

# Disparities in Cancer Screening in Sexual and Gender Minority Populations: A Secondary Analysis of Behavioral Risk Factor Surveillance System Data

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**OBJECTIVES:** To describe cancer screening characteristics and better understand individual-, environmental-, and organizational-level barriers of sexual and gender minority (SGM) populations.

**SAMPLE & SETTING:** This study was conducted using a combined sample from the Behavioral Risk Factor Surveillance System (BRFSS) national dataset from 2014 and 2016.

**METHODS & VARIABLES:** Chi-square tests for independence and logistic regression analysis tests were performed to determine whether relationships existed between SGM status and demographics.

**RESULTS:** Black respondents or those who reported their race as other, were female, had some college or technical school or more, and had healthcare coverage were less likely to present for cancer screening. SGM respondents who were in good or better health; were unmarried; were aged 18–44 years or 45–55 years; or were Asian, Native American, or Hawaiian, or reported their race as other, had higher odds of screening for cancer.

**IMPLICATIONS FOR NURSING:** Disparities in cancer screening among SGM populations are not well documented. These findings will inform structured education and preventative interventions to improve screening participation among SGM populations.

**KEYWORDS** cancer screening; LGBTQ+; sexual orientation; gender identity

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Sexual and gender minority (SGM) populations, made up of people identifying as part of the LGBTQ+ (lesbian, gay, bisexual, transgender, or queer) community, are less likely to seek routine cancer screening, have higher rates of certain cancers (Bristowe et al., 2018; Burkhalter et al., 2016; Institute of Medicine, 2011; Schabath et al., 2019), and may present with advanced stages of cancer, leading to higher mortality rates (National LGBT Cancer Network, 2013). Overall cancer mortality rates continue to decrease, and individuals are living longer with cancer as a chronic condition (Curtin, 2019). This is not the case for members of SGM populations who are less likely to participate in cancer screening (Burkhalter et al., 2016; Schabath et al., 2019), despite the well-established fact that improved outcomes and increased survival rates occur with early detection of cancer and participation in routine health care (World Health Organization, 2017).

Little is known about the demographic, socioeconomic, and healthcare characteristics of eligible SGM individuals who present for cancer screening (screeners) compared to eligible SGM individuals who do not participate in cancer screening (nonscreeners). Although nonscreening SGM populations are at higher risk for developing cancer, the lack of screening participation remains an elusive and complex problem.

A major barrier to understanding cancer screening characteristics among the SGM population is the failure to collect sexual orientation and gender identity (SOGI) data (Cathcart-Rake, 2018; Institute of Medicine, 2011; Joint Commission, 2011). To identify, track, and address disparities in SGM populations, the National Academy of Medicine and the Joint Commission recommend these data be collected electronically (Institute of

Medicine, 2011; Joint Commission, 2011). Although collection of SOGI data is imperative to understanding the healthcare needs of SGM populations, many hospital registries and major national large-scale population studies (e.g., National Cancer Database; National Program of Cancer Registries; Surveillance, Epidemiology, and End Results Program) do not currently collect these data (Cahill, 2018; Gates, 2017; Grasso et al., 2019; Institute of Medicine, 2012; Joint Commission, 2011). Existing databases, though limited, provide a source of information for the analysis to establish a profile of cancer disparities among SGM populations.

The addition of SGM data documented on cancer disparities may lead to a better understanding of nonscreeners, although literature describing cancer screening participation in SGM populations is limited (Baptiste-Roberts et al., 2017). Reasons for the lack of screening remain elusive, which places this population at greater risk for poorer health outcomes from cancer. Although cancer screening has been shown to reduce mortality from breast (Oeffinger et al., 2015), cervical (Saslow et al., 2012), colorectal (Wolf et al., 2018), prostate (Wolf et al., 2010), and lung cancers (Wender et al., 2013), data suggest members of SGM populations who are eligible for cancer screening do not routinely participate in screening (Burkhalter et al., 2016).

