

Childhood Sexual Abuse, Adult Sexual Orientation, and Their Combined Influences on Mental Health and Health-Risk Behaviors

Ray M Merrill*, Jacob C Palmer, Kenyon C Chipman and Steven B Ko

Department of Public Health, College of Life Sciences, Brigham Young University, Provo, Utah, 84602, United States

*Corresponding author

Ray M. Merrill, PhD, MPH, Department of Public Health, College of Life Sciences, Brigham Young University, Provo, Utah, 84602, United States.

Received: April 16, 2026; Accepted: April 24, 2026; Published: May 04, 2026

ABSTRACT

This study evaluated (1) adult sexual orientation by selected demographic variables; (2) the association between sexual adverse childhood experiences (ACEs) and adult sexual orientation; and (3) the estimated associations of both sexual ACEs and adult sexual orientation with stress, poor mental health, smoking, and alcohol drinking. Multiple logistic regression models adjusted for selected demographic variables and assessed whether the associations differed between men and women. Analyses involved 84,266 men and 99,963 women from 18 U.S. states and the Virgin Islands who completed 2020-2024 BRFSS surveys. A higher percentage of women were a sexual minority than men (9% vs. 6%), primarily due to higher bisexual orientation. Higher sexual minority orientation in women (vs. men) tended to occur across the levels of the demographic variables. Sexual ACEs were significantly positively associated with sexual minority orientation in adulthood. Each type of sexual minority orientation was significantly greater for those with sexual ACEs. The associations were greater for men than for women. Stress and poor mental health were significantly greater in those with sexual minority orientation and in those with sexual ACEs (vs. none), with associations involving sexual ACEs greater. Women with sexual minority orientation and men and women with sexual ACEs were significantly more likely to be current smokers, binge drinkers, and heavy drinkers. Current smoking was more strongly associated with sexual ACEs than adult sexual orientation among men and women, and binge and heavy drinking were more strongly associated with sexual ACEs than adult sexual orientation among men but less for women.

Keywords: Adverse Childhood Experiences, Sexual Orientation, Sexual Abuse, Mental Health, Substance Use, BRFSS

Introduction

Nationally, sexual minority identification has increased from 3.4% in 2014-2015 to 5.5% in 2020-2021. This increase is more pronounced in younger age groups, increasing from 7.6% in 2014-2015 to 15.7% in 2020-2021 in 18-24-year-olds. In the last few decades, cultural perception of the lesbian/gay, bisexual, transgender, queer, questioning, or another identity community has shifted, and in turn, research has focused on the demographics and health of this population. The prevalence of suicide, depression, substance abuse, and victimization from harassment and violence has been observed for these sexual minority groups. Elevated burdens of diabetes and cardiovascular-related diseases have also been reported [1-5].

Lesbian/gay, bisexual, and other sexual minorities have experienced higher rates of adverse childhood experiences (ACEs). ACEs are

defined as potentially traumatic events occurring in childhood, including abuse, neglect, and household dysfunction. Extensive research has demonstrated consistent associations between ACEs and adverse health outcomes in adulthood, including mental health disorders, substance abuse, and chronic diseases. While much of the existing literature has focused on these well-documented consequences, some research indicates that ACEs have been associated with sexual orientation and gender identity in observational studies. Research has found that individuals with a history of childhood sexual abuse report higher rates of identifying as a sexual minority. While these findings do not indicate a deterministic link between childhood trauma and sexual orientation, they underscore the potential influence of early-life adversity on sexual identity development. Contrastingly, another study reported a relationship between sexual non-conformity in childhood and greater vulnerability of subsequent abuse. ACEs are also associated with social and behavioral challenges, such as difficulties in forming stable relationships, lower socioeconomic attainment, and engagement in high-risk behaviors [6-14].

Citation: Ray M Merrill, Jacob C Palmer, Kenyon C Chipman, Steven B Ko. Childhood Sexual Abuse, Adult Sexual Orientation, and Their Combined Influences on Mental Health and Health-Risk Behaviors. *J Sex Health Reprod Med.* 2026. 2(2): 1-10. DOI: doi.org/10.61440/JSHRM.2026.v2.38

There is more we can learn, particularly at the population level, about the association between ACEs and adult sexual orientation and health-risk behaviors. Existing studies often rely on small or non-representative samples, limiting generalizability [8,9]. Additionally, many analyses fail to account for potential confounding and mediating factors such as socioeconomic status, mental health, and substance use [15,16]. To best address the health of sexual minorities, population data can provide insights into associations between population trends, demographics, gender, and health. In the past, data collection on sexual minorities has been limited due to a lack of routine assessment [17], but analyzing disparities has now become a priority for research around the globe [2]. Failing to capture and characterize sexual minority data only furthers health disparities [5].

To address gaps in sexual ACE-related research, as well as research regarding demographic, gender, and health within sexual minorities, this study utilizes data from the 2020-2024 Behavioral Risk Factor Surveillance System (BRFSS), a large-scale, nationally representative survey. The purpose of the current study was to assess adult sexual orientation by selected demographic variables for men and women, the association between sexual ACEs and adult sexual orientation for men and women, and the associations of both sexual ACEs and adult sexual orientation with stress, mental health, smoking, and alcohol drinking for men and women. Models considered interactions involving biological sex to determine whether the associations differed between men and women. Understanding these relationships is important for informing public health interventions and mental health services aimed at supporting individuals who have experienced ACEs and may face additional challenges related to their sexual orientation [1-3,7,10,13].

Materials and Methods

Study Design and Data Source

This study utilizes data from the 2020-2024 BRFSS surveys. The BRFSS is a national system of health-related telephone surveys that collects data from all 50 states, the District of Columbia, and U.S. territories about health behaviors, chronic health conditions, and preventive service usage. It employs a cross-sectional design with standardized questionnaires and annually completes over 400,000 adult surveys (ages 18 and older), using random probability sampling on landlines and cell phones. The BRFSS survey consists of 3 components: (1) Standard core questions, (2) Rotating core questions, and (3) Optional modules [18]. The median response rate for all participating states and territories was 44.8% in 2020, 43.4% in 2021, 45.1% in 2022, 47.2% in 2023, and 45.6% in 2024 [19-23].

Study participants provided verbal consent prior to the anonymized survey. Details of the BRFSS survey design, questionnaires, and data collection methods are available elsewhere [24]. Participants were asked specifically about their biological gender and if sexual abuse occurred before the age of 18.

