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Differences in Chronic Disease Behavioral Indicators by Sexual Orientation and Sex

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Abstract

Context—Lesbian, gay, and bisexual (LGB) populations experience significant health inequities in preventive behaviors and chronic disease compared with non-LGB populations.

Objectives—To examine differences in physical activity and diet by sexual orientation and sex subgroups and to assess the influences of home and neighborhood environments on these relationships.

Design—A population-based survey conducted in 2013–2014.

Setting—A stratified, simple, random sample of households in 20 sites in the United States.

Participants—A total of 21 322 adult LGB and straight-identified men and women.

Outcome Measures—Any leisure-time physical activity in the past month; physical activity 150 min/wk or more; daily frequency of consumption of vegetables, fruit, water, and sugar-sweetened beverages; and the number of meals prepared away from home in the past 7 days.

Results—Physical activity and diet varied by sexual orientation and sex; differences persisted after adjusting for sociodemographic factors and household and community environments. Bisexual men reported a higher odds of engaging in frequent physical activity than straight men (odds ratio [OR] = 3.10; 95% confidence interval [CI], 1.57–6.14), as did bisexual women compared with straight women (OR = 1.84; 95% CI, 1.20–2.80). LGB subgroups reported residing in more favorable walking and cycling environments. In contrast, gay men and lesbian and bisexual women reported a less favorable community eating environment (availability, affordability, and quality of fruit and vegetables) and a lower frequency of having fruit or vegetables in the home. Lesbian women reported lower daily vegetable consumption (1.79 vs 2.00 mean times per day; difference = −0.21; 95% CI, −0.03 to −0.38), and gay men reported consumption of more meals prepared away from home (3.17 vs 2.63; difference = 0.53; 95% CI, 0.11–0.95) than straight women and men, respectively. Gay men and lesbian and bisexual women reported a higher odds of sugar-sweetened beverage consumption than straight men and women.

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Conclusions—Findings highlight opportunities for targeted approaches to promote physical activity and mitigate differences in diet to reduce health inequities.

Keywords

diet; health inequities; physical activity; sexual orientation

Lesbian, gay, and bisexual (LGB) populations have well-documented, significant health inequities, including lower levels of preventive health behaviors, increased health risks, and poorer physical and mental health outcomes than non-LGB populations.[1–3] One of the 4 overarching goals of *Healthy People 2020* is to eliminate such health inequities (www.healthypeople.gov). There is extensive evidence that health inequities reflect systematic disadvantages in the environments in which people live.[4] A better understanding of the role that social and contextual determinants play in shaping health behaviors and chronic disease outcomes among LGB populations will therefore inform public health strategies to reduce inequities.[5]

Sexual minority populations in the United States have elevated rates of chronic disease and associated risks; in particular, lesbian and bisexual women have disproportionately higher rates of obesity and related chronic health conditions.[6,7] Higher-risk chronic disease behavioral indicators are also seen for gay and bisexual men.[2,8] The 2011 Institute of Medicine report on *The Health of Lesbian, Gay, Bisexual, and Transgender People* strongly recommended the collection of population-based data that include questions on sexual orientation to better characterize and reduce LGB health inequities.[9]

Although differences in chronic disease risks among sexual orientation groups have been reported in the literature, including several recent publications of regional[3,10] and national[1] population-based studies, few analyses have adjusted for sociodemographic and contextual factors that might contribute to these inequities.[11] Physical activity and diet are modifiable behaviors associated with chronic disease outcomes and are among the top targets for public health interventions. The few studies that have examined physical activity and diet among sexual orientation groups yield inconsistent findings regarding sexual orientation inequities for these risk behaviors.[2,11–15] In some studies, sexual minority subgroups reported lower levels of physical activity and consumption of fruit and vegetables; in others, specific subgroups reported higher levels of physical activity or fruit and vegetable consumption; and in some others, no differences were found. Because of small sample sizes, sexual orientation groups are frequently combined (eg, sexual minority vs straight) rather than analyzed as distinct groups (ie, gay, lesbian, and bisexual women and men).

This study examines 2 modifiable health indicators associated with multiple chronic disease outcomes—physical activity and diet—by sexual orientation and sex among a population-based sample of adult women and men living in 20 communities across the United States. Importantly, the study sample is sufficiently large to permit subgroup analysis of LGB and heterosexual women and men, thereby affording comparisons that inform development of tailored public health interventions. The study describes the level of physical activity and diet behaviors by sexual orientation and sex subgroups and explores whether observed differences persist after adjusting for sociodemographic factors and contextual factors,

including health-promoting environments and community-level socioeconomic vulnerability.

