.01)	0.88 (0.53–1.45)	1.26 (1.13–1.40)	1.10 (0.99–1.21)	0.72 (0.64–0.80)	1.09 (1.03–1.16)	0.86 (0.69–1.06)	1.21 (1.10–1.34)
Male, heterosexual	0.90 (0.79–1.02)	0.75 (0.65–0.86)	1.02 (0.47–2.21)	1.19 (1.01–1.40)	1.02 (0.85–1.21)	0.95 (0.78–1.15)	0.95 (0.84–1.07)	1.01 (0.70–1.44)	0.76 (0.61–0.95)
Age, years (Ref: 30–39)									
18–29	1.06 (1.05–1.08)	1.00 (0.98–1.02)		1.13 (1.11–1.15)	1.09 (1.06–1.12)	0.73 (0.71–0.76)	1.09 (1.07–1.11)	1.28 (1.21–1.35)	0.85 (0.82–0.89)
40–49	1.05 (1.03–1.06)	1.05 (1.03–1.07)		0.94 (0.92–0.96)	1.05 (1.02–1.07)	0.87 (0.84–0.89)	1.03 (1.02–1.05)	0.83 (0.78–0.88)	1.13 (1.09–1.16)
50–64	1.11 (1.09–1.12)	1.14 (1.12–1.16)		0.95 (0.93–0.96)	1.12 (1.10–1.15)	0.61 (0.59–0.63)	1.07 (1.06–1.09)	0.73 (0.69–0.77)	1.25 (1.22–1.28)
65 and above	1.24 (1.22–1.26)	1.27 (1.25–1.29)	0.87 (0.82–0.92) ^d	1.05 (1.03–1.07)	1.20 (1.18–1.23)	0.30 (0.29–0.32)	1.23 (1.22–1.25)	0.69 (0.64–0.74)	1.43 (1.39–1.47)
Ethnicity (Ref: Non-Hispanic)									
Hispanic	0.85 (0.84–0.87)	0.89 (0.87–0.90)	1.07 (0.99–1.16)	0.97 (0.95–0.99)	0.91 (0.90–0.93)	1.19 (1.15–1.22)	1.14 (1.13–1.15)	0.90 (0.86–0.95)	1.08 (1.06–1.10)
Race (Ref: White)									
Black	0.97 (0.96–0.99)	0.98 (0.96–0.99)	1.29 (1.21–1.38)	0.86 (0.84–0.88)	0.91 (0.89–0.93)	1.67 (1.63–1.72)	1.05 (1.04–1.06)	0.96 (0.91–1.01)	1.18 (1.15–1.20)
Other	0.98 (0.97–1.00)	0.90 (0.89–0.92)	1.00 (0.90–1.11)	1.15 (1.13–1.18)	0.93 (0.91–0.96)	0.96 (0.92–1.01)	1.07 (1.05–1.08)	0.80 (0.74–0.86)	1.18 (1.15–1.21)
Marital status (Ref: Married)									
Widowed/ divorced/ separated	0.94 (0.92–0.95)	0.96 (0.94–0.97)	0.87 (0.83–0.92)	0.99 (0.98–1.01)	0.85 (0.84–0.87)	1.16 (1.13–1.19)	0.90 (0.89–0.91)	0.99 (0.94–1.04)	0.95 (0.93–0.97)
Never married	0.99 (0.98–1.00)	0.95 (0.93–0.96)	0.80 (0.74–0.88)	1.01 (0.99–1.02)	1.03 (1.01–1.05)	0.88 (0.85–0.91)	0.98 (0.97–1.00)	1.24 (1.19–1.30)	0.94 (0.91–0.96)
Education level (Ref: High School Graduate or less)									
Some college	1.10 (1.09–1.11)	1.08 (1.07–1.10)	1.12 (1.05–1.20)	1.00 (0.98–1.02)	1.22 (1.19–1.24)	1.15 (1.11–1.19)	1.09 (1.08–1.11)	1.57 (1.48–1.66)	1.03 (1.00–1.05)
College degree	1.12 (1.11–1.13)	1.09 (1.08–1.11)	1.19 (1.11–1.26)	1.09 (1.07–1.11)	1.33 (1.31–1.36)	1.19 (1.15–1.23)	1.17 (1.16–1.19)	1.90 (1.81–1.99)	1.05 (1.03–1.07)
Graduate degree	1.18 (1.16–1.19)	1.13 (1.11–1.15)	1.28 (1.18–1.39)	1.19 (1.17–1.21)	1.47 (1.43–1.50)	1.25 (1.20–1.30)	1.24 (1.23–1.26)	2.20 (2.06–2.35)	1.12 (1.09–1.14)
Individual income (Ref: \$20,000–\$34,999)									
\$0	1.00 (0.99–1.02)	1.05 (1.04–1.07)	1.14 (1.04–1.26)	1.00 (0.98–1.02)	0.95 (0.93–0.97)	1.02 (0.99–1.06)	0.99 (0.98–1.01)	0.88 (0.83–0.94)	1.09 (1.06–1.12)
\$1–\$19,999	0.92 (0.90–0.93)	1.00 (0.98–1.01)	0.95 (0.84–1.07)	1.02 (1.00–1.04)	0.94 (0.92–0.97)	1.02 (0.98–1.05)	0.99 (0.98–1.01)	1.01 (0.95–1.07)	1.04 (1.01–1.06)
\$35,000–\$54,999	1.17 (1.15–1.19)	1.06 (1.04–1.08)	1.01 (0.90–1.13)	0.99 (0.97–1.02)	1.14 (1.11–1.16)	0.99 (0.94–1.04)	1.04 (1.03–1.06)	1.16 (1.09–1.24)	0.98 (0.95–1.00)
\$55,000–\$74,999	1.17 (1.15–1.19)	1.07 (1.04–1.10)	1.08 (0.94–1.24)	1.00 (0.97–1.03)	1.22 (1.18–1.26)	1.03 (0.98–1.08)	1.07 (1.05–1.09)	1.32 (1.22–1.41)	0.95 (0.92–0.98)
\$75,000 or more	1.18 (1.17–1.20)	1.09 (1.06–1.11)	1.11 (0.98–1.26)	1.03 (1.00–1.06)	1.30 (1.26–1.34)	1.04 (1.00–1.09)	1.10 (1.09–1.12)	1.43 (1.33–1.54)	0.96 (0.93–0.99)