Study Population

Data analysis was restricted to 18 U.S. states and the Virgin Islands that included questions about both ACEs and sexual orientation (11 areas [Georgia, Hawaii, Idaho, Iowa, Montana, Rhode Island, South Carolina, Texas, Utah, Virginia, Wisconsin]

in 2020, 6 areas [Arkansas, Iowa, Mississippi, Nevada, Virginia, Wisconsin] in 2021, 4 areas [Iowa, Nevada, North Dakota, Virginia] in 2022, 7 areas [Delaware, Georgia, Missouri, Nevada, New Jersey, Rhode Island, Virginia] in 2023, and 6 areas [Georgia, Hawaii, Nevada, North Dakota, Virginia, Virgin Islands] in 2024). The total number participating was 84,266 men and 99,963 women.

Measures

Sexually related ACE questions considered were: "How often did anyone, at least 5 years older than you or an adult, ever touch you sexually?" "How often did anyone, at least 5 years older or an adult, try to make you touch them sexually?" and "How often did anyone at least 5 years older than you or an adult, force you to have sex?" Response options for each of these items were "Never," "Once," "More than Once," "Don't Know," and "Refused." The latter two options were combined as "Unknown." A new variable was created called "Sexual Abuse," which was coded as "Yes," if any of the three items occurred one or more times, "No," or "Unknown."

Sexual orientation was determined from the BRFSS question: "Which of the following best represents how you think of yourself?" Options were "Gay," "Straight, that is, not gay," "Bisexual," "Something else," "Don't know," "Refused."

Demographic variables used in this study included sex (men, women), age (18-24, 25-34, 35-44, 45-54, 55-64, ≥ 65), race/ethnicity (non-Hispanic [NH] White, NH Black, NH Other, Hispanic, unknown), marital status (married or cohabitating, previously married, never married, unknown), education (< high school, high school, some college or technical school, college or technical school, unknown), annual household income (<50K, 50K to <100K, 100K to <200K, $\geq 200K$, unknown), and calendar year. Interaction terms between sex and demographics were assessed. Sexual orientation was assessed according to childhood sexual abuse (yes vs. no) and biological sex, adjusting for selected variables.

Statistical Analysis

Descriptive statistics included frequencies and percentages. Estimates were determined by taking the survey stratum, primary sampling units, and sampling weights into consideration. Binary logistic regression estimated odds ratios of the association between sexual orientation and demographic variables, adjusting for sex, age, race/ethnicity, marital status, education, annual household income, and year. Interaction terms were assessed between sex and the other demographic variables to determine if different associations existed between men and women. Doing so allowed for considerations of demographic variations in a single multiple regression model. Logistic regression also estimated odds ratios of the association between adult sexual orientation and childhood sexual abuse and between certain mental health and health-risk behaviors and sexual orientation and childhood sexual abuse, adjusting for demographics. The analyses identify statistical associations and do not signify causality. Interaction terms were also assessed. Variable significance was assessed using the Ftest. Variable significance was also indicated by odds ratios with confidence intervals that did not overlap 1. The estimated annual percent change (EAPC) was calculated by fitting a regression line to the natural logarithm of the rates

using calendar year as a regressor variable; $y = mx + b$, where $y = \ln(\text{rate})$ and $x = \text{calendar year}$, with $EAPC = 100 \times (em - 1)$. All statistical tests were two-sided, with a significance level of 0.05. All analyses were conducted using Statistical Analysis System (SAS) software, version 9.4 (SAS Institute Inc., Cary, NC, USA, 2012).

Results

Sexual orientation by age, race/ethnicity, marital status, education, annual household income, and year for men and women is presented in Table 1. Women were more likely to be a sexual minority than men (9% [SE=0.2] vs. 6% [SE = 0.2]), explained primarily by a higher level of bisexual orientation. This result was generally seen across the levels of the demographic

variables, except for age, where the higher levels in women occurred in the younger age groups but not in the older age groups.

Higher significance of sexual minority orientation in women than men occurred through age 54 and then became significantly lower in the oldest two age groups. In addition, there was no significant difference in sexual minority orientation between men and women who were previously married or in the highest income group. The highest sexual minority orientation was in never married and in the lowest income group. The EAPC in sexual minority orientation from 2020 through 2024 was 13% for men ($p = 0.0036$) and 6% for women ($p = 0.1280$).

Table 1: Distribution of Sexual Orientation by Demographic Variables for Men and Women in the U.S.

	No.	Column %*	Men				Women			
			Gay %*†	Straight %*†	Bisexual %*†	Other %*†	Lesbian %*†	Straight %*†	Bisexual %*†	Other %*†
			n =	1,826	77,743	1,529	1,067	1,273	90,565	3,264
Age										
18-24	11,071	11.8	3.3	87.4	6.6	2.7	3.7	69.9	21.4	5.1
25-34	18,075	15.5	3.9	90.3	3.6	2.2	2.0	83.2	10.9	3.9
35-44	22,728	16.1	2.2	94.5	1.7	1.7	1.5	91.9	4.5	2.1
45-54	26,033	15.7	1.8	95.9	1.3	1.0	1.5	95.1	2.1	1.3
55-64	34,150	17.2	2.2	95.9	1.1	0.8	1.3	96.8	1.1	0.8
≥65	72,172	23.7	1.4	96.4	1.0	1.3	0.8	97.4	0.6	1.3
Sex										
Men	84,266	48.0	2.4	93.8	2.3	1.6				
Women	99,963	52.0					1.6	90.9	5.4	2.1
Race/ethnicity										
NH White	133,822	59.9	2.4	94.1	2.3	1.3	1.6	91.3	5.4	1.7
NH Black	17,375	15.2	2.4	93.4	2.6	1.6	1.7	91.5	4.7	2.1
NH Other	15,798	9.0	2.0	93.3	2.6	2.1	2.2	89.2	5.8	2.8
Hispanic	13,594	14.0	2.6	93.0	2.0	2.4	1.2	89.2	5.9	3.7
Unknown	3,640	2.0	2.7	93.1	2.0	2.2	0.9	89.6	4.7	4.9
Marital Status										
Married/Cohab	103,415	56.2	1.5	96.1	1.3	1.1	1.3	93.5	3.6	1.6
Previously M	48,388	19.9	1.4	95.2	1.6	1.8	0.9	94.8	2.7	1.6
Never M	31,072	23.1	4.9	87.8	5.0	2.4	3.3	79.3	13.4	4.0
Unknown	1,354	0.8	4.2	89.3	1.6	5.0	1.3	91.1	3.1	4.6
Education										
< HS	11,034	11.2	1.3	93.7	2.3	2.7	1.1	89.2	5.5	4.2
HS	47,140	27.7	1.8	93.9	2.7	1.7	1.6	89.7	6.3	2.4
Some College	51,296	31.1	2.7	93.3	2.5	1.4	1.7	90.3	6.1	1.9
College	74,174	29.7	3.1	94.1	1.7	1.1	1.6	93.0	3.9	1.4
Unknown	585	0.3	0.7	95.2	1.7	2.4	0.2	91.7	4.3	3.8
Annual Household Income										
<50K	63,877	34.4	2.6	92.8	2.5	2.1	1.6	89.6	6.2	2.7
50K-<100K	62,303	32.2	2.3	94.8	1.9	1.1	1.7	92.1	4.8	1.4
100K-<200K	20,214	11.7	2.5	94.5	2.0	1.0	1.8	92.0	4.5	1.7
≥200K	6,558	4.4	2.3	94.6	2.4	0.7	2.0	93.6	3.9	0.5