To better understand individual, environmental, and organizational cancer-screening barriers SGM populations face, the aim of this analysis of an existing dataset was to compare demographic (individual) and healthcare (environmental and organizational) characteristics between SGM and non-SGM populations. The objective was to justify areas of research needed to describe SGM populations, so that targeted interventions can be developed to improve cancer screening participation. This study addresses the National Academy of Medicine's recommendation to build a solid evidence base of clinical data to establish evidence of healthcare differences in cancer screening among SGM populations and describe the characteristics of a large sample of SGM populations (Institute of Medicine, 2011). One a priori assumption of this study was that non-White SGM respondents with a lower socioeconomic status were less likely to present for cancer screening when compared to White non-SGM individuals with a lower socioeconomic status.

## Methods

### Sample and Setting

Data were extracted from the Centers for Disease Control and Prevention (CDC) Behavioral Risk

Factor Surveillance System (BRFSS) dataset. This dataset was chosen for the large sample size, accessibility, time efficiency, and cost-effectiveness (Polit & Beck, 2017) when compared to the initiation of a new survey. The BRFSS, a cross-sectional national dataset, is the largest ongoing health survey conducted by the CDC and contains SOGI data.

The BRFSS is an annual national telephone survey of more than 400,000 U.S. residents in all 50 states as well as the District of Columbia and U.S. territories that documents health-related risk behaviors, chronic health conditions, and the use of preventive services (CDC, 2018). The survey is comprised of a set of core questions, optional modules, and state-added questions. Beginning in 2014, one optional module included SOGI questions (CDC, 2018). Cancer screening data (colon, breast, and cervical) are collected in the core questionnaire every even year. As a result, 20 states in 2014 and 26 states in 2016, spanning all regions of the United States, collected SGM and cancer screening data, which were used to meet the specific aims of this study.

### Data Collection and Analysis

The following two methods of data collection are used in the BRFSS: (a) a disproportionate stratified sampling technique, or a sample without proportionate stratum to the population of the stratum that uses landlines, and (b) a sampling frame for mobile telephones comprised of area code and prefix combinations. Inclusion criteria of respondents in the BRFSS database included the following: (a) being a noninstitutionalized adult household member, (b) being aged 18 years or older, (c) residing in the United States or a U.S. territory, (d) speaking English or Spanish, and (e) having a landline or mobile telephone. Respondents are recruited by means of random digit-dialing continuously throughout the year; via telephone interview, respondents are asked a series of standardized core questions, optional modules, and state-added questions according to each state's protocol. As many as 15 call attempts to each telephone number are made (CDC, 2018). Individual state health departments manage field operations, develop protocols, and send collected data to the CDC for editing, weighting, and analyses. Weighting is done through iterative proportional fitting or raking. Raking is an adjustment of the data to better represent the entire population for the reduction of bias within error estimates and is based on sex, age, race, education, marital status, home ownership, telephone ownership, and substate region. The deidentified BRFSS datasets are publicly available for download from the CDC's (2018) website.

**TABLE 1. Demographics and Healthcare Characteristics of Overall SGM and Non-SGM Populations**

Variable	Overall Sample (N = 403,900)		SGM Sample (N = 12,204)		Non-SGM Sample (N = 391,696)	
	n	% <sup>a</sup>	n	% <sup>a</sup>	n	% <sup>a</sup>
<b>Age (years)</b>						
18–24	22,135	6	1,685	18	20,469	9
25–34	39,812	10	1,995	21	37,837	16
35–44	46,483	12	1,553	17	44,947	15
45–54	66,646	17	2,204	17	64,463	18
55–64	91,778	23	2,465	16	89,341	20
65 or older	137,046	34	2,805	14	134,327	22
<b>Annual income (\$)</b>						
Less than 15,000	34,537	9	1,725	14	32,852	9
15,000–24,000	57,068	14	2,223	17	54,885	14
25,000–34,000	37,688	9	1,230	10	36,477	9
35,000–50,000	49,808	12	1,509	12	48,317	12
50,000 or greater	162,816	40	4,417	36	158,429	43
<b>Healthcare coverage</b>						
Yes	374,436	93	8,585	72	226,784	67
No	27,993	7	1,206	13	246,084	10
<b>Education level</b>						
Did not graduate high school	29,909	7	1,130	10	28,825	9
Graduated high school	116,528	29	3,343	25	113,254	26
Some college or technical school	107,950	27	3,400	28	104,594	26
Graduated college or technical school	147,523	37	4,810	37	142,742	39
<b>Employment status</b>						
Employed	169,759	42	5,634	50	164,175	49
Retired	119,311	30	2,537	13	116,833	20
Self-employed	33,629	8	1,070	9	32,577	9
Unable to work	28,841	7	1,380	9	27,487	6
Homemaker	21,969	5	465	4	21,523	5
Student	10,327	3	726	8	9,604	4
Out of work for 1 year or more	8,369	2	390	3	7,988	2
Out of work for less than 1 year	8,152	2	428	4	7,728	3
<b>Marital status</b>						
Married	211,796	52	3,648	27	20,821	52
Never married	63,926	16	4,958	43	59,021	21
Divorced	54,773	14	1,547	11	53,244	13
Widowed	50,899	13	921	4	50,015	8
Member of unmarried couple	11,626	3	1,227	11	10,409	4
Separated	7,918	2	320	3	7,603	3
<b>Race and ethnicity</b>						
American Indian or Alaskan Native	4,491	1	368	4	12,164	4
Asian	12,520	3	184	1	4,310	< 1
Black	28,976	7	961	9	28,028	9