Methods

Study design and sample

A population-based survey (Adult Targeted Surveillance Survey, ATSS) was conducted in 2013–2014 as part of the national evaluation of the Centers for Disease Control and Prevention's Community Transformation Grants Program. We used an address-based sampling methodology to select a stratified, simple, random sample of households in 20 sites selected to represent geographic variation nationally. We collected initial screener information to determine whether the household was eligible to participate (we classified an address as ineligible if it was a vacation home, group quarters, vacant or uninhabitable dwelling unit, a non-residential structure such as a business, or an address with mail returned as undeliverable). From each eligible household, we randomly selected 1 adult resident at least 18 years of age to complete the ATSS either through a computer-assisted telephone interview or by self-administered pencil-and-paper interview. We implemented an oversampling strategy to increase the number of completed interviews for rural, black, and Hispanic subpopulations. As respondent sexual orientation was not known until completion of the survey, sexual orientation was not included as part of the sampling strategy.

We selected 177 719 addresses from the 20 sites over 5 sample draws to reach the target number of respondents (~1000 respondents per site and 4000 total rural, black, and Hispanic/Latino respondents). We collected data during a 12-month period beginning in September 2013. Of those sampled households with known eligibility, 22 381 completed the ATSS, yielding a 14.8% cooperation rate. We examined our research questions among the 21 361 ATSS respondents with nonmissing data on sexual orientation (95.4% of total sample).

The study protocol was approved by the institutional review board at RTI International. Centers for Disease Control and Prevention institutional review board approval was not required. Respondents who completed computer-assisted telephone interviews were read a script and asked to give verbal consent before beginning the survey. Respondents who completed a self-administered interview were provided a "Consent to Participate" document and gave consent by completing the survey. No financial incentive was provided for survey participation.

Measures

Our examination of the relationship between sexual orientation and indicators of physical activity and diet was framed by the social-ecological model. Thus, we assessed the influences of health-promoting built and eating environments as well as socioeconomic vulnerability indicators at the community level on the primary associations of interest. Our outcome measures and most covariates included in this analysis were collected in the ATSS. The ATSS included many items drawn from existing national surveys, such as the Behavioral Risk Factor Surveillance System (BRFSS). Several measures of community

environment were drawn from the 2007–2011 American Community Survey 5-Year Summary File geocoded to individual respondents at the census tract level.

Physical activity—We examined 2 physical activity measures: any leisure-time physical activity (physical activity) in the past month (ie, a "yes" response to the question, "During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?"); and leisure-time physical activity 150 min/wk or more, which we derived from the frequency and duration of physical activity in which respondents engaged in their most typical activity (frequent activity).

Diet—We assessed 5 indicators of a healthful diet using 2012 BRFSS questions: daily frequency of consumption of vegetables (sum of the daily frequency of consumption of beans, dark green vegetables, orange vegetables, and other vegetables), fruit (sum of daily frequency of consumption of 100% fruit juice and fruit), water, and sugar-sweetened beverages ([SSBs]; sum of daily consumption of regular soda and sweetened fruit drinks)[*]; and the number of meals that were prepared away from home in the past 7 days.

Sexual orientation—We assessed sexual orientation using the 2013 National Health Interview Survey[†] question that asks, "Which of the following best represents how you think of yourself?" Response options are "Lesbian or gay; Straight, that is, not lesbian or gay; Bisexual; Something else; I don't know." Two subsequent questions are designed as follow-up for those respondents who select one of the 2 last response options; data from these follow-up questions resulted in recoding 1 response to the "lesbian or gay" category and 37 responses to the "straight" category. *Individual-level sociodemographic factors* included age, sex, race/ethnicity, and educational attainment.

Health-promoting built and eating environments—We assessed the *neighborhood built environment* using the 5-item Neighborhood Environment Walkability Scale,[16,17] which assesses, through respondent self-report, features such as the presence of sidewalks in the neighborhood, the presence of bicycle or pedestrian trails, and the physical maintenance of sidewalks.

