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Cardiovascular Disease Disparities in Sexual Minority Adults: An Examination of the Behavioral Risk Factor Surveillance System (2014-2016)

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Abstract

Purpose: Investigate sexual orientation differences in cardiovascular disease risk and cardiovascular disease.

Design: Cross-sectional.

Setting: The 2014 to 2016 Behavioral Risk Factor Surveillance System.

Participants: A total of 395 154 participants.

Measures: The exposure measure was sexual orientation. Self-report of cardiovascular disease risk factors and cardiovascular disease was assessed.

Analysis: Sex-stratified logistic regression analyses to examine sexual orientation differences in cardiovascular disease risk and cardiovascular disease (heterosexuals = reference group).

Results: Sexual minority men reported higher rates of mental distress (gay adjusted odds ratio [AOR]: 1.59; bisexual AOR: 1.88) and lifetime depression (gay AOR: 2.48; bisexual: AOR 2.67). Gay men reported higher rates of current smoking (AOR: 1.28), but lower rates of obesity (AOR: 0.82) compared to heterosexual men. Sexual minority women reported higher rates of several cardiovascular risk factors including mental distress (lesbian AOR: 1.37; bisexual AOR: 2.33), lifetime depression (lesbian AOR: 1.96; bisexual AOR: 3.26), current smoking (lesbian AOR: 1.65; bisexual AOR: 1.29), heavy drinking (lesbian AOR: 2.01; bisexual AOR: 2.04), and obesity (lesbian AOR: 1.50; bisexual AOR: 1.29), but were more likely to exercise than heterosexual women (lesbian AOR: 1.34; bisexual AOR: 1.24). Lesbian women reported lower rates of heart attack (AOR: 0.62), but bisexual women had higher rates of stroke than heterosexual women (AOR: 1.46).

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Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the CDC. As a publicly available data set, the BRFSS is not considered research with human subjects by the Columbia University Medical Center IRB. Therefore, IRB approval is waived.

Conclusions: Findings can inform the development of prevention efforts to reduce cardiovascular disease risk in sexual minorities.

Keywords

sexual minorities; cardiovascular disease; disease prevention

Purpose

Health disparities among sexual minority (lesbian, gay, and bisexual) individuals have recently gained increased attention. In fact, improving the health of sexual minorities has been identified as an important public health issue and included as an objective of Healthy People 2020.¹ In 2011, the National Academy of Medicine asserted that sexual minorities experience significant health and health-care disparities related to social stressors such as discrimination and victimization.² Although mental health³ and HIV/AIDS disparities⁴ are well-documented among sexual minorities, fewer studies have examined physical health conditions.

As the leading cause of death and disability worldwide,⁵ cardiovascular disease (CVD) is a significant public health concern. Indeed, the prevalence of CVD in the United States is anticipated to increase to 45% by 2035.⁶ This projected growth will be accompanied by a 2-fold increase in direct and indirect medical costs related to CVD.⁶ Modifiable risk factors including psychosocial factors, tobacco use, alcohol consumption, diet, physical activity, obesity, hypertension, diabetes, and lipids contribute to over 90% of CVD risk.^{7,8}

Cardiovascular disease has been highlighted as an area in need of further investigation within sexual minority health research.² Sexual minorities exhibit higher rates of several modifiable risk factors for CVD.⁹ A recent systematic review revealed higher CVD risk in sexual minorities related to higher rates of poor mental health and current tobacco use compared to heterosexual peers, and among sexual minority women, specifically, higher rates of alcohol consumption and obesity.⁹ Furthermore, sexual minorities report higher rates of psychological stress.^{10–12} Indeed, several studies indicate that sexual minorities have 2 to 3 times higher odds of experiencing psychological stress than their heterosexual peers.^{13–18} Exposure to stressful life experiences is posited to contribute to higher CVD risk among sexual minorities.¹⁹ In the general population, psychological stress has been found to increase CVD risk through direct and mediated behavioral^{20–24} and biological pathways.^{25–28}

This analysis was informed by a conceptual model developed by Lick et al.¹⁹ As a stigmatized population, we hypothesized that sexual minorities would report higher rates of psychosocial factors (mental distress and lifetime depression) and negative health behaviors (tobacco use, heavy drinking, and physical inactivity) associated with metabolic risk factors (obesity and diabetes) that increase risk for CVD.¹⁹ Although obesity and diabetes are distinct conditions, they are both recognized metabolic risk factors for CVD^{7,29} and are, therefore, treated as such in the present study. The aforementioned systematic review⁹ identified that few studies have focused exclusively on CVD risk in sexual minorities, which has led to the omission of important CVD risk factors from previous analyses.