Unknown	31,277	17.3	1.9	92.4	3.2	2.5	1.2	90.3	5.7	2.8
Calendar Year										
2020	70,535	37.9	2.1	95.0	1.6	1.5	1.6	92.4	4.3	1.7
2021	31,426	15.8	2.2	94.6	2.1	1.2	1.3	90.9	6.0	1.9
2022	21,799	9.0	2.5	93.1	2.8	1.6	1.8	89.4	6.4	2.4
2023	35,680	23.3	2.6	92.7	2.8	1.8	1.8	89.4	6.2	2.6
2024	24,789	14.0	2.9	91.8	3.5	1.8	1.6	90.3	5.6	2.5

Source: BRFSS 2020-2024. *Weighted percentages. †Percentages sum to 100 across the row. 2101 missing responses for men and 3302 missing responses for women were not included in this analysis.

The odds of women versus men with sexual minority orientation (vs. straight) were 1.7 (95% CI = 1.6-1.8), after adjusting for age, race/ethnicity, marital status, education, annual household income, and year. In the model, sex significantly interacted with age ($p < .0001$), marital status ($p < .0001$), education ($p < .0001$), and year ($p = 0.0216$) but not race/ethnicity or annual household income. The adjusted odds of men and women with sexual minority orientation (vs. straight) are presented by age, marital status, education, and year in Figure 1. The decreasing adjusted odds of sexual minority orientation (vs. straight) with older age were more pronounced for women than men. Positive adjusted odds of sexual minority orientation for never married (vs. married/cohabitation), some college/college (vs. HS), and later years (vs. 2020) were significantly greater for men than women.

Adverse childhood sexual experiences (ACEs) by sexual orientation are presented in Table 2. The odds of sexual minority orientation (vs. straight) significantly increased with one experience (vs. none) and even more so for two or more experiences (vs. none) for the three types of sexual ACEs. For each type of sexual ACE, the increase was significantly more pronounced for men than for women.

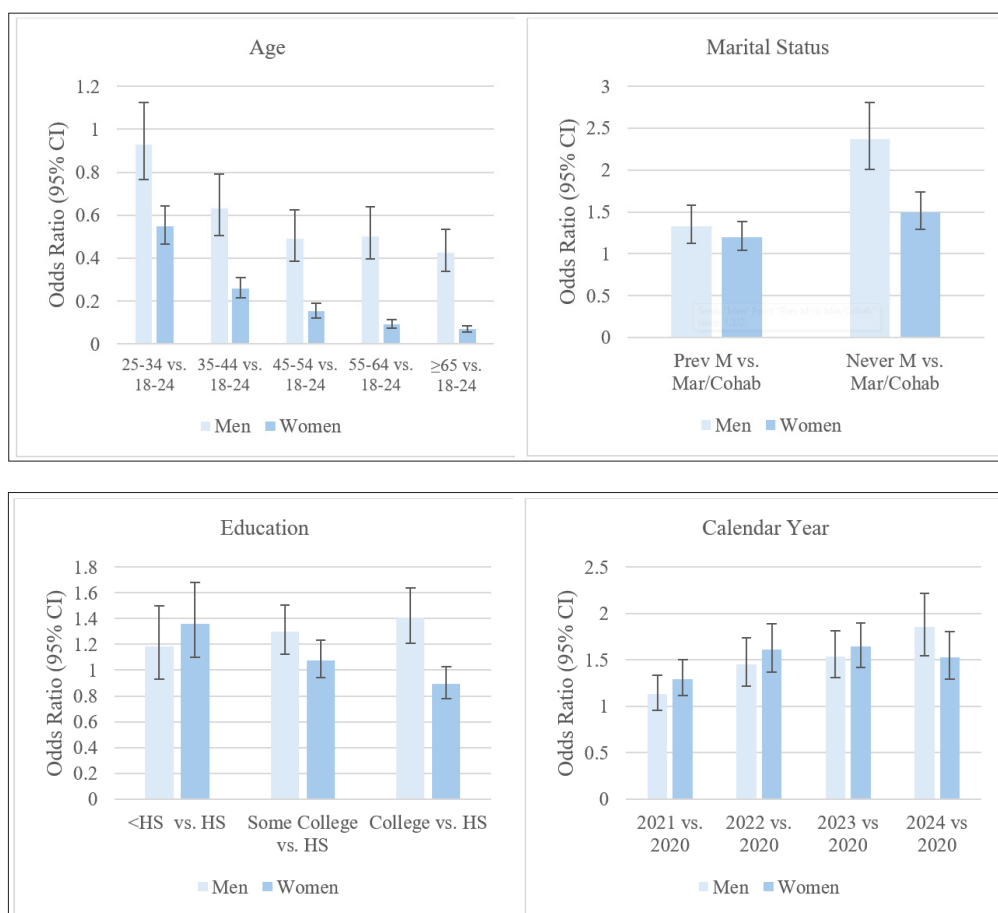


Figure 1: Odds of Gay/Lesbian, Bisexual, or Other Sexual Minority Orientation by Sex and Other Demographic Characteristics.