Excluding proxies and those reporting limitations due to senility or dementia. Model adjusted for age, ethnicity, race, marital status, education, and income.

^aRestricted to those aged <65 years.

^bRestricted to those aged 50–75 years.

^cRestricted to those aged ≥20 years.

^dThe reference group is “65 and above.”

APR, adjusted prevalence ratio; CRC, colorectal cancer; PCP, primary care provider; Ref, reference category.

TABLE 6. WEIGHTED AND ADJUSTED PREVALENCE RATIOS (95% CONFIDENCE INTERVAL) FOR MEETING ALL ELIGIBLE OUTCOMES, NATIONAL HEALTH INTERVIEW SURVEY 2013–2015

	<i>Average number of eligible LHIs (95% CI)</i>	<i>Average number of LHIs met (95% CI)</i>	<i>APR (95% CI) with HIV outcome</i>	<i>APR (95% CI) without HIV outcome</i>
Sex and sexual orientation				
Male, gay	8.20 (8.16–8.25)	5.31 (5.16–5.45)	2.18 (0.92–5.16)	2.21 (1.00–4.92)
Female, gay/lesbian	8.21 (8.15–8.27)	4.84 (4.69–4.99)	0.60 (0.19–1.85)	1.23 (0.47–3.24)
Male, bisexual	8.16 (8.15–8.17)	4.46 (4.44–4.49)	0.71 (0.33–1.52)	1.54 (0.76–3.14)
Female, bisexual	8.15 (8.14–8.15)	4.74 (4.72–4.77)	0.78 (0.35–1.75)	1.58 (0.77–3.26)
Male, heterosexual	8.12 (8.03–8.20)	4.50 (4.19–4.82)	0.35 (0.05–2.67)	0.29 (0.05–1.88)
Female, heterosexual (Ref)	7.93 (7.85–8.02)	4.66 (4.47–4.85)		
Age, years ^a				
18–29	7.83 (7.82–7.84)	4.40 (4.37–4.44)	0.89 (0.72–1.09)	1.16 (1.00–1.36)
30–39 (Ref)	8.00 (–)	4.73 (4.70–4.77)		
40–49	8.00 (–)	4.74 (4.70–4.78)	1.01 (0.83–1.24)	1.12 (0.97–1.31)
50–64	9.00 (9.00–9.00)	4.94 (4.91–4.97)	0.28 (0.22–0.37)	0.37 (0.31–0.45)
65 and above	7.63 (7.62–7.63)	3.96 (3.93–3.99)	0.19 (0.13–0.28)	0.71 (0.59–0.85)
Ethnicity				
Hispanic	8.10 (8.09–8.11)	4.19 (4.16–4.23)	1.02 (0.82–1.27)	0.81 (0.69–0.95)
Non-Hispanic (Ref)	8.16 (8.16–8.17)	4.64 (4.62–4.66)		
Race				
White (Ref)	8.15 (8.15–8.16)	4.57 (4.55–4.59)		
Black	8.16 (8.15–8.17)	4.54 (4.50–4.58)	1.78 (1.43–2.22)	0.90 (0.74–1.08)
Other	8.15 (8.13–8.17)	4.64 (4.60–4.69)	0.95 (0.72–1.25)	0.92 (0.74–1.14)
Marital status				
Married (Ref)	8.24 (8.23–8.25)	4.74 (4.72–4.77)		
Widowed/divorced/separated	8.12 (8.11–8.14)	4.23 (4.20–4.26)	0.81 (0.65–1.02)	0.75 (0.65–0.86)
Never married	7.94 (7.93–7.95)	4.38 (4.35–4.41)	0.84 (0.69–1.03)	1.02 (0.89–1.16)
Education level				
High school graduate or less (Ref)	8.09 (8.08–8.10)	3.93 (3.91–3.95)		
Some college	8.12 (8.10–8.13)	4.58 (4.55–4.61)	2.27 (1.68–3.06)	1.85 (1.53–2.23)
College degree	8.24 (8.23–8.24)	5.07 (5.05–5.10)	3.09 (2.37–4.04)	2.73 (2.32–3.23)
Graduate degree	8.22 (8.21–8.23)	5.49 (5.46–5.52)	3.92 (2.85–5.40)	3.52 (2.91–4.26)
Individual income				
\$0	7.97 (7.96–7.98)	4.17 (4.15–4.20)	1.03 (0.74–1.44)	1.34 (1.10–1.64)
\$1–\$19,999	8.10 (8.09–8.11)	4.30 (4.27–4.34)	0.81 (0.56–1.18)	1.00 (0.79–1.26)
\$20,000–\$34,999 (Ref)	8.25 (8.24–8.26)	4.53 (4.50–4.57)		
\$35,000–\$54,000	8.30 (8.28–8.31)	4.92 (4.88–4.96)	1.12 (0.81–1.54)	1.16 (0.94–1.45)
\$55,000–\$74,999	8.34 (8.32–8.35)	5.21 (5.16–5.26)	1.32 (0.93–1.87)	1.42 (1.15–1.76)
\$75,000 or more	8.37 (8.35–8.38)	5.44 (5.39–5.49)	1.85 (1.33–2.59)	1.79 (1.47–2.18)