The present study used data from the Behavioral Risk Factor Surveillance System (BRFSS; 2014–2016), one of the largest available samples of sexual minorities in the United States, to examine sexual orientation differences in CVD risk and CVD. The purpose of this study was to investigate sexual orientation differences in the prevalence of modifiable risk factors for CVD risk factors (including psychosocial factors, health behaviors, and metabolic risk factors) and CVD among American adults.

Methods

Design

This cross-sectional study used data from the BRFSS (2014–2016). The BRFSS is a national telephone survey that was initiated in 1984 to assess health behaviors, chronic conditions, and use of preventive services among American adults. All data were self-reported. The BRFSS uses random digit dialing techniques to recruit and collect data from more than 400 000 individuals every year in all 50 states, the District of Columbia, and 3 US territories. With methodological assistance from the Centers for Disease Control and Prevention (CDC), state health departments conduct telephone interviews continuously throughout the year. Noninstitutionalized individuals over the age of 18 are eligible for participation in the BRFSS. The BRFSS 2014 to 2016 response rate ranged from 47.7% to 48.2% for landlines and 40.5% to 47.2% for cellular phones, which is consistent with similar surveys.^{30–32} For more detail about BRSS methodology, see CDC.³³

Sample

In 2014, the CDC provided an optional sexual orientation module that, in addition to the US territory of Guam, was used by 19 states (Delaware, Hawaii, Idaho, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Minnesota, Montana, Nevada, New York, Ohio, Pennsylvania, Vermont, Virginia, Wisconsin, and Wyoming) in 2014, 21 states (Colorado, Connecticut, Delaware, Georgia, Hawaii, Illinois, Indiana, Iowa, Kansas, Maryland, Massachusetts, Minnesota, Missouri, Nevada, New York, Ohio, Pennsylvania, Texas, Virginia, West Virginia, and Wisconsin) in 2015, and 25 states (California, Connecticut, Delaware, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Massachusetts, Minnesota, Mississippi, Missouri, Nevada, New York, Ohio, Pennsylvania, Rhode Island, Texas, Vermont, Virginia, Washington, and Wisconsin) in 2016.³⁴

All male and female participants who completed the sexual orientation module in the 2014 to 2016 BRFSS were eligible for inclusion (N = 525 671). Participants who answered “other” (n = 1945) or “don’t know/not sure” (n = 5117), and those who refused to answer the sexual orientation item (n = 8961) were excluded from analyses. Participants with any missing data for other measures were also excluded from analyses.

Measures

Sexual orientation.—The measure of sexual orientation used in this study was sexual identity. Male and female participants were asked: “Do you consider yourself to be straight or heterosexual, lesbian or gay, bisexual, or other?” We categorized participants as heterosexual, lesbian or gay, or bisexual based on this item.

Demographic characteristics.—The following demographic characteristics were assessed: age in years (18–24, 25–34, 35–44, 45–54, 55–64, over 65), sex (male or female), race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, other, or multiracial), income level (less than \$15 000, \$15 000–\$24 999, \$25 000–\$34 999, \$35 000–\$49 999, and over \$50 000), education (less than high school, graduated high school, attended college or technical college, graduated from college or technical college), marital status (married/partnered, single, or other), and employment status (employed vs not employed). We also examined state of residence and survey year.

Health-care access and utilization.—We assessed 3 measures related to health-care access and utilization, including: (1) health-care coverage, (2) whether participants reported they had to delay seeking health-care due to costs in the past year, and (3) length of time since last routine checkup (categorized as within past year vs greater than 1 year ago).

Psychosocial factors.—Participants were asked to report the number of days in which their mental health was not good in the past month. We then dichotomized this variable (14 days or 0–13 days) and categorized it as frequent mental distress based on established criteria.³⁵ Lifetime depression was based on report of ever being told they had depression, major depression, dysthymia, or minor depression.