Source: BRFSS 2020-2024. Weighted estimates. Odds ratios adjusted for age, sex, race/ethnicity, marital status, education, annual household income, and year. The multiple logistic regression model for men gave Type 3 analysis of effects of 34.33 ($p < .0001$) for marital status, 17.16 ($p < .0001$) for age, 14.62 ($p < .0001$) for year, 5.46 ($p = 0.0002$) for education, 3.94 ($p = 0.0034$) for income, and 1.13 ($p = 0.3390$) for race/ethnicity. For women, the type 3 analysis of effects was 171.29 ($p < .0001$) for age, 14.02 ($p < .0001$) for year, 9.88 ($p < .0001$) for marital status, 9.75 ($p < .0001$) for race/ethnicity, 4.35 ($p = 0.0015$) for education, and 3.66 ($p = 0.0055$) for income.

Table 2: Sexual Adverse Childhood Experiences (ACEs) by Adult Sexual Orientation in the U.S.

			Gay, Bisexual, Other vs. Straight Men	Gay, Bisexual, Other vs. Straight Women
	No.	%*	Adjusted Odds Ratio (95% CI)*	Adjusted Odds Ratio (95% CI)*
How often did anyone, at least 5 years older than you or an adult, ever touch you sexually?				
Never	284,210	85.64	1.00	1.00
Once	12,990	4.14	3.01 (2.38-3.80)	1.90 (1.56-2.31)
More than once	23,536	7.73	4.78 (3.91-5.82)	2.48 (2.19-2.82)
Unknown	8,217	2.5	1.25 (0.80-1.93)	1.38 (1.02-1.86)
How often did anyone, at least 5 years older or an adult, try to make you touch them sexually?				
Never	294,255	88.47	1.00	1.00
Once	9,712	3.28	2.84 (2.20-3.67)	2.15 (1.73-2.66)
More than once	16,987	5.82	5.06 (4.09-6.25)	2.72 (2.36-3.12)
Unknown	7,999	2.44	1.18 (0.80-1.74)	1.22 (0.89-1.66)
How often did anyone at least 5 years older than you or an adult, force you to have sex?				
Never	305,531	92.31	1.00	1.00
Once	5,355	1.94	3.76 (2.68-5.27)	1.82 (1.44-2.31)
More than once	10,241	3.44	5.00 (3.82-6.56)	2.69 (2.25-3.21)
Unknown	7,826	2.31	1.32 (0.87-1.99)	1.58 (1.18-2.11)
Any Sexual Abuse				
No	277,960	83.64	1.00	1.00
Yes	44,997	14.63	3.41 (2.94-3.95)	2.14 (1.92-2.40)
Unknown	5,996	1.73	1.14 (0.70-1.85)	1.46 (1.01-2.10)

Source: BRFSS 2020-2024. *Weighted odds ratios. CI: Confidence Interval. Odds ratios adjusted for age, sex, race/ethnicity, marital status, education, annual household income, and year.

The odds of each type of sexual minority orientation (vs. straight) according to sexual ACE (yes vs. no) appears for men and women in Figure 2. Individuals with each type of sexual minority orientation were significantly more likely to have had a sexual ACE than those who were straight. The positive associations were significantly greater in men than women.

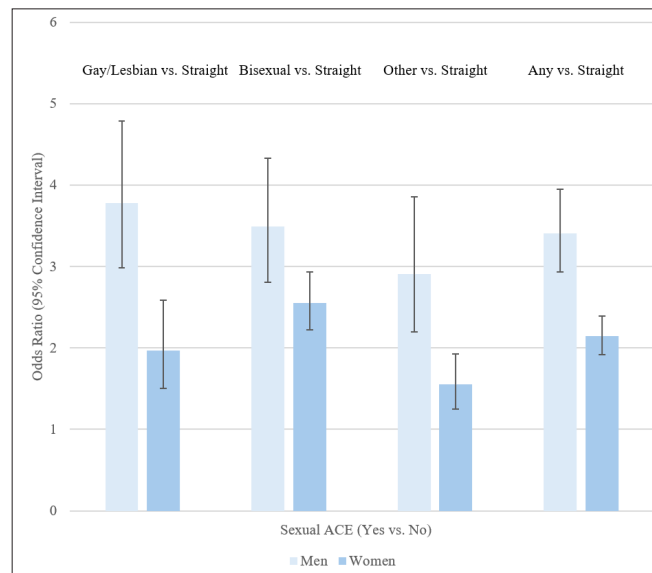


Figure 2: Odds of Gay/Lesbian, Bisexual, or Other (vs. Straight) for Sexually abused During Childhood (vs. not Sexually Abused) and Biological Sex.

Source: BRFSS 2020-2024. Weighted odds ratios. Odds ratios adjusted for age, sex, race/ethnicity, marital status, education, annual household income, and year.

Prevalence estimates of stress and poor mental health appear in Table 3. For both men and women, the odds of stress or poor mental health were significantly greater in those with gay/lesbian, bisexual, or other orientation (vs. straight) and in those with sexual ACEs (vs. none), after adjusting for sexual abuse and other demographic variables (Table 3). The association between sexual ACEs and

stress was significantly stronger than between sexual orientation and stress, for both men and women. Sexual orientation and sexual ACE variables did not significantly interact in these models.

Table 3: Odds of Selected Mental Health Outcomes by Sexual Orientation and Sexual Abuse for Men and Women.

	Stress in Past Month Always/Usually (13.91%) vs. Som/Rare/Nev (86.09%)		Poor Mental Health in Past Month ≥14 (14.71%) days vs. 0 (59.01%)		Poor Mental Health in Past Month 1-13 days (26.28%) vs. 0 (59.01%)	
	Men	Women	Men	Women	Men	Women
	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)
Sexual Orientation						
Straight	1.00	1.00	1.00	1.00	1.00	1.00
Gay/Lesb, Bis, Other	1.91 (1.48-2.46)	1.51 (1.23-1.87)	2.55 (2.18-2.98)	2.76 (2.41-3.14)	1.86 (1.62-2.14)	1.58 (1.39-1.80)
Unknown	0.63 (0.34-1.15)	0.75 (0.52-1.09)	1.08 (0.75-1.55)	0.72 (0.57-0.93)	0.68 (0.53-0.86)	0.79 (0.62-1.00)
Sexual ACE						
No	1.00	1.00	1.00	1.00	1.00	1.00
Yes	3.17 (2.52-3.99)	2.77 (2.40-3.19)	2.70 (2.35-3.10)	3.02 (2.77-3.30)	1.89 (1.67-2.15)	1.85 (1.71-2.01)
Unknown	2.36 (1.45-3.83)	1.35 (0.85-2.13)	1.84 (1.32-2.57)	1.99 (1.57-2.52)	1.08 (0.83-1.40)	1.09 (0.86-1.39)

Source: BRFSS 2020-2024. *Weighted odds ratios. ACE: adverse childhood experience. “Stress” refers to a situation in which a person feels tense, restless, nervous, or anxious, or is unable to sleep at night because his/her mind is troubled all the time. Within the last 30 days, how often have you felt this kind of stress? The stress variable had 44,995 responses, of which 230 (0.51%) were unknown and not included in this analysis. The mental health variable had 184,229 responses, of which 3,256 (1.77%) were unknown and are now included in this analysis. Odds ratios adjusted for sexual orientation, sexual abuse, age, sex, race/ethnicity, marital status, education, annual household income, and year.