*Continued on the next page*

**TABLE 1. Demographics and Healthcare Characteristics of Overall SGM and Non-SGM Populations (Continued)**

Variable	Overall Sample (N = 403,900)		SGM Sample (N = 12,204)		Non-SGM Sample (N = 391,696)	
	n	% <sup>a</sup>	n	% <sup>a</sup>	n	% <sup>a</sup>
<b>Race and ethnicity (continued)</b>						
Hispanic	22,697	6	1,039	15	21,690	12
Native Hawaiian or other Pacific Islander	2,408	1	154	1	2,257	< 1
White	314,428	78	9,212	65	305,330	69
Multiracial	9,922	3	517	3	9,410	2
Other	1,675	< 1	71	1	1,606	1
<b>Self-reported health status</b>						
Good or better	–	–	9,925	78	319,332	82
Fair or poor	–	–	2,741	22	70,911	18
<b>Sex</b>						
Female	230,850	57	6,869	51	224,081	52
Male	173,033	43	5,837	49	167,287	48
<b>SGM status<sup>b</sup></b>						
SGM	12,204	3	–	–	–	–
Non-SGM	391,696	97	–	–	–	–
SM	11,555	3	–	–	–	–
Non-SM	333,990	83	–	–	–	–
GM	1,464	< 1	–	–	–	–
Non-GM	349,253	87	–	–	–	–
SM and GM	321	< 1	–	–	–	–

<sup>a</sup> Unweighted frequencies and weighted percentages shown<sup>b</sup> Respondents could choose more than 1 answer.

GM—gender minority; SGM—sexual and gender minority; SM—sexual minority

**Note.** Discrepancies are because of missing data that were not included in the survey.**Note.** Because of rounding, percentages may not total 100.**Note.** Because all the statistics are based on weighted percentages from the Behavioral Risk Factor Surveillance System dataset, which were then translated to unweighted frequencies, n values may total an amount exceeding the N value of that category.

The Health Equity Promotion Model and the Social Ecological Model were used to guide data extraction and selection of variables (see Table 1). From the BRFSS survey data, demographic and healthcare characteristics were the two main variable sets collected. Demographic characteristics were SGM status, age, sex, race and ethnicity, marital status, socioeconomic characteristics (e.g., education, employment status, annual income), and healthcare characteristics were self-reported health status, screening status, and healthcare coverage.

Data were imported into IBM SPSS Statistics, version 25.0, for analysis. To account for the complex survey methodology of the BRFSS, IBM SPSS Complex Samples, version 25.0, analyses procedures were used for all analyses. Descriptive statistics (frequency distributions and percentages) were

reported overall and by SGM status. Chi-square statistics were obtained to determine whether a relationship between the potential predictor variables (demographic and healthcare characteristics) and dependent variables (SGM and screening statuses) existed. All results were reported as unweighted frequencies and survey weighted percentages.