Health behaviors.—Health behaviors included current tobacco use, heavy drinking (>14 drinks per week for men and >7 drink per week for women),³⁶ and exercise, which was assessed by report of engaging in any recreational physical activity in the past 30 days.

Metabolic risk factors.—Obesity (body mass index ≥ 30 kg/m²) was based on self-reported height and weight and calculated by dividing weight in kilograms by height in meters squared using established criteria.³⁷ To assess diabetes, participants were asked if they had ever been told they had diabetes. Participants who reported they had gestational diabetes during a previous pregnancy or prediabetes were categorized as not having diabetes.

Cardiovascular disease.—Participants were asked whether they had ever been told by a doctor, nurse, or other health professional they had angina/coronary heart disease, stroke, or heart attack.

Analysis

All analyses were conducted in Stata version 15 and incorporated sampling weights provided by BRFSS. We conducted sex-stratified analyses in which heterosexual participants were the reference group. For bivariate analyses, we examined sexual orientation differences across all variables using the Rao Scott χ^2 test. Next, we conducted multiple logistic regression models to estimate odds ratios with 95% confidence intervals (CIs) for the association of sexual orientation with CVD risk factors (psychosocial factors, health behaviors, and metabolic risk factors), adjusting for potential confounders (demographic characteristics, state of residence, survey year, and health-care access and utilization), which were selected a priori. We then conducted multiple logistic regression models to estimate odds ratios with 95% CI for the association of sexual orientation and

CVD, adding adjustment for CVD risk factors in addition to the previously mentioned confounders. A 2-sided P value $<.05$ was considered statistically significant for all analyses.

Results

The final analytic sample consisted of 395 154 participants, of which 177 096 were male (gay 2.2%; bisexual 1.5%). As shown in Table 1, compared to heterosexual men, sexual minority men were more likely to be younger (ages 18–24; gay = 15.0% vs 10.4%; $P < .001$; bisexual = 21.7% vs 10.4%; $P < .001$), single (gay = 59.1% vs 22.8%; $P < .001$; bisexual = 46.4% vs 22.8%; $P < .001$), and report an income less than \$15 000 (gay = 10.8% vs 7.4%; $P < .001$; bisexual = 13.6% vs 7.4%; $P < .001$). Bisexual men were also less likely than heterosexual men to identify as non-Hispanic white (62.4% vs 70.0%; $P < .001$). Gay men reported higher rates of having graduated college or technical college than heterosexual men (41.6% vs 28.2%; $P < .001$), whereas bisexual men reported lower rates (24.4% vs 28.2%; $P = .02$). Compared to heterosexual men, both gay (12.4% vs 10.4%; $P < .05$) and bisexual men (15.6% vs 10.4%; $P < .001$) were more likely to delay health care due to cost. Gay men were also more likely to have a routine checkup in the past year relative to their heterosexual peers (72.5% vs 67.6%; $P < .01$).

As shown in Table 2, a total of 218 058 women were included (lesbian 1.3%, bisexual 2.4%) in this analysis. Compared to heterosexual women, sexual minority women were more likely to be younger (ages 18–24; lesbian = 17.9% vs 9.5%; $P < .001$; bisexual = 30.5% vs 9.5%; $P < .001$), single (lesbian = 44.4% vs 19.1%; $P < .001$; bisexual = 45.4% vs 19.1%; $P < .001$), and employed (lesbian = 62.5% vs 54.0%; $P < .001$; bisexual = 58.1% vs 54.0%; $P < .01$). Lesbian women were more likely to have graduated college or technical college than their heterosexual peers (34.3% vs 29.4%; $P = .02$). Bisexual women were less likely to identify as non-Hispanic white (63.1% vs 69.4%; $P < .001$) and to have graduated college or technical college (24.0% vs 29.4%; $P < .001$). In addition, bisexual women were also more likely to have an income less than \$15 000 (33.3% vs 47.9%; $P < .001$) and lower rates of health-care coverage relative to heterosexual women (87.7% vs 91.8%; $P < .001$). Sexual minority women were more likely to delay seeking health care due to cost (lesbian = 17.8% vs 12.8%; $P = .01$; bisexual = 23.7% vs 12.8%; $P < .001$) and less likely to have a routine checkup in the past year than heterosexual women (lesbian = 72.8% vs 76.3%; $P < .03$; bisexual = 67.6% vs 76.3%; $P < .001$).