The prevalence of current cigarette smoking, binge drinking, and heavy drinking appear in Table 4. The odds of current smoker, binge drinking, and heavy drinking (vs. otherwise) were significantly positively associated with sexual orientation among women but not men and with sexual ACEs for men and women (Table 4). A sexual ACE was more strongly associated with current smoking than sexual orientation among men and women. A sexual ACE was more strongly associated with binge drinking and heavy drinking than sexual orientation among men, but a sexual ACE was less strongly associated with binge drinking and heavy drinking than sexual orientation among women. Sexual orientation and sexual ACE variables did not significantly interact in these models.

Table 4: Odds of Selected Health Behavior Outcomes by Sexual Orientation and Sexual Abuse for Men and Women.

	Current smoker (13.37%) vs. never smoker (62.81%)		Binge drinking (men having five or more drinks on one occasion, women having four or more drinks on one occasion) Yes (15.35%) vs. No (84.65%)		Heavy drinking (adult men having more than 14 drinks per week and adult women having more than 7 drinks per week) Yes (6.22%) vs. No (93.78%)	
	Men	Women	Men	Women	Men	Women
	Odds Ratio (95% CI)*	Odds Ratio (95% CI) *	Odds Ratio (95% CI) *	Odds Ratio (95% CI) *	Odds Ratio (95% CI) *	Odds Ratio (95% CI) *
Sexual Orientation						
Straight	1.00	1.00	1.00	1.00	1.00	1.00
Gay/Lesb, Bis, Other	1.04 (0.87-1.24)	1.38 (1.19-1.62)	1.02 (0.88-1.17)	1.51 (1.32-1.72)	1.09 (0.86-1.38)	1.59 (1.33-1.90)
Unknown	0.85 (0.59-1.22)	0.47 (0.35-0.62)	0.67 (0.51-0.89)	0.46 (0.31-0.67)	0.59 (0.32-1.06)	0.38 (0.26-0.56)
Sexual ACE						
No	1.00	1.00	1.00	1.00	1.00	1.00
Yes	1.88 (1.63-2.18)	2.28 (2.08-2.50)	1.21 (1.07-1.38)	1.27 (1.15-1.40)	1.52 (1.27-1.81)	1.27 (1.12-1.43)
Unknown	1.09 (0.75-1.58)	1.93 (1.49-2.50)	0.86 (0.60-1.21)	1.22 (0.85-1.77)	0.68 (0.46-1.02)	1.44 (0.93-2.21)

Source: BRFSS 2020-2024. *Weighted odds ratios. ACE: adverse childhood experience. CI: Confidence Interval. The smoking, binge drinking, and heavy drinking variables had 184,229 responses, of which 1175 (0.64%) had unknown smoking information, 3178 (1.73%) had unknown binge drinking information, and 3118 (1.69%) had unknown heavy drinking information. Odds ratios adjusted for sexual orientation, sexual abuse, age, sex, race/ethnicity, marital status, education, annual household income, and year.

Discussion

This study assessed (1) adult sexual orientation by selected demographic variables; (2) the association between sexual ACEs and adult sexual orientation; and (3) the simultaneous associations of both sexual ACEs and adult sexual orientation with stress, mental health, smoking, and alcohol drinking. The measured associations were adjusted for selected demographic variables, and interactions with biologic sex were tested to determine if the associations differed between men and women.

The prevalence of identifying as a sexual minority was generally significantly greater in women than in men, which is consistent with other research [1,25-27]. The higher prevalence of sexual minority status in women was primarily explained by their having higher levels of bisexual orientation, as observed across the levels of all the demographic variables, except in women aged ≥ 65 . Women were 2.3 times more likely to identify as bisexual than men, and other studies have shown they are 2-3 times more likely in the U.S. which may reflect differences in reporting, social factors, and sexuality among genders. The reason for this finding is unclear and may involve both cultural and biological factors [28].

Other research has shown a decline in sexual activity and an increase in sexual disorders as we age [28-32]. In women, menopause can affect sexual desire because of hormonal changes, physical symptoms, and emotional factors, although experiences vary widely. Sexual disorders worsen with more advanced menopause status after age adjustment, which impacts sexual desire. In men, lower sexual desire with age is likewise due to a combination of biological, emotional, and lifestyle factors, but the primary reason is a natural decline in testosterone levels. Corresponding with a general decline in sexual desire in older age, the current study showed a decline in sexual minority orientation. The decline occurred in both men and women, albeit more so for women. The pronounced higher level of sexual minority orientation in women in the younger ages reversed in the older ages (≥ 55). This result may be associated with a cohort effect influenced by sexual disorders and changes in sexual desires due to menopause [33-36].

The relationship between sexual desire and sexual orientation is complex and multifaceted. Research suggests that a high sex drive in women is associated with increased sexual attraction to both men and women [37]. On the other hand, men with a high sex drive have an increased attraction to one sex or the other, depending on their sexual orientation [37]. Further research is warranted in exploring the relationship between sexual desire and sexual minority orientation.

The highest levels of sexual minority orientation were in never married and lower income groups. The comparatively high percentage of sexual minorities who have never married is consistent with another research. Although same-sex couples have been able to legally marry in all areas of the U.S. since the Supreme Court's 2015 ruling in *Obergefell vs. Hodges* and the Respect for Marriage Act of 2022, which added a federal statutory backstop, the social climate may still discourage many same-sex couples from marrying. In addition, the high percentage of sexual minorities who are financially poor is consistent with several other studies. Reasons for higher poverty in sexual

minorities may be influenced by systematic discrimination, family rejection, and lack of legal protection. Nevertheless, higher prevalence of sexual minority identification in the U.S. may partially reflect an increasing cultural acceptance of sexual minorities and greater legal protection, as suggested in prior studies [1]. Increased levels of bisexual identification among women may also be related to greater general openness to same-sex sexuality compared to men [38-44].