Potential predictor variables with multiple categories were collapsed into combined categories. For example, race and ethnicity was recoded into Asian, Black, Hawaiian, Hispanic, Native American, or White, and those who reported their race as other because of small frequencies in the categories Asian, Hawaiian, Hispanic, and Native American. Similarly, education attainment was recoded into some college or technical school or more, and high school or less; marital status was recoded into married and not

married; employment was recoded into unemployed and employed; income was recoded into less than \$15,000, \$15,000–\$34,000, and \$35,000 or more; age was recoded into 18–44 years, 45–54 years, and 55 years or older. A series of multiple logistic regression models were performed, and because this is an exploratory analysis, forward stepwise multiple logistic regression was used to add variables into the model based on statistical significance. This modeling was repeated after using multiple imputation for missing data. Conclusions from both modeling approaches regarding magnitude (odds ratio [OR] and precision of 95% confidence intervals around the OR) and direction were similar; therefore, only results from the models without multiple imputation were reported for ease of interpretation (Polit & Beck, 2017). This study did not require approval from the institutional review board at the Medical University of South Carolina.

## Results

### Participants

There were 403,900 respondents in the BRFSS dataset for states that collected SOGI data in 2014 and 2016. Participants had a mean age of 55 years (standard deviation = 17; range = 18–62 years) (see Table 2). About 57% ( $n = 230,850$ ) were women, and 64% ( $n = 257,123$ ) participated in some type of cancer screening. The majority were White (78%,  $n = 314,428$ ), married (52%,  $n = 211,796$ ), had an annual household income of \$50,000 or greater (40%,  $n = 162,816$ ), and had some type of healthcare coverage (93%,  $n = 374,436$ ).

### Descriptive Sample Data

Among SGM respondents, 21% ( $n = 1,995$ ) were aged 25–34 years, 51% ( $n = 6,869$ ) were women, 65% ( $n = 9,212$ ) were White, 43% ( $n = 4,958$ ) were never married, 50% ( $n = 5,634$ ) were employed, 37% ( $n = 4,810$ ) had graduated from college or technical school, 36% ( $n = 4,417$ ) had an income greater than \$50,000, 78% ( $n = 9,925$ ) reported good or better health, and 72% ( $n = 8,585$ ) had healthcare coverage. Among non-SGM respondents, 22% ( $n = 134,327$ ) were aged older than 65 years, 52% ( $n = 224,081$ ) were women, 69% ( $n = 305,330$ ) were White, 52% ( $n = 20,821$ ) were married, 49% ( $n = 164,175$ ) were employed, 43% ( $n = 158,429$ ) had an annual household income of \$50,000 or more, 67% ( $n = 226,784$ ) had healthcare coverage, and 39% ( $n = 142,742$ ) had graduated from college or technical school.

Chi-square tests of independence showed SGM nonscreeners were more likely to be younger

compared to SGM screeners ( $\chi^2 [5] = 2,676.7$ ,  $p < 0.001$ ).

## Associations of Screening Status Within SGM and Non-SGM Populations

### Individual-Level Associations

Female SGM respondents had 10 times the odds ( $p = 0.001$ ) of being nonscreeners than male SGM respondents. Black respondents had 1.4 times the odds ( $p = 0.002$ ) of being nonscreeners than White respondents. Female non-SGM respondents had 12 times the odds ( $p = 0.001$ ) of being nonscreeners than male non-SGM respondents. Asian, Native American, and Hawaiian SGM respondents had two times the odds ( $OR = 1/0.5$ ,  $p = 0.001$ ) of being screeners than White SGM respondents and 1.6 times the odds ( $OR = 1/0.6$ ,  $p = 0.001$ ) of being screeners than White non-SGM respondents. SGM respondents who reported their race or ethnicity as other had 1.4 times the odds ( $OR = 1/0.7$ ,  $p = 0.002$ ) of being screeners than White SGM respondents. Non-SGM respondents who reported their race as other had 1.1 times the odds ( $OR = 1/0.9$ ,  $p = 0.001$ ) of being screeners than White non-SGM respondents. Respondents aged 45–55 years had three times the odds ( $OR = 1/0.3$ ,  $p = 0.001$ ) of being screeners than respondents aged 55 years or older. Those aged 18–44 years had 10 times the odds ( $OR = 1/0.1$ ,  $p = 0.001$ ) of being screeners than respondents aged 55 years or older.