Table 3 presents findings for CVD risk factors and CVD for men and women. Sexual minority men were more likely than heterosexual men to report frequent mental distress (gay adjusted odds ratio [AOR]: 1.59, 95% CI = 1.33–1.89; bisexual AOR: 1.88, 95% CI = 1.52–2.32) and lifetime depression (gay AOR: 2.48, 95% CI = 2.16–2.84; bisexual AOR: 2.67, 95% CI = 2.23–3.20). While, bisexual men reported no difference in health behaviors relative to heterosexual men, gay men were more likely to report current tobacco use (AOR: 1.28, 95% CI = 1.09–1.50). In addition, gay men were less likely to be obese (AOR: 0.82, 95% CI = 0.71–0.95) but had similar rates of diabetes compared to heterosexual men.

Moreover, sexual minority women were more likely to report higher rates of frequent mental distress (lesbian AOR: 1.37, 95% CI = 1.10–1.71; bisexual AOR: 2.33, 95% CI = 2.01–2.71)

and lifetime depression (lesbian AOR: 1.96, 95% CI = 1.57–2.46; bisexual AOR: 3.26, 95% CI = 2.85–3.72) than their heterosexual peers. Sexual minority women also reported higher rates of current tobacco use (lesbian AOR: 1.65, 95% CI = 1.31–2.07; bisexual AOR: 1.29, 95% CI = 1.11–1.50) and heavy drinking (lesbian AOR: 2.01, 95% CI = 1.57–2.56; bisexual AOR: 2.04, 95% CI = 1.66–2.51) than heterosexual women. In addition, sexual minority women were more likely to exercise in the past month (lesbian AOR: 1.35, 95% CI = 1.09–1.67; bisexual AOR: 1.24, 95% CI = 1.06–1.48). Although no differences were observed for diabetes, we detected higher odds of obesity in sexual minority women (lesbian AOR: 1.50, 95% CI = 1.22–1.84; bisexual AOR: 1.29, 95% CI = 1.13–1.47).

Although we did not identify sexual orientation differences for CVD for men, several differences were detected among women. Lesbian women reported significantly lower rates of heart attack compared to heterosexual women (AOR: 0.62, 95% CI = 0.40–0.97). Bisexual women reported higher rates of stroke (AOR: 1.46, 95% CI = 1.01–2.12) than heterosexual women.

Discussion

This study, which combined 3 years of BRFSS data, is one of the largest analyses of CVD in sexual minorities and adds to the nascent body of research examining CVD in this population. We observed several sexual orientation differences in psychosocial factors, health behaviors, and metabolic risk factors but fewer differences in CVD. Sexual minorities reported a higher prevalence of mental distress and lifetime depression compared to heterosexual participants. The mental health disparities we observed in sexual minorities are well-documented.^{19,38,39} Among sexual minority men, gay men reported higher rates of current tobacco use, but lower rates of obesity, relative to heterosexual men. Previous analyses of population-based studies, including state-level analyses of BRFSS data, also found elevated rates of current tobacco use in gay men.^{14,40–44} The lower rates of obesity found among gay men have also been previously described in the literature.^{9,40–42,44,45} We did not identify sexual orientation differences in physical activity for men, which is consistent with most evidence.^{43,44,46–48} Although we did not detect significant differences in health behaviors and CVD among bisexual men, several studies indicate bisexual men demonstrate higher rates of tobacco use,^{41–43} alcohol consumption,⁴³ and diabetes^{16,49} than heterosexual men.

The higher rates of current tobacco use, heavy drinking, and obesity observed in sexual minority women are consistent with findings of 2 recent systematic reviews.^{9,50} Sexual minority women in the present study were also more likely to exercise in the past month compared to heterosexual women, which contradicts several studies that indicate there are no sexual orientation differences in physical activity for women.^{41,44,46,48,51–53} However, a recent study found that sexual minority women reported higher rates of certain types of physical activity (both aerobic and strengthening exercises).⁵⁴ In addition, sexual minority women in that study also reported higher rates of sedentary behaviors (including average number of hours sitting per week) relative to heterosexual women.⁵⁴ The conflicting evidence regarding sexual orientation differences in physical activity and sedentary behaviors warrants further research in this area. To date, no studies have examined objective

measures of physical activity in sexual minorities, which may be an important step to advance our knowledge of physical activity in this population.