We created a walking and bicycling environment score by summing the number of items on which the respondent indicated he or she strongly or somewhat agreed. We created an indicator (0/1) of a healthy eating *community* environment based on whether the respondent strongly agreed or agreed to having good availability, affordability, and quality of fruit and vegetables where he or she shopped for food. We also created an indicator of a healthy eating *home* environment based on whether the respondent indicated having fruit and vegetables in the home "always" or "most of the time." We also included an indicator of whether the census tract of residence was rural as defined by the 2006 National Center for Health Statistics Urban-Rural Classification Scheme for Counties.[‡]

[*]See http://www.cdc.gov/brfss/annualdata/2012/pdf/2012_Calculated_Variables.pdf for a complete description of the calculations.
[†]Complete text and details of the NHIS sexual orientation questions are provided in the 2013 Sample Adult Survey questionnaire, which can be accessed on the NHIS Web site: http://www.cdc.gov/nchs/nhis.htm.
[‡]http://www.cdc.gov/nchs/data_access/urban_rural.htm

Socioeconomic vulnerability indicators at the census tract level—We examined 3 census tract-level measures derived from the American Community Survey: percentage of the population below the federal poverty level; percentage of the population aged 25 years or older with less than high school education; and percentage of the population aged 16 years or older that was employed.

Analysis

To account for the stratified, simple, random sampling design and to apply weighting to allow inferences to be made back to the population from which the sample was drawn, we used survey data analysis procedures using SAS (version 9.3) and SAS-callable SUDAAN (version 11.0) software to compute point estimates and standard errors. First, we explored sex-specific associations between individual-level sociodemographic factors and contextual factors related to the healthy eating and physical activity environment and sexual orientation (Table 1). We examined the distribution of the frequency of consumption variables to determine the best approach to modeling the outcome since they all tended to be positively skewed. With the exception of SSBs, we found that a square root transformation or Winsorizing at the 95th percentile ensured the data conformed to an approximate normal distribution (skewness and kurtosis values between −1.0 and 1.0). We report on the results for Winsorized indicators for the frequency of consumption of fruit, vegetables, water, and meals prepared away from home and for a dichotomous indictor for “any” versus “no” consumption of SSBs. We fit separate multivariable regression models for each of the key physical activity (Table 2) and diet outcomes (linear regression in Table 3, and logistic regression presented in Table 4). We chose not to present results for water because of lack of differences across subgroups. We repeated this modeling procedure several times, adding more confounding or potentially mediating variables each time. We included age, race/ethnicity, educational attainment, household income, and a 6-level sexual orientation by sex variable in the first model. In the second model, we added self-reported perceptions of the walking and cycling environments (for physical activity outcomes) or the healthy eating environment (for diet-related outcomes) that might be potential mediators of the observed associations between sexual orientation and the outcome of interest. In the final model, we added the objectively measured socioeconomic vulnerability measures assessed at the census tract level. Each group of potential confounders/mediators was added to the model simultaneously, and the association between physical activity and diet outcomes and sexual orientation was examined again. We were particularly interested in testing sex-specific comparisons between sexual minority subgroups and their straight counterparts. The degree of attenuation of the association with the addition of each set of contextual factors was considered to reflect the magnitude of mediating effect for these factors in the primary relationship. However, we generally did not see much attenuation with the addition of home and community contextual factors and present the results from those models only.

Results

Age was significantly associated with sexual orientation: a higher proportion of gay men and lesbian and bisexual women were aged 18 to 44 years than were bisexual men and straight-identified men or women (Table 1). Race/ethnicity was also associated with sexual

orientation, with a higher proportion of gay men reporting their race/ethnicity as white and a higher proportion of lesbian and bisexual women reporting their ethnicity as Hispanic. On average, gay men were the most highly educated group, and bisexual women had the lowest educational attainment. The household income for women was less than that for men, on average, with bisexual women having significantly lower income than straight or lesbian women. Among men, differences in household income were seen across all 3 sexual orientation groups, but bisexual men had a lower average household income. For both healthy eating environment measures (community and home), environments varied by sexual orientation. Straight men and bisexual women, on average, reported the highest availability of fruit and vegetables in the community. Gay men and lesbian and bisexual women, on average, reported a less healthy home eating environment than straight men or women. In contrast, they resided in more favorable walking and cycling environments. Among socioeconomic vulnerability indicators, all LGB subgroups resided in census tracts with a significantly higher proportion of residents below poverty than did straight men and women.