### Environmental-Level Associations

Unmarried SGM respondents had two times the odds ( $OR = 1/0.5$ ,  $p = 0.001$ ) of being screeners than married SGM respondents, and unmarried non-SGM respondents had 1.6 times the odds ( $OR = 1/0.6$ ,  $p = 0.001$ ) of being screeners than married non-SGM respondents. SGM respondents who had some college or technical school or more had 1.5 times the odds ( $p = 0.001$ ) of being nonscreeners than SGM respondents who had a high school education or less. Non-SGM respondents with some college or technical school or more had 1.4 times the odds ( $p = 0.001$ ) of being nonscreeners than SGM respondents with a high school education or less.

### Organizational-Level Associations

SGM respondents who reported being in good or better health had 1.7 times the odds ( $OR = 1/0.6$ ,  $p = 0.001$ ) of being screeners as SGM respondents who reported fair or poor health. SGM respondents who had healthcare coverage had 1.7 times the odds ( $p = 0.001$ ) of being nonscreeners than SGM respondents

**TABLE 2. Multiple Regression Results From Comparison of Nonscreeners Versus Screeners (Reference Group) Within SGM and Non-SGM Populations**

Variable	SGM			Non-SGM		
	OR	95% CI	p	OR	95% CI	p
<b>Age (years)</b>						
18–44 versus 55 or older	0.1	[0.04, 0.07]	0.001	0.1	[0.1, 0.1]	0.001
45–54 versus 55 or older	0.3	[0.2, 0.4]	0.001	0.3	[0.2, 0.3]	0.001
<b>Annual income (\$)</b>						
Less than 15,000 or as much as 34,000 versus 35,000 or more	0.9	[0.7, 1]	0.098	0.7	[0.7, 0.8]	0.001
<b>Education level</b>						
Some college or technical school or more versus high school or less	1.5	[1.3, 1.9]	0.001	1.4	[1.3, 1.5]	0.001
<b>Self-reported health status</b>						
Good or better versus fair or poor	0.6	[0.5, 0.8]	0.001	1	[0.9, 1]	0.591
<b>Healthcare coverage</b>						
Yes versus no	1.7	[1.3, 2.3]	0.001	2	[1.8, 2.1]	0.001
<b>Marital status</b>						
Not married versus married	0.5	[0.4, 0.6]	0.001	0.6	[0.6, 0.6]	0.001
<b>Race and ethnicity</b>						
Asian, Native American, or Hawaiian versus White	0.5	[0.4, 0.8]	0.002	0.6	[0.6, 0.7]	0.001
Black versus White	1.4	[1, 1.9]	0.002	1.4	[1.4, 1.5]	0.001
Hispanic versus White	1	[0.8, 1.3]	0.002	1.1	[1, 1.2]	0.001
Other race versus White	0.7	[0.4, 1.3]	0.002	0.9	[0.8, 1]	0.001
<b>Sex</b>						
Female versus male	10.2	[8.4, 12.7]	0.001	11.7	[11.2, 12.3]	0.001
CI—confidence interval; OR—odds ratio; SGM—sexual and gender minority						

without healthcare coverage. Non-SGM respondents who had healthcare coverage had two times the odds ( $p = 0.001$ ) of being nonscreeners than non-SGM respondents without healthcare coverage.

### **Associations of SGM Status Within Screening and Nonscreening Populations**

#### **Individual-Level Associations**

Female nonscreeners had 1.3 times the odds ( $p = 0.001$ ) of being an SGM respondent than male nonscreeners (see Table 3). Participants aged 45–55 years who were nonscreeners and screeners had 1.6 times the odds ( $p = 0.001$ ) of being an SGM respondent than their nonscreening counterparts aged 55 years or older. Nonscreeners aged 18–44 years had 1.9 times the odds ( $p = 0.001$ ) of being an SGM respondent than their nonscreening counterparts aged 55 years or older; screeners aged 18–44 years had 2.2 times the odds ( $p =$

$0.001$ ) of being an SGM respondent than screeners aged 55 years or older. Black respondents who were screeners had 1.3 times the odds ( $OR = 1/0.8$ ,  $p = 0.001$ ) of being a non-SGM respondent than White screeners. All those who reported their race and ethnicity as other had 1.4 times the odds ( $p = 0.001$ ) of being an SGM respondent than White screeners.