In the current study, sexual ACEs were positively associated with identifying as a sexual minority. Other studies have reported associations between ACEs and the later development of same-sex attraction. However, the association is complex and possibly bidirectional and influenced by various factors. While maltreatment may shape sexual orientation, sexual minority orientation may increase the risk of maltreatment. Further, children who do not conform to gender-related expectations or cross-dress are more likely to experience ACEs [45-47].

The association between ACEs and identifying as a sexual minority was significantly more pronounced in men than women, as consistent with another research. Many studies indicate that males are the perpetrators for the majority sexual abuse cases. However, our study does not include data on the gender of perpetrators, so further evaluation cannot be observed without further research. More research is needed to better understand this complex relationship, considering the complicated interaction with broader social, psychological, and biological factors that help shape identity [46,48,49].

In the multiple logistic regression models including both sexual orientation and sexual ACE variables, stress and poor mental health were significantly greater in those with sexual minority orientation and in those with sexual ACEs, with the association involving sexual ACEs significantly greater. Higher levels of stress and poor mental health among sexual minorities are consistent with other research [40,51].

Minority stress theory, although not directly measured within this study, states that excess social stress from stigma and prejudice is the source of mental health inequality. This model further outlines how stress affects sexual minority mental health, citing discrimination, expectations of rejection, experience of prejudiced events, and internalized homophobia. Victimization and barriers to accessing mental healthcare services have also been identified as factors contributing to greater stress and mental health challenges. The stronger association involving sexual ACEs is consistent with theories suggesting possible lasting physiological and psychological effects of ACEs on mental health. Biological and psychological process theories posit that ACEs can cause psychological and physiological processes that adversely affect long-term health and can disrupt brain development, resulting in chronic stress later in life [51-55].

In the multiple logistic regression models including both sexual orientation and sexual ACE variables, women with sexual minority orientation and men and women with sexual ACEs were significantly more likely to be current smokers, binge drinkers, or heavy drinkers (vs. otherwise). While sexual abuse was more strongly associated with binge drinking and heavy drinking than sexual orientation for men, the trend was opposite for women.

Binge drinking among men was associated more with childhood sexual abuse than with sexual orientation, whereas among women, sexual orientation had stronger associations. Previous studies have shown higher levels of alcohol abuse for both men and women with a history of sexual abuse [56,57], perhaps to cope with traumatic recollections of childhood sexual abuse and subsequent anxiety, low self-esteem, guilt, discomfort, isolation, and disturbances stemming from the abuse [58,59]. Among sexual minority women, the adverse drinking behaviors were better explained by sexual orientation than by sexual abuse. This finding aligns with that of other studies, which show higher rates of heavy drinking and other dangerous alcohol use patterns among lesbian and bisexual women compared to heterosexual women [60-62]. Similarly, another study of lesbians/gays and bisexuals in England found that disparities in hazardous alcohol use across sexual identities attenuated when controlling for sociodemographic variables for men but were still significant for women [25]. Several explanations have been offered, the first of which references the minority stress theory, claiming that increased drinking among LGB women is due to stress resulting from discrimination, stigma, and prejudice, with increased stress due to double discrimination for being a sexual minority and being a woman [9,51]. In addition, previous studies have explained the significance of the association between sexual orientation and drinking habits among women with gender expression. Research has shown that more masculine lesbian and bisexual women drink more than feminine lesbian and bisexual women, displaying how gender non-conformity and expression within the community itself contributes to alcohol behaviors [49,63]. This finding further emphasizes the need for interventions designed and tailored for these lesbian and bisexual women to mitigate the damaging effects of alcohol.

BRFSS data is not without limitations. Because of its cross-sectional design, conclusions about causal direction cannot be made. In addition, it is administered among adults, so recall bias is possible. It is unknown whether sexual orientation influenced whether some participants viewed certain acts during childhood as sexually abusive. Social stigmas regarding sexual orientation and ACEs may further have influenced responses. Nevertheless, because BRFSS data are anonymous, response bias due to stigma may be less. Finally, not all areas in the U.S. asked about ACEs and sexual orientation, which may limit generalizability to the entire country.

Conclusion

Sexual minority identification increased in the U.S. during 2020 through 2024, more so for men than women. Yet women had significantly greater prevalence of sexual minority status, primarily due to higher bisexual orientation, suggesting differences in patterns of sexual orientation between men and women. Higher sexual minority status, primarily bisexual orientation, in women was generally observed across the levels of each demographic variable. Decrease in sexual minority orientation with advancing age corresponds with declining sexual desire in women and men because of hormonal changes, physical symptoms, and emotional factors. A single sexual ACE was associated with sexual minority orientation in adulthood. The strength of the association tended to be significantly greater if two or more sexual ACEs occurred. Each type of sexual minority orientation was significantly more pronounced for those who had experienced sexual ACEs. Sexual minority orientation was greatest in never married and in those

with lower incomes. Further research exploring the role of systematic discrimination, family rejection, and lack of legal protection is warranted. Finally, theories were presented that may help contextualize why sexual minority status and, more so, sexual ACEs, are associated with greater stress, poor mental health, smoking, and alcohol drinking.

Implications for Health Behavior Research

Further research should be conducted to integrate ACEs in relation to sexual minority health. Understanding sexual orientation should not be limited to viewing it as an isolated variable. Future research should not simply study sexual orientation, but should also incorporate broader context from individuals' life experiences. Understanding additional factors correlated with sexual orientation will help researchers better identify elements associated with sexual orientation that our study did not cover.

The implications of this study could be strengthened if more research is conducted on the type, timing, and severity of ACEs, as this level of detail is not currently available. The categorization of sexual orientation could also be expanded in future research to include a broader range of sexual minority identities. Public health officials should consider screening for ACEs in public health settings to help identify at-risk individuals. Further research should be conducted to better understand why correlations between ACEs and sexual orientation exist. Factors such as social stigma, discrimination, coping mechanisms, and stress response should be examined.

Discussion Questions

Given the observed associations between sexual adverse childhood experiences (ACEs), adult sexual orientation, and both mental health and health-risk behaviors, how should health behavior researchers better integrate life-course and trauma-informed frameworks when studying sexual minority populations?

The findings suggest differing strengths of association between sexual ACEs and health outcomes across sex and sexual orientation groups. How can future research better account for intersecting identities (e.g., sex, sexual orientation, and childhood trauma) to improve the development of more targeted and effective public health interventions?