Excluding proxies and those reporting limitations due to senility or dementia. Model adjusted for age, ethnicity, race, marital status, education, and income.

^aMedical insurance outcome was restricted to those aged <65, obesity outcome was restricted to those aged ≥20, and colorectal cancer screening was restricted to those aged 50–75 years.

CI, 95% confidence interval; LHIs, leading health indicators; Ref, reference group.

Social Survey (3.0%), and Gallup's Daily Tracking (4.0%) surveys.^{29,30} This may be attributed to differences in item design and/or question wording used to elicit sexual orientation: 0.2% in 2013, 0.3% in 2014, and 0.4% in 2015 identified as "something else"; 0.5% in 2013, 0.4% in 2014, and 0.7% in 2015 responded "I don't know the answer"; and 0.6% in 2013, 0.6% in 2014, and 0.4% in 2015 refused to answer the NHIS question. In addition, while a split-ballot experiment showed no differences between audio computer-assisted self-interviewing and computer-assisted personal interviewing administration modes (the latter is used in NHIS),²⁹ reporting bias (i.e., underreporting, misreporting) is likely because respondents may be reluctant to disclose their sexual identity face-to-face to a stranger, to a government employee, or out of fear of discrimination. Partic-

ipants may be more likely to report sensitive items (e.g., sexual orientation, drug use) accurately via electronic methods.³¹

Not unexpectedly, overall, sexual minority adults identified in the 2013–2015 NHIS were more likely to be younger than their heterosexual counterparts. This may represent changing generational comfort with sexual identity disclosure coupled with a significant mortality among sexual minority men during the AIDS epidemic in the 1980s–1990s. Corroborated by prior studies,³² sexual minorities reported more education than their heterosexual counterparts. The reasons for this remain contested and may include a high motivation to learn³³ and a population-based resiliency in response to historical discrimination and prejudice. With marriage equality being a new social concept and only available in 10–35 states (depending on month) at the time of the

2013–2015 NHIS (until the *Obergefell vs. Hodges* U.S. Supreme Court decision³⁴ on June 26, 2015), all sexual minorities were more likely to report being “never married” than heterosexual people. Given the recent legalization of same-sex marriage, studies evaluating the effects of marriage equality on sexual minority health are needed.