We identified lesbian women were less likely to report having had a heart attack, but bisexual women were more likely to report a history of stroke compared to their heterosexual peers. Most studies suggest that, despite elevated CVD risk, there are few differences in CVD diagnoses between sexual minority and heterosexual women.⁹ However, recent data from the National Health Interview Survey (NHIS) indicate that significant sexual orientation differences in CVD exist. Older sexual minority women (age 50 years old) in the NHIS were more likely to report having a history of heart attack and stroke, while sexual minority men reported higher rates of angina/coronary heart disease than heterosexuals.⁵⁵ It is important to note that analyses in that study were combined for gay/lesbian and bisexual participants of the same sex, potentially obscuring differences between sexual minority subgroups. Similarly, another analysis of NHIS data found lesbian women had higher a prevalence of stroke, while gay men reported higher rates of CVD than heterosexual peers.⁵⁶ Unlike the present study, neither study adjusted regression analyses for recognized modifiable risk factors for CVD (such as psychosocial factors or health behaviors). Most studies on CVD in sexual minorities (including the present study) use self-reported data, which may underestimate the presence of biological risk factors (such as diabetes, hypertension, and hyperlipidemia) and CVD diagnoses. For instance, a recent analysis of data from the National Health and Nutrition Examination Survey detected higher rates of objectively measured obesity and hyperglycemia in sexual minority women and bisexual men.^{15,16} Objective measures of CVD risk factors (such as body mass index, physical activity, diabetes, hypertension and lipids) should be integrated into CVD research with sexual minorities.

This study is an important contribution to CVD research in sexual minorities. Few studies have focused exclusively on CVD in sexual minorities. Previous studies have not accounted for the full breadth of CVD risk factors, such as psychological factors or metabolic risk factors.^{14,56,57} In fact, a limitation of previous work has been the lack of statistical adjustment for relevant CVD risk factors,⁵⁸ which leads to residual confounding. This study underscores the need for continued inclusion of sexual orientation items in population-based surveys.⁵⁹

Moreover, these findings have implications for health promotion and disease prevention among sexual minorities. The large representative sample of the BRFSS increases generalizability of study findings. We recommend that clinicians should routinely screen for modifiable risk factors for CVD (including psychosocial factors and health behaviors) in sexual minorities. Indeed, we found that sexual minority women reported higher rates of current tobacco use, heavy drinking, and obesity, while gay men reported higher rates of current tobacco use than same-sex heterosexual peers. Although public health initiatives have focused on CVD risk reduction in racial/ethnic and low income populations,⁶⁰ these data suggest there is an urgent need for CVD prevention programs aimed at reducing CVD risk in sexual minorities.⁶⁰ Given evidence of elevated risk factors for CVD in sexual minority women, and to a lesser extent in gay men, clinicians and public health practitioners

should develop health promotion efforts tailored to promote the cardiovascular health of sexual minorities.

Limitations of This Study

Given that BRFSS consists of self-reported cross-sectional data, we examined correlations among included variables, but we were unable to comment about temporality, thus, limiting causality. Longitudinal studies examining sexual orientation differences in CVD are needed. Previous studies have shown disagreement between self-reported cardiovascular risk factors such as body mass index versus objective measurement.^{61,62} Similarly, there is concern over the accuracy of self-reported CVD compared to medical records.⁶³ The use of medical records and diagnostic data to ascertain the presence of CVD is an important area in need of further attention.⁵⁸ This should be of particular concern especially since sexual minority women in the present study had lower health-care utilization compared to heterosexual women. In addition, important CVD risk factors such as hypertension, lipids, and diet were not assessed throughout all BRFSS years included in this study. Therefore, it was not possible to comprehensively investigate differences in CVD risk in sexual minorities. Likewise, since BRFSS 2014 to 2016 did not include measures of minority stressors (such as victimization, discrimination, expectations of rejection, etc) or chronic stress, we were unable to examine the impact of these factors on CVD risk in sexual minorities.