Author Contribution: R.M.M. conceptualized the study, led the study design, and provided overall supervision of the project. J.C.P. contributed to manuscript writing, editing, and improving clarity and flow. K.C.C. and S.B.K. assisted with manuscript writing and contributed to revisions.

Declarations

Funding

The authors received no financial support for the research, authorship, and or publication of this article.

Conflicts of Interest/Competing Interests

The authors have no conflicts of interest to declare.

Ethical Approval and Informed Consent

This study was determined to be exempt from human subject research review by the author's institutional review board, as BRFSS data are publicly available and deidentified.

Availability of Data and Materials

Data will be made available with a reasonable request.

Acknowledgments

The authors declare that there are no acknowledgments.

References

- Twenge JM, Wells BE, Le J. Increases in LGB identification among U.S. adults, 2014-2021. *Sexuality Research and Social Policy*. 2024. 21: 863-878.
- Lampe NM, Barbee H, Tran NM, Bastow S, McKay T. Health disparities among lesbian, gay, bisexual, transgender, and queer older adults: A structural competency approach. *International Journal of Aging & Human Development*. 2024. 98: 39-55.
- Liu H, Reczek R. Birth cohort trends in health disparities by sexual orientation. *Demography*. 2021. 58: 1445-1471.
- Franklin CC. Poorer health in the LGBTQ+ community due to fear of mistreatment. *Journal of Pediatric Orthopaedics Society of North America*. 2024. 5: 625.
- Moreira JD, Haack K, White V, Bates ML, Gopal DM. Importance of survey demographic questions to foster inclusion in medicine and research and reduce health inequities for LGBTQIA2S+ individuals. *American Journal of Physiology-Heart and Circulatory Physiology*. 2023. 324: H856-H862.
- Craig SL, Austin A, Levenson J, Leung VWY, Eaton AD. Frequencies and patterns of adverse childhood events in LGBTQ+ youth. *Child Abuse & Neglect*. 2020. 107: 104623.
- Jones MS, Worthen MGF. Measuring the prevalence and impact of adverse childhood experiences in the lives of LGBTQ individuals: A much-needed expansion. *Child Abuse & Neglect*. 2023. 146: 106560.
- Hustedde C. Adverse childhood experiences. *Primary Care*. 2021. 48: 493-504.
- Silva C, Moreira P, Moreira DS, Rafael F, Rodrigues A. Impact of adverse childhood experiences in young adults and adults: A systematic literature review. *Pediatric Reports*. 2024. 16: 461-481.
- Dorri AA, Stone AL, Salcido RJ, Russell ST, Schnarrs PW. Sexual and gender minority adverse childhood experiences (SGM-ACEs): Perceived social support, and adult mental health. *Child Abuse & Neglect*. 2023. 143: 106277.
- Tran NM, Mann S, Cortez MG, Harrell B, Nettuno L. Adverse childhood experiences (ACEs) and mental health by gender identity in the United States, 2019–2021. *Preventive Medicine*. 2023. 175: 107705.
- Hughes PM, Ostrout TL, Pérez Jolles M, Thomas KC. Adverse childhood experiences across birth generation and LGBTQ+ identity. *American Journal of Public Health*. 2022. 112: 662-670.
- Xu Y, Zheng Y. Does sexual orientation precede childhood sexual abuse? Childhood gender nonconformity as a risk factor and instrumental variable analysis. *Sexual Abuse*. 2017. 29: 786-802.
- Schilling EA, Aseltine RH, Gore S. Adverse childhood experiences and mental health in young adults: A longitudinal survey. *BMC Public Health*. 2007. 7: 30.
- Stewart-Tufescu A, Struck S, Taillieu T, Salmon S, Fortier J, et al. Adverse childhood experiences and education outcomes among adolescents. *International Journal of Environmental Research and Public Health*. 2022. 19: 11564.
- Sutton TE, Edwards KM, Siller L, Shorey RC. An exploration of factors that mediate the relationship between adverse childhood experiences and sexual assault victimization among LGBTQ+ college students. *Child Maltreatment*. 2022. 27: 539-549.
- Rattay KT. Improved data collection for our LGBTQ population is needed to improve health care and reduce health disparities. *Delaware Journal of Public Health*. 2019. 5: 24-26.
- Centers for Disease Control and Prevention. The BRFSS user guide. 2013. https://www.cdc.gov/brfss/data_documentation/pdf/UserguideJune2013.pdf
- Centers for Disease Control and Prevention. 2020 BRFSS summary data quality report. 2021. https://www.cdc.gov/brfss/annual_data/2020/pdf/2020-sdqr-508.pdf
- Centers for Disease Control and Prevention. 2021 BRFSS summary data quality report. 2022. https://www.cdc.gov/brfss/annual_data/2021/pdf/2021-DQR-508.pdf
- Centers for Disease Control and Prevention. 2022 BRFSS summary data quality report. 2023. https://www.cdc.gov/brfss/annual_data/2022/pdf/2022-DQR-508.pdf
- Centers for Disease Control and Prevention. 2023 BRFSS summary data quality report. 2024. https://www.cdc.gov/brfss/annual_data/2023/pdf/2023-DQR-508.pdf
- Centers for Disease Control and Prevention. 2024 BRFSS summary data quality report. 2025. https://www.cdc.gov/brfss/annual_data/2024/pdf/2024-DQR-508.pdf
- Centers for Disease Control and Prevention. Behavioral Risk Factor Surveillance System. 2025. <https://www.cdc.gov/brfss/index.html>
- Shahab L, Brown J, Hagger-Johnson G, Michie S, Semlyen J. Sexual orientation identity and tobacco and hazardous alcohol use: Findings from a cross-sectional English population survey. *BMJ Open*. 2017. 7: e015058.
- Srivastava A, Winn J, Senese J, Goldbach JT. Sexual orientation changes among adolescents and young adults: A systematic review. *Archives of Sexual Behavior*. 2022. 51: 3361-3376.
- Stacey L. An updated data portrait of heterosexual, gay/lesbian, bisexual, and other sexual minorities in the United States. *Social Currents*. 2024. 11: 383-400.
- Jackson SE, Firth J, Veronese N, Stubbs B, Koyanagi A, et al. Decline in sexuality and wellbeing in older adults: A population-based study. *Journal of Affective Disorders*. 2019. 245: 912-917.
- Beutel ME, Stöbel-Richter Y, Brähler E. Sexual desire and sexual activity across the lifespan. *BJU International*. 2008. 101: 76-82.
- Eplov L, Giraldi A, Davidsen M, Garde K, Kamper-Jørgensen F. Sexual desire in a nationally representative Danish population. *The Journal of Sexual Medicine*. 2007. 4: 47-56.
- Gore-Gorszewska G, Ševčíková A, Gottfried J. Predicting changes to sexual activity in later life: A longitudinal study. *Sexuality Research and Social Policy*. Advance online publication. 2023. 21: 1259-1269.