#### **Environmental-Level Associations**

Nonscreening unmarried respondents had 3.3 times the odds of being an SGM respondent ( $p = 0.001$ ) than nonscreening married respondents. Screeners who were unmarried had 2.7 times the odds ( $p = 0.001$ ) of being an SGM respondent than unmarried screeners. Nonscreeners who had some college or technical school or more had 1.2 times the odds ( $p = 0.001$ ) of being an SGM respondent than nonscreeners who had a high school education or less. Screeners with some college education had 1.3 times



the odds ( $p = 0.001$ ) of being an SGM respondent than screeners with a high school education or less.

### Organizational-Level Association

Screeners who reported to be in good or better health had 1.3 times the odds ( $OR = 1/0.8$ ,  $p = 0.001$ ) of being non-SGM respondents than screeners reporting fair or poor health. No differences were significant for nonscreening or screening SGM respondents in healthcare coverage and self-reported health status.

### Summary of Findings

Among cancer screeners and nonscreeners, Black SGM respondents (compared to White) who were female (compared to male), were college educated (compared to high school or less), and had healthcare coverage (compared to no healthcare coverage) had higher odds of being nonscreeners. Asian, Hawaiian, and Native American SGM respondents and SGM respondents who reported their race as other (when compared to White SGM respondents), who were in good or better health (compared to fair or poor health), unmarried (compared to married), aged 18–44 years (compared to 55 years or older) or 45–55 years (compared to 55 years or older) had higher odds of being screeners.

Among respondents within nonscreening and screening populations, female nonscreeners (compared to male) who had some college or technical school or more (compared to high school or less), were unmarried (compared to married), were aged 18–44 years (compared to 55 years or older) or 45–55 years (compared to 55 years or older), or reported their race as other (when compared to White respondents) were more likely to be SGM respondents. Screeners who had some college or technical school or more (compared to high school or less), were unmarried (compared to married), were aged 18–44 years (compared to 55 years or older) or 45–55 years (compared to 55 years or older), or reported their race as other (when compared to White respondents) were more likely to be SGM respondents.

### Discussion

This study aimed to describe and compare demographic and healthcare characteristics of SGM and non-SGM populations and cancer screeners and nonscreeners from data derived from the CDC's BRFSS datasets. Findings proved the researchers' hypothesis that non-White SGM respondents with lower socioeconomic status were less likely to present for cancer screening when compared to White non-SGM individuals with lower socioeconomic status.

The demographic findings from this study have mixed correlations with the literature. Black SGM respondents have higher odds of not presenting for cancer screening, a finding that is congruent with the existing literature reporting that racially and ethnically underrepresented SGM populations experience barriers when presenting for cancer screening and routine healthcare participation (Agénor et al., 2015). These findings showed that female SGM respondents have increased odds of not participating in cancer screening. Additional research should be conducted to evaluate these results.

Healthcare characteristics—environmental and organizational—suggest that SGM respondents with some college education or technical school or more have greater odds of nonscreening. The literature has shown that SGM respondents who present for healthcare participation have varying degrees of educational attainment (Johnson et al., 2016). For example, lesbian women with a high school education or less compared to lesbian women with a college education have increased knowledge about cervical cancer. This may indicate that college-educated lesbian women are not receiving education about cervical cancer screening recommendations (Polek & Hardie, 2010). Other literature shows higher educational attainment as a facilitator to cancer screening in SGM populations (Johnson et al., 2016).

Surprisingly, SGM populations with healthcare coverage were found to be less likely to participate in cancer screening than SGM populations who do not have coverage. It has been suggested that out-of-pocket costs for screening tests may limit accessibility, healthcare coverage plans may not cover costs associated with cancer screening, the details about coverage for cancer screening tests may be confusing, or healthcare providers (HCPs) are not informing their patients about cancer screening guidelines (Kates et al., 2018).

Financial insecurity has been a barrier to cancer screening; conversely, having a higher household income and being employed (Johnson et al., 2016) are facilitators to routine cancer screening in SGM populations. This study's findings did not show household income or employment status to be statistically significant predictors of screening, warranting additional research with more respondents.