In examining the LHIs, our data corroborated previous studies reporting increased HIV testing,³⁵ increased smoking,^{36,37} and increased alcohol consumption^{38,39} among all sexual minorities. Our data reported that 23.8% (95% CI, 19.9%–28.1%) of gay/lesbian females, 25.3% (95% CI, 21.2%–29.8%) of gay males, 21.4% (95% CI, 17.2%–26.2%) of bisexual females, and 25.5% (95% CI, 18.7%–33.8%) of bisexual males were current smokers. Similarly, the 2009–2010 National Adult Tobacco Survey found that 22.40% of lesbian women, 25.91% of gay men, 31.98% of bisexual women, and 33.70% of bisexual men were current smokers.³⁶ The strong societal influence of bars and night clubs,^{40,41} minority stress,^{42–44} and targeted direct-to-consumer marketing^{45–47} to the sexual minority population may be contributing factors for increased current smoking and binge drinking in this population.

While prior reports indicated lower health insurance coverage among SGM people compared to non-SGM people (24.2% vs. 17.2% uninsured),⁴⁸ we found that gay/lesbian females were less likely to have health insurance than their heterosexual peers despite reporting higher annual incomes. Our uninsurance rates (19.3% for gay/lesbian females vs. 14.8% for heterosexual females) are notably lower than prior estimates, likely due to mandated individual coverage under the Patient Protection and Affordable Care Act of 2010.⁴⁹ Differences in insurance coverage between SGM and non-SGM individuals have previously been attributed to lower income, lack of a primary care provider,⁵⁰ and unique challenges to obtaining coverage.⁵¹ These include lack of same-sex relationship benefits (e.g., employer-sponsored insurance coverage) and employment discrimination that forces LGBT people into low-wage jobs without benefits. Given that we also did not see an income differential that could explain decreased coverage, prior studies may have studied samples at higher risk for negative health outcomes.

Gay males (but not bisexual males) were more likely to report having colorectal cancer screening than their heterosexual male counterparts. This may represent patient or primary care provider knowledge about increased risk for colorectal and anal cancers in men who have sex with men,⁵² especially those with HIV infection,⁵³ as well as gay males taking interest in their gastrointestinal health.⁵⁴

Sexual minority females were more likely to have a BMI >30, corroborating prior studies and reviews.⁵⁵ While the precise reasons underlying this difference are unknown, prior work has proposed complex societal interactions between sex, sexual orientation, race, gender, and class.⁵⁶ More complex models of minority stress that integrate factors internal and external to the individual have been proposed.²⁰

Our study has several strengths. First, it uses a large nationally representative sample that permitted comparisons between sexual minority groups and with heterosexuals with low relative standard errors. Second, we utilized 3 years of NHIS data; this achieved a sample size that permitted separation of bisexual people from gay/lesbian people (in lieu of grouping all sexual minorities together) to uncover specific health inequities in this often-invisible population.

In addition, the novel LHI composite index developed for this study provides a high-level overview of selected health outcomes that may be useful for assessing positive health outcomes on a population level.

Limitations

Our study also has several limitations. First, with high sexual minority population density in specific geographic areas (e.g., 13% of San Francisco’s population identifies as LGB⁵⁷), the current NHIS sample likely underestimates the U.S. sexual minority population. Oversampling of sexual minorities in future NHIS samples may enable a more accurate representation, but this will require improved U.S. census collection of SOGI data to provide data on which sampling frames can be developed. Second, our study did not report on transgender people (gender minorities) because NHIS did not assess gender identity. Third, information bias may have affected results if individuals chose not to disclose their identity due to social desirability. Fourth, because the 2013 NHIS assessed binge drinking as five or more alcoholic beverages consumed per occasion regardless of sex, we used the criterion of five or more alcoholic beverages per occasion for females as well. This likely introduced a slight underestimation of the percentage of binge drinking among females, which is commonly defined as four or more alcoholic beverages consumed per occasion. In the 2014 and 2015 NHIS, the question was tailored to the respondent’s sex. Finally, self-reported behaviors in this national survey were not validated using objective measures (e.g., urinary cotinine levels to confirm current cigarette smoking, measured height and weight to calculate BMI).

While recurrent, standardized collection of cross-sectional data, especially on federal health surveys, will enable analysis of temporal health-related trends, prospective longitudinal cohort studies with sizable numbers of SGM people (e.g., The PRIDE Study—pridestudy.org, All of Us Research Program—joinallofus.org) are needed and will be valuable in determining how SGM identity and its associated societal factors influence physical, mental, and social health.

Conclusion

LGB adults represent ~2.4% of the U.S. population and experience a number of significant health disparities, including substance use and obesity coupled with healthcare inequities of decreased health screenings and insurance coverage. Factors negatively affecting LGB health, including numerous social determinants of health (e.g., poverty status, neighborhood safety, stable housing, access to food), warrant further investigation and consideration for targeted interventions. As federal studies and national clinical data research networks (e.g., PCORnet Common Data Model version 3.1⁵⁸) collect additional SOGI data, a composite measure, such as the one used in this study, could be designed for all 26 LHIs to provide high-level insights into the health of underserved populations.

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Disclaimer

The findings and conclusions in this study are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Author Disclosure Statement

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