32. Leventhal JL. Management of libido problems in menopause. *The Permanente Journal*. 2000. 4: 29-34.
33. Lee DM, Nazroo J, O'Connor DB, Blake M, Pendleton N. Sexual health and well-being among older adults. *Archives of Sexual Behavior*. 2016. 45: 133-144.
34. Scavello I, Maseroli E, Di Stasi V, Vignozzi L. Sexual health in menopause. *Medicina*. 2019. 55: 559.
35. Lippa RA. The relation between sex drive and sexual attraction. *Archives of Sexual Behavior*. 2007. 36: 209-222.
36. Rojas-Zambrano JG, Rojas-Zambrano A, Rojas-Zambrano AF. Impact of testosterone on male health: A systematic review. *Cureus*. 2025. 17: e82917.
37. Manning WD, Westrick-Payne KK, Gates GJ. Cohabitation and marriage among same-sex couples. *Demography*. 2022. 59: 1595-1605.
38. Conron KJ, Goldberg SK, Halpern CT. Sexual orientation and socioeconomic status. *Journal of Epidemiology & Community Health*. 2018. 72: 1016-1026.
39. Badgett MVL. Left out? Lesbian, gay, and bisexual poverty in the U.S. *Population Research and Policy Review*. 2018. 37: 667-702.
40. Badgett MVL, Choi SK, Wilson BDM. LGBT poverty in the United States. Williams Institute. 2019. <https://williamsinstitute.law.ucla.edu/publications/lgbt-poverty-us/>
41. Monto MA, Neuweiler S. The rise of bisexuality. *Journal of Sex Research*. 2024. 61: 974-987.
42. Schneebaum A, Badgett MVL. Poverty in U.S. lesbian and gay couple households. *Feminist Economics*. 2019. 25: 1-30.
43. Wilson BD, Bouton LJ, Badgett ML, Macklin ML. LGBT poverty in the United States. Williams Institute. 2023. <https://williamsinstitute.law.ucla.edu/publications/lgbt-poverty-us/>
44. Roberts AL, Glymour MM, Koenen KC. Childhood maltreatment and sexual orientation. *Archives of Sexual Behavior*. 2013. 42: 161-171.
45. Bos H, De Haas S, Kuyper, L. Childhood trauma and sexual victimization. *Journal of Interpersonal Violence*. 2019. 34: 496-515.
46. Gartner RB. Sexual victimization of boys by men. *Journal of Gay & Lesbian Psychotherapy*. 2000. 3: 1-33.
47. Holmes WC, Slap GB. Sexual abuse of boys. *JAMA*. 1998. 280: 1855-1862.
48. Vogeltanz ND, Wilsnack SC, Harris TR, Wilsnack RW, Wonderlich AF. Childhood sexual abuse in women. *Child Abuse & Neglect*. 1999. 23: 579-592.
49. Russell ST, Fish JN. Mental health in LGBTQ+ youth. *Annual Review of Clinical Psychology*. 2016. 12: 465-487.
50. Frost DM, Meyer IH. Minority stress theory. *Current Opinion in Psychology*. 2023. 51: 101579.
51. Hughes K, Bellis M, Hardcastle K, Dinesh Sethi, Alexander Butchart, et al. Adverse childhood experiences and health. *The Lancet Public Health*. 2017. 2: e356-e366.
52. Moagi MM, van der Wath AE, Jiyane PM, Rikhotso RS. Mental health challenges in LGBTQ populations. *Health SA Gesondheid*. 2021. 26: 1487.
53. Haczekwicz KM, Shahid S, Finnegan HA. Adverse childhood experiences (ACEs), resilience, and outcomes in older adulthood: A scoping review. *Child Abuse & Neglect*. 2025. 168: 106864.
54. Galaif ER, Stein JA, Newcomb MD, Bernstein DP. Gender differences in the prediction of problem alcohol use in adulthood: Exploring the influence of family factors and childhood maltreatment. *Journal of Studies on Alcohol*. 2001. 62: 486-493.
55. Nusslock R, Miller GE. Early-life adversity and physical and emotional health across the lifespan: A neuroimmune network hypothesis. *Biological Psychiatry*. 2016. 80: 23-32.
56. Jasinski JL, Williams LM, Siegel J. Childhood physical and sexual abuse as risk factors for heavy drinking among African-American women: A prospective study. *Child Abuse & Neglect*. 2000. 24: 1061-1071.
57. Moncrieff J, Drummond DC, Candy B, Checinski K. Sexual abuse in people with alcohol problems: A study of the prevalence of sexual abuse and its relationship to drinking behaviour. *The British Journal of Psychiatry*. 1996. 169: 355-360.
58. Hequembourg AL, Blayney JA, Bostwick W, Van Ryzin M. Concurrent daily alcohol and tobacco use among sexual minority and heterosexual women. *Substance Use & Misuse*. 2020. 55: 66-78.
59. Young L. Sexual abuse and the problem of embodiment. *Child Abuse & Neglect*. 1992. 16: 89-100.
60. Coulter RWS, Marzell M, Saltz R, Stall R, Mair C. Sexual-orientation differences in drinking patterns and use of drinking contexts among college students. *Drug and Alcohol Dependence*. 2016. 160: 197-204.
61. Gruskin EP, Hart S, Gordon N, Ackerson L. Patterns of cigarette smoking and alcohol use among lesbians and bisexual women enrolled in a large health maintenance organization. *American Journal of Public Health*. 2001. 91: 976-979.
62. Rosario M, Schrimshaw EW, Hunter J. Butch/femme differences in substance use and abuse among young lesbian and bisexual women: Examination and potential explanations. *Substance Use & Misuse*. 2008. 43: 1002-1015.
63. Stentagg M, Skar L, Berglund JS, Lindberg T. Cross-sectional study of sexual activity and satisfaction among older adults ≥ 60 years of age. *Sexual Medicine*. 2021. 9: 100316.