Some SGM populations are less likely to participate in cancer screening compared to non-SGM populations, as evidenced in the literature and supported by this study's results (Peitzmeier et al., 2017). When assessing and evaluating these findings for improved

**TABLE 3. Multiple Regression Results From Comparison of SGM Respondents Versus Non-SGM Respondents Status (Reference Group) Within Nonscreening and Screening Populations**

Variable	Nonscreeners			Screeners		
	OR	95% CI	p	OR	95% CI	p
<b>Age (years)</b>						
18–44 versus 55 or older	1.9	[1.6, 2.3]	0.001	2.2	[1.9, 2.5]	0.001
45–54 versus 55 or older	1.6	[1.3, 2]	0.001	1.6	[1.4, 1.9]	0.001
<b>Annual income (\$)</b>						
Less than 15,000 or as much as 34,000 versus 35,000 or more	1.1	[1, 1.3]	0.062	1.1	[1, 1.2]	0.065
<b>Education level</b>						
Some college or technical school or more versus high school or less	1.2	[1.1, 1.4]	0.001	1.3	[1.1, 1.4]	0.001
<b>Employment status</b>						
Unemployed versus employed	1.1	[1, 1.2]	0.252	1	[0.9, 1.1]	0.317
<b>Self-reported health status</b>						
Good or better versus fair or poor	1	[0.9, 1.2]	0.599	0.8	[0.7, 0.9]	0.001
<b>Healthcare coverage</b>						
Yes versus no	1.1	[0.9, 1.3]	0.294	0.9	[0.7, 1]	0.1
<b>Marital status</b>						
Not married versus married	3.3	[2.9, 3.9]	0.001	2.7	[2.4, 3]	0.001
<b>Race and ethnicity</b>						
Asian, Native American, or Hawaiian versus White	1	[0.8, 1.2]	0.081	1	[0.7, 1.3]	0.001
Black versus White	0.9	[0.7, 1]	0.081	0.8	[0.7, 0.9]	0.001
Hispanic versus White	1.1	[0.9, 1.3]	0.081	1.1	[0.9, 1.4]	0.001
Other race versus White	1.4	[1, 1.8]	0.081	1.4	[1.1, 1.3]	0.001
<b>Sex</b>						
Female versus male	1.3	[1.2, 1.5]	0.001	0.6	[0.5, 0.6]	0.001

CI—confidence interval; OR—odds ratio; SGM—sexual and gender minority

health outcomes, interventions by nurses and advanced practice nurses can be identified at various levels for maximum efficacy. To comprehensively address the disparities found in these results, interventions aimed at critical areas of need should be implemented for change, such as collecting SOGI data in electronic health records to elicit epidemiologic population-based data, expand access to insurance coverage, add nondiscrimination protections, and establish requirements for data collection (Kates et al., 2018).

Research outlines additional barriers that are not addressed in this study, including a lack of knowledge by SGM patients and HCPs, nondisclosure of SOGI status to HCPs, overall poor psychological distress

and coping, social isolation (Johnson et al., 2016), lack of cultural competency, lack of trust, fear of discrimination, low health engagement, heteronormative assumptions by HCPs, unwelcoming environments, and the lack of national screening guidelines (Haviland et al., 2020). SGM status is associated with overall poor mental health outcomes, decreased coping or resilience (Baptiste-Roberts et al., 2017), prohibited gender identity and expression, and being bisexual. Perceived discrimination and stigma in SGM populations may lead to higher-risk behaviors, which are known contributors to cancer (Daniel & Butkus, 2015).

The literature indicates that additional facilitators for cancer screening participation may include



being an older adult, matched race and ethnicity among patients and HCPs, social position, life experiences, gender, willingness, sexual activity history or abnormal Papanicolaou (Pap) test results, having healthcare coverage, familial history of cancer, cultural competency, positive communication and teamwork (Haviland et al., 2020), knowledge of screening guidelines, welcoming environments with partner inclusion, and legal protections.

### Implications for Nursing

Individual-, organizational-, and environmental-level changes can be made by implementing programs such as the CDC's Colorectal Cancer Control Program. This program can be tailored to fit cancer screening in SGM populations for improved screening participation (Joseph et al., 2016). For example, the CDC's Colorectal Cancer Control Program identifies the following five strategies to improve community participation in colorectal cancer screening: (a) client reminders, (b) high-quality media information materials, (c) removal of structural barriers, (d) provider reminders that patient is due for screening, and (e) provider assessment and feedback mechanisms to assess provider performance of the delivery of cancer screening (Joseph et al., 2016). Through funding from the CDC's Office of Minority Health and Health Equity, SGM community organizations could tailor targeted cancer screening campaigns to female, Black, unmarried, and college-educated SGM populations for improved participation in cancer screening and better education for providers (Joseph et al., 2016).