Conclusion

As one of the largest analyses of CVD in sexual minorities, the present study represents an important contribution to knowledge of CVD risk in sexual minorities. These findings underscore the need for longitudinal analyses and the use of objective measures in CVD research with sexual minorities. More importantly, there are few evidence-based guidelines for the prevention and treatment of CVD in sexual minorities. This study identifies the need to develop culturally tailored health promotion initiatives that target CVD risk reduction in this population, particularly among sexual minority women. We encourage clinicians and public health practitioners to incorporate evidence-based approaches for CVD risk reduction among sexual minorities that acknowledge the potential impact of risk factors unique to this population, such as minority stressors.

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SO WHAT?

What is already known on this topic?

Sexual minorities are exposed to significant social stressors that may lead to excess cardiovascular disease (CVD) risk. However, there is a dearth of research on CVD in this population.

What does this article add?

This study, which is one of the largest analyses of CVD in sexual minorities, adds to the nascent body of research examining CVD in this population. Findings indicate significantly higher psychosocial and risk behaviors among sexual minority women relative to heterosexual women. But sexual minority women were also more likely to exercise in the past month. Gay men reported higher rates of current tobacco use but lower rates of obesity than heterosexual men. Lesbian women reported lower rates of heart attack, whereas bisexual women reported higher rates of stroke than heterosexual women. No sexual orientation differences in cardiovascular diagnoses were noted among men.

What are the implications for health promotion practices or research?

Clinicians and public health practitioners should develop health promotion efforts tailored to reduce CVD risk in sexual minorities. Additional research that incorporates objective measures and longitudinal analyses is needed.

Table 1.

Sexual Orientation Differences for Demographic Characteristics and Health-Care Access and Utilization Among Men, Behavioral Risk Factor Surveillance System 2014–2016.^{a,b}

Demographic characteristics	Heterosexual (n = 171 289)		Gay (n = 3590)		Gay vs Heterosexual		Bisexual (n = 2217)		Bisexual vs Heterosexual	
	%		%		P Value	%		P Value		
Age					<.001				<.001	
18–24	10.4	15	10.4	15		21.7	21.7			
25–34	16.3	20.7	16.3	20.7		22.2	22.2			
35–44	16.9	14.4	16.9	14.4		14	14			
45–54	19.1	23.5	19.1	23.5		14.4	14.4			
55–64	18.4	16.6	18.4	16.6		14.4	14.4			
65	18.9	9.8	18.9	9.8		13.3	13.3			
Race					.59				<.001	
Non-Hispanic white	70	70	70	70		62.4	62.4			
Non-Hispanic black	10.4	9.3	10.4	9.3		13.4	13.4			
Hispanic	12.3	12.4	12.3	12.4		12.7	12.7			
Other race	7.3	8.3	7.3	8.3		11.5	11.5			
Income					<.001				<.001	
<\$15 000	7.4	10.8	7.4	10.8		13.6	13.6			
\$15 000–\$24 999	13.7	14	13.7	14		18.2	18.2			
\$25 000–\$34 999	9.7	7.2	9.7	7.2		13.8	13.8			
\$35 000–\$49 999	14.3	15.7	14.3	15.7		13.9	13.9			
>\$50 000	54.9	52.3	54.9	52.3		40.5	40.5			
Education					<.001				.02	
Did not graduate high school	11.6	6.9	11.6	6.9		14.3	14.3			
Graduated high school	30.3	20.2	30.3	20.2		27.8	27.8			
Attended college or technical college	29.9	31.6	29.9	31.6		33.5	33.5			
Graduated college or technical college	28.2	41.6	28.2	41.6		24.4	24.4			
Marital status					<.001				<.001	
Married/partnered	61.4	33.1	61.4	33.1		38.5	38.5			
Single	22.8	59.1	22.8	59.1		46.4	46.4			

Demographic characteristics	Heterosexual (n = 171 289)		Gay (n = 3590)		Gay vs Heterosexual		Bisexual (n = 2217)		Bisexual vs Heterosexual	
	%		%		P Value	%		P Value		
Other	15.8		7.8	15.1						
Employment status					.78					<.001
Employed	67		66.6	58.2						
Not employed	33		33.4	41.7						
Health-care access and utilization in past year										
Health-care coverage	89.2		91.9	88.5	.09					.53
Health-care delayed due to cost	10.4		12.4	15.6	.05					<.001
Routine checkup within past year	67.6		72.5	65.7	< .01					.75

^aN = 177 096.