Five of the 7 physical activity and diet indicators varied by sexual orientation and sex, with adjustment for sociodemographic and contextual factors. As shown in Table 2, gay men had the lowest prevalence of engagement in any physical activity (70.1%), whereas lesbian women (82.6%) and bisexual men (80.5%) had the highest prevalence. Lesbian women had a significantly higher odds than straight women of reporting any physical activity in the last month in the minimally adjusted model controlling for sociodemographic factors (odds ratio [OR] = 1.92; 95% confidence interval [CI], 1.02–3.57; data not shown). However, this relationship became nonsignificant after adjusting for contextual measures (walking and cycling environments and rural community of residence). This may suggest a potential role for the walking and cycling environments. The prevalence of engaging in frequent activity (≥150 min/wk) had greater variation across sexual orientation and sex groups (range, 37.7%–71.0%). Bisexual men had a higher odds of engaging in frequent physical activity than straight men (OR = 3.10; 95% CI, 1.57–6.14). Bisexual women also had a higher odds of meeting this activity threshold than straight women (OR = 1.84; 95% CI, 1.20–2.80).

The relationships between sexual orientation and each of the 4 diet indicators revealed patterns that contrasted with those observed for the 2 physical activity indicators. As shown in Table 3, bisexual men consumed fruit significantly more times per day than straight men (1.88 vs 1.47; difference: 0.41; 95% CI, 0.003–0.82) whereas lesbian women consumed vegetables significantly fewer times per day than straight women (1.79 vs 2.00; difference: −0.21; 95% CI, −0.38 to −0.03). There were no significant differences in vegetable consumption among men by sexual orientation, nor in fruit consumption among women by sexual orientation. After controlling for sociodemographic factors, we found that gay men consumed nearly 1 additional prepared meal away from home in the past 7 days than straight men (3.74 vs 2.88; data not shown). This difference was attenuated after controlling for diet-related contextual variables and neighborhood vulnerability measures but remained significant (3.17 vs 2.63; difference: 0.53; 95% CI, 0.11–0.95). As shown in Table 4, gay men had a significantly higher odds of having consumed any SSB in the previous week than straight men (OR = 1.62; 95% CI, 1.01–2.59) and lesbian and bisexual women had a

similarly higher odds of having consumed SSBs than straight women (OR = 1.68; 95% CI, 1.04–2.71; OR = 1.93; 95% CI, 1.14–3.28).

Discussion

Multiple indicators of physical activity and diet, both modifiable risk factors for chronic disease, varied by sexual orientation and sex. These differences persisted after adjusting for sociodemographic factors. Physical activity and diet-related contextual factors and neighborhood socioeconomic vulnerability also varied by sexual orientation and contributed significantly to differences in reports of any physical activity and diet indicators, including fruit consumption and the frequency of eating prepared meals away from home. Overall, gay men and lesbian and bisexual women reported a less favorable community eating environment defined by the availability, affordability, and quality of fruit and vegetables where they shopped for food and a lower frequency of having fruit or vegetables in the home than straight men or women.

In contrast, LGB subgroups reported residing in more favorable walking and cycling environments that included features such as well-maintained sidewalks and bicycle pedestrian trails. Bisexual women were more likely than straight women to report frequent physical activity. Nonetheless, less than half of respondents, overall, reported engaging in frequent activity, and women were less likely to do so than men. These findings underscore the need for tailored, public health approaches to reinforce and promote positive health behaviors that were already adopted to a somewhat greater extent in the lesbian and bisexual populations.

Among the 5 diet indicators examined, 4 varied by sexual orientation and sex: vegetable consumption, fruit consumption, the frequency of eating away from home, and any consumption of SSBs. Lesbian women consumed fewer vegetables than straight women, and gay men consumed fewer fruits and a greater number of meals prepared away from home than straight men. Gay men and lesbian and bisexual women were more likely to consume SSBs than their straight counterparts. This study highlights the potential for consistent access to fruit and vegetables in the home to reduce differences in diet indicators by sexual orientation and sex, particularly for gay men. Overall, regular access to fruit and vegetables in the home was associated with increases in both fruit and vegetable consumption by approximately 1 time each per day. These results suggest that one public health strategy might be to ensure readily available and accessible fruit and vegetables offered in a wide variety, at good prices, and with good quality. Importantly, such structural interventions might address how to engage LGB subgroups in shifting behavior to bring fruit and vegetables into their homes to ensure more regular access. As all LGB subgroups resided in census tracts with a significantly higher proportion of residents below the federal poverty level than did straight men and women, the role of the socioeconomic environment in shaping fruit and vegetable access, as well as SSB consumption, also warrants attention.