The interventions mentioned at the individual and environmental levels may bring about larger-scale change and, in turn, decrease heterosexism. The National LGBTQIA+ Health Education Center, a program at the Fenway Institute, identifies national LGBTQ+ health initiatives to bring about change at the national level. Suggestions cite collecting SOGI data in electronic health records by the National Academy of Medicine to elicit epidemiologic population-based data. In addition, the Patient Protection and Affordable Care Act identifies three areas of ongoing change to provide health coverage to SGM individuals: (a) expanding access to insurance coverage, (b) adding nondiscrimination protections, and (c) establishing requirements for data collection (Kates et al., 2018).

### Limitations

There are several limitations to this study. The BRFSS data are part of an existing dataset collected

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### KNOWLEDGE TRANSLATION

- Cancer screening inequities exist among sexual and gender minority (SGM) populations.
  - Certain groups with marginalized intersectional identities within SGM populations may lead to worse cancer screening participation.
  - Targeted screening interventions may help to improve cancer screening adherence in SGM populations.
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in the past, so data may be outdated and are not individualized to this study. The data do not include institutionalized or homeless respondents. Although the dataset is representative of populations in certain states, not all states collect SGM population data, limiting generalizability. Despite this dataset having a large sample size overall, some of the gender minority population subsets are smaller, increasing the likelihood of type II errors; therefore, the identification of certain disparities may have been missed. Larger epidemiologic studies and nationwide collection of SOGI data would improve these analyses. In addition, historic and cultural context barriers were not quantified in the BRFSS dataset; the disparities identified by these results cannot be separated from institutional and internalized heterosexism.

Limitations for transgender data have been identified because of the BRFSS one-step approach to gender identification. During data collection, the caller identifies the respondent as a man or woman based on their voice (Tordoff et al., 2019). The respondent does not identify their own gender but may identify as transgender, if applicable. This process brings forth several problems, including misclassifying the respondent's sex assigned at birth and, subsequently, asking questions related to sex-based cancer screening (e.g., prostate screening, Pap testing, mammography) based only on the researcher's identification (Tordoff et al., 2019). For example, a transgender male (female assigned at birth) would be asked about prostate screening but not Pap testing and mammography because cancer screening questions related to female anatomy would be skipped (Tordoff et al., 2019). According to Tordoff et al. (2019), based on findings about transgender bias in cancer screenings from the 2014 dataset, cancer screeners who are transgender may be missed according to their sex assigned at birth and a bias may exist in these data. Based on findings from Tordoff et al. (2019) for the 2014 dataset and no change in data collection of the BRFSS, the same findings may apply to the

data from 2016. In addition, a limitation of the BRFSS survey is self-selection bias; people who were willing to participate in the BRFSS survey may differ from those who declined.

## Conclusion

These analyses of an existing dataset (BRFSS) describe characteristics in cancer screening behaviors of SGM and non-SGM respondents, identifying demographic, socioeconomic, and healthcare characteristic differences. SGM subpopulations are studied to address the profound gaps in the literature describing these populations. Findings from these subgroups identify screening behavior inequities and can provide a better understanding of the characteristics that place populations at risk for lack of participation in cancer screening. The results can be used to develop HCP and patient education, expand scientific knowledge, and provide a base for future research critically needed to target interventions for enhancing cancer screening participation.

This study is innovative because it uses the BRFSS data from SGM populations not previously described and provides an account of SGM cancer screening characteristics by means of explanation through the Health Equity Promotion Model and the Social Ecological Model, setting the stage for a multilevel exploration of disparate cancer screening through a social inequities lens influenced by healthcare characteristics. In addition, this study adds new insights to subgroups of populations who present for screening differently than other SGM populations. Specific knowledge about SGM populations contributes to the creation of targeted screening and prevention strategies to reduce mortality and high-risk behaviors, and to improve education models for HCPs. To date, this is the largest SGM dataset used to analyze demographic and other characteristics of cancer screeners and nonscreeners in SGM populations.

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