^bBoldface denotes statistically significant results at the .05 level.

Table 2.

Sexual Orientation Differences for Demographic Characteristics and Health-Care Access and Utilization Among Women, Behavioral Risk Factor Surveillance System 2014 to 2016.^{a,b}

Demographic characteristics	Heterosexual (n = 212 010)		Lesbian vs Heterosexual		Bisexual (n = 3585)		Bisexual vs Heterosexual	
	%	%	P Value	%	P Value	%	P Value	
Age			<.001		<.001		<.001	
18–24	9.5	17.9		30.5				
25–34	14.7	19.4		32.2				
35–44	16.8	16.9		15.8				
45–54	19	21.3		9.8				
55–64	18.7	13.8		6.4				
65	21.3	10.7		5.3				
Race			.15		<.001			
Non-Hispanic white	69.3	64.2		63.1				
Non-Hispanic black	12.4	13.7		13.9				
Hispanic	11.6	12.3		14				
Other race	6.7	9.8		9				
Income			.65		<.001			
<\$15 000	10.8	12.6		16.5				
\$15 000–\$24 999	17	16.3		25.3				
\$25 000–\$34 999	10.7	9.9		11				
\$35 000–\$49 999	13.7	12.9		13.9				
>\$50 000	47.9	48.3		33.3				
Education			.02		<.001			
Did not graduate high school	10.1	8		12.5				
Graduated high school	27	21.6		25.5				
Attended college or technical college	33.5	36.1		38				
Graduated college or technical college	29.4	34.3		24				
Marital status			<.001		<.001			
Married/partnered	56.3	41.7		37.4				
Single	19.1	44.4		45.4				

Demographic characteristics	Heterosexual (n = 212 010)		Lesbian (n = 2463)		Bisexual vs Heterosexual		Bisexual (n = 3585)		Bisexual vs Heterosexual	
	%		%		P Value	%		P Value		
Other	24.6		13.9			17.2				
Employment status										
Employed	54		62.5		<.001	58.1				.01
Not employed	46		37.5			41.9				
Health-care access and use in past year										
Health-care coverage	91.8		90.4		.19	87.7				<.001
Health-care delayed due to cost	12.8		17.8		.01	23.7				<.001
Routine checkup within past year	76.3		72.8		.03	67.6				<.001

^aN = 218 058.

^bBoldface denotes statistically significant results at the .05 level.

Table 3.

Sexual Orientation Differences in Psychosocial Factors, Health Behaviors, Metabolic Risk Factors, and Cardiovascular Disease in Men and Women, Behavioral Risk Factor Surveillance System 2014 to 2016.^{a,b}