This examination of differences in modifiable indicators of chronic disease risk by sexual orientation and sex is among few national, population-based assessments of these relationships.[1] The ATSS conducted among adults in 20 sites nationwide included newly

developed, validated measures of sexual orientation to provide a standardized assessment. These data afforded the opportunity to conduct subgroup analyses between sexual minority groups and a sample of straight-identified individuals, which has been lacking in much population-based research conducted to date.[9]

Several limitations to this study should be noted. First, the cross-sectional data limit our conclusions to associations only between population characteristics and behavioral health outcomes, not changes in these measures or causal relationships. Without follow-up data, we will not be able to determine whether and how specific improvements might advance health equity by reducing the inequities between LGB subgroups and non-LBG populations. Second, because respondents were sampled from only 20 communities, the data reported might not represent adults from other communities in the United States. Third, the response rate of the survey was low, which may call into question the representativeness of the sample. We cannot determine in what ways selection bias might have affected our study sample; however, the bias is likely to be non-differential. The levels of physical activity and dietary patterns reflected in the indicators assessed were consistent with those derived from the BRFSS during the same time period. Furthermore, to remove biases due to nonresponse and coverage, we calibrated the sampling weights to the age, sex, race/ethnicity, and educational attainment population distributions in each community.[18] Fourth, because ATSS data were self-reported and subject to recall bias or social desirability effects, reported estimates of consumption of healthy foods/beverages and engagement in physical activity might be under- or overestimated. Fifth, our physical activity measures did not allow us to distinguish between light and moderate or vigorous intensity activity; therefore, our estimates of the prevalence of engaging in 150 minutes or more of activity do not map directly to the most current federal guidelines of 150 minutes of moderate-to-vigorous-intensity physical activity per week.[19] Sixth, we only measured leisure-time physical activity; employment-related physical activity has an unknown effect on our results. Finally, we did not integrate measures of social support and mental health into this analysis; yet, other research suggests this is another area where disparities by sexual orientation may contribute to inequities in physical health outcomes.[3,20]

Conclusions

This study found that some measures of physical activity and diet varied by sexual orientation and sex, even after adjusting for sociodemographic and contextual influences. Our results varied across health indicators, yet suggest opportunities for targeted approaches that may help mitigate observed differences. Public health interventions might, for example, be tailored to reinforce and promote positive health behaviors already adopted by some LGB subgroups, such as increased physical activity by lesbian and bisexual women, and capitalize on favorable contextual features already included in neighborhoods with higher concentrations of LGB residents. Furthermore, results suggest a potential role for readily available and accessible fruit and vegetables offered in a wide variety, at good prices, and with good quality in increasing fruit and vegetable consumption overall. Importantly, such structural interventions might address how to engage LGB subgroups in shifting behavior to increase intake of those foods both in and outside home settings. Such intervention strategies may lead to improved diet among LGB subgroups and ultimately contribute to reducing the

differences in behaviors associated with chronic disease between LGB subgroups and non-LBG populations.