Health outcomes	Men (n = 177 096)			Women (n = 218 058)		
	%	OR (95% CI)	AOR (95% CI)	%	OR (95% CI)	AOR (95% CI)
Psychosocial factors						
Frequent mental distress						
Heterosexual	8.6	Ref	Ref	Ref	Ref	Ref
Gay/lesbian	13.9	1.72 (1.45–2.03)	1.59 (1.33–1.89) ^c	17	1.44 (1.16–1.78)	1.37 (1.10–1.71) ^c
Bisexual	18.5	2.41 (1.97–2.94)	1.88 (1.52–2.32) ^c	30.6	3.09 (2.69–3.56)	2.33 (2.01–2.71) ^c
Lifetime depression						
Heterosexual	12.1	Ref	Ref	21.5	Ref	Ref
Gay/lesbian	26.8	2.68 (2.35–3.05)	2.48 (2.16–2.84) ^c	33.3	1.82 (1.50–2.22)	1.96 (1.57–2.46) ^c
Bisexual	29.8	3.09 (2.60–3.67)	2.67 (2.23–3.20) ^c	49.1	3.52 (3.11–3.99)	3.26 (2.85–3.72) ^c
Health behaviors						
Current tobacco use						
Heterosexual	18.7	Ref	Ref	15.3	Ref	Ref
Gay/lesbian	24.6	1.42 (1.23–1.64)	1.28 (1.09–1.50) ^d	24.4	1.78 (1.45–2.20)	1.65 (1.31–2.07) ^d
Bisexual	23.4	1.33 (1.11–1.59)	0.95 (0.78–1.16) ^d	28.2	2.17 (1.89–2.49)	1.29 (1.11–1.50) ^d
Heavy drinking						
Heterosexual	6.9	Ref	Ref	5.9	Ref	Ref
Gay/lesbian	7.8	1.15 (0.93–1.44)	0.97 (0.77–1.22) ^d	13.3	2.47 (1.94–3.15)	2.01 (1.57–2.56) ^d
Bisexual	9.4	1.41 (1.08–1.86)	1.23 (0.93–1.63) ^d	13.3	2.47 (2.03–2.99)	2.04 (1.66–2.51) ^d
Exercise in past month						
Heterosexual	78	Ref	Ref	74.8	Ref	Ref
Gay/lesbian	80.1	1.13 (0.97–1.31)	0.93 (0.80–1.09) ^d	81.3	1.46 (1.20–1.77)	1.35 (1.09–1.67) ^d
Bisexual	79.2	1.08 (0.89–1.30)	1.15 (0.95–1.41) ^d	78	1.20 (1.03–1.39)	1.24 (1.06–1.48) ^d
Metabolic risk factors						
Obesity						
Heterosexual	31.1	Ref	Ref	30.5	Ref	Ref
Gay/lesbian	23.9	0.70 (0.61–0.80)	0.82 (0.71–0.95) ^e	37.3	1.35 (1.11–1.65)	1.50 (1.22–1.84) ^e

Health outcomes	Men (n = 177 096)			Women (n = 218 058)		
	%	OR (95% CI)	AOR (95% CI)	%	OR (95% CI)	AOR (95% CI)
Bisexual	30.3	0.96 (0.80–1.16)	1.03 (0.85–1.24) ^e	36.8	1.33 (1.17–1.51)	1.29 (1.13–1.47)^e
Diabetes						
Heterosexual	11.6	Ref	Ref	10.2	Ref	Ref
Gay/lesbian	9.4	0.79 (0.66–0.94)	1.07 (0.87–1.31) ^f	9.6	0.93 (0.59–1.47)	1.20 (0.85–1.70) ^f
Bisexual	11.2	0.97 (0.76–1.24)	1.11 (0.86–1.44) ^f	6.4	0.60 (0.49–0.73)	1.02 (0.82–1.26) ^f
Cardiovascular disease Angina/coronary heart disease						
Heterosexual	5.5	Ref	Ref	3.4	Ref	Ref
Gay/lesbian	4	0.72 (0.55–0.93)	1.02 (0.76–1.35) ^g	1.8	0.52 (0.35–0.77)	0.76 (0.49–1.19) ^g
Bisexual	4.7	0.85 (0.62–1.17)	1.00 (0.70–1.43) ^g	1.5	0.45 (0.30–0.66)	0.93 (0.61–1.41) ^g
Stroke						
Heterosexual	3	Ref	Ref	3	Ref	Ref
Gay/lesbian	2.4	0.81 (0.57–1.15)	0.96 (0.65–1.39) ^g	2.8	0.90 (0.61–1.33)	1.17 (0.75–1.82) ^g
Bisexual	4.4	1.52 (0.99–2.34)	1.52 (0.96–2.41) ^g	2.8	0.91 (0.64–1.29)	1.46 (1.01–2.12)^g
Heart attack						
Heterosexual	5.6	Ref	Ref	2.9	Ref	Ref
Gay/lesbian	4.3	0.74 (0.57–0.96)	1.04 (0.78–1.38) ^g	1.3	0.44 (0.29–0.67)	0.62 (0.40–0.97)^g
Bisexual	6	1.07 (0.77–1.50)	1.19 (0.81–1.75) ^g	1.6	0.54 (0.35–0.84)	1.00 (0.63–1.58) ^g

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; OR, odds ratio.

^aN = 395 154.

^bBoldface denotes statistically significant results at the .05 level.

^cAdjusted for demographic characteristics.

^dAdded psychosocial factors.

^eAdded health behaviors and health-care access and utilization.

^fAdded obesity.

^gAdded diabetes.