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References

1. Ward BW, Dahlhamer JM, Galinsky AM, Joestl SS. Sexual orientation and health among U.S. adults: national health interview survey, 2013. Natl Health Stat Rep. 2014; 77:1–10.
2. Conron KJ, Mimiaga MJ, Landers SJ. A population-based study of sexual orientation identity and gender differences in adult health. Am J Public Health. 2010; 100(10):1953–1960. [PubMed: 20516373]
3. Fredriksen-Goldsen KI, Kim HJ, Barkan SE, Muraco A, Hoy-Ellis CP. Health disparities among lesbian, gay, and bisexual older adults: results from a population-based study. Am J Public Health. 2013; 103(10):1802–1809. [PubMed: 23763391]
4. Miller WD, Pollack CE, Williams DR. Healthy homes and communities: putting the pieces together. Am J Prev Med. 2011; 40(1 suppl 1):S48–S57. [PubMed: 21146779]
5. Truman BI, Smith KC, Roy K, et al. Rationale for regular reporting on health disparities and inequalities—United States. MMWR Surveill Summ. 2011; 60(suppl):3–10.
6. Eliason MJ, Ingraham N, Fogel SC, et al. A systematic review of the literature on weight in sexual minority women. Womens Health Issues. 2015; 25(2):162–175. [PubMed: 25747521]
7. Boehmer U, Bowen D, Bauer G. Overweight and obesity in sexual-minority women: evidence from population-based data. Am J Public Health. 2007; 97(6):1134–1140. [PubMed: 17463369]
8. Garland-Forshee RY, Fiala SC, Ngo DL, Moseley K. Sexual orientation and sex differences in adult chronic conditions, health risk factors, and protective health practices, Oregon, 2005–2008. Prev Chronic Dis. 2014; 11:E136. [PubMed: 25101493]
9. Institute of Medicine. The Health of Lesbian, Gay, Bisexual, and Transgender People: Building a Foundation for Better Understanding. Washington, DC: Institute of Medicine; 2011.
10. Deputy NP, Boehmer U. Weight status and sexual orientation: differences by age and within racial and ethnic subgroups. Am J Public Health. 2014; 104(1):103–109. [PubMed: 24228650]
11. VanKim, N.; Erickson, D.; Eisenberg, M.; Lust, K.; Rosser, B.; Laska, M. Differences in weight-related behavioral profiles by sexual orientation among college men: a latent class analysis [published online ahead of print August 25, 2015]. Am J Health Promot. http://dx.doi.org/10.4278/ajhp.140714-QUAN-331
12. Boehmer U, Miao X, Linkletter C, Clark MA. Adult health behaviors over the life course by sexual orientation. Am J Public Health. 2012; 102(2):292–300. [PubMed: 22390443]
13. Rosario M, Corliss HL, Everett BG, et al. Sexual orientation disparities in cancer-related risk behaviors of tobacco, alcohol, sexual behaviors, and diet and physical activity: pooled Youth Risk Behavior Surveys. Am J Public Health. 2014; 104(2):245–254. [PubMed: 24328632]
14. Deputy NP, Boehmer U. Determinants of body weight among men of different sexual orientation. Prev Med. 2010; 51(2):129–131. [PubMed: 20510272]
15. Kaminski PL, Chapman BP, Haynes SD, Own L. Body image, eating behaviors, and attitudes toward exercise among gay and straight men. Eat Behav. 2005; 6(3):179–187. [PubMed: 15854864]
16. Cerin E, Saelens BE, Sallis JF, Frank LD. Neighborhood Environment Walkability Scale: validity and development of a short form. Med Sci Sports Exerc. 2006; 38(9):1682–1691. [PubMed: 16960531]

17. Saelens BE, Sallis JF, Black JB, Chen D. Neighborhood-based differences in physical activity: an environment scale evaluation. Am J Public Health. 2003; 93(9):1552–1558. [PubMed: 12948979]
18. Kalton, G. Compensating for Missing Survey Data. Ann Arbor, MI: Survey Research Center, Institute for Social Research, University of Michigan; 1983.
19. US Department of Health and Human Services. Physical Activity Guidelines for Americans. Washington, DC: US Department of Health and Human Services; 2008.
20. Blosnich J, Foynes MM, Shipherd JC. Health disparities among sexual minority women veterans. J Womens Health. 2013; 22(7):631–636.

TABLE 1

Sociodemographic Characteristics, by Sexual Orientation and Sex: Community Transformation Grants Behavioral Assessment, 2013–2014

	Men			Women			
Characteristic	**Straight (n = 6970)**	**Gay (n = 236)**	**Bisexual (n = 79)**	**Straight (n = 13 601)**	**Lesbian (n = 195)**	**Bisexual (n = 241)**	***P*** [a]
Age group, % (SE), y							
18–44	47.6 (0.95)	69.9 (3.97)	48.3 (8.48)	50.7 (0.67)	59.6 (6.68)	88.3 (2.21)	<.001
45–64	33.9 (0.82)	25.2 (3.59)	24.2 (6.12)	34.4 (0.61)	36.2 (6.70)	8.0 (1.77)	
65+	18.5 (0.59)	4.9 (1.44)	27.5 (6.65)	14.8 (0.4)	4.2 (1.24)	3.6 (1.28)	
Race/ethnicity, % (SE)							
Hispanic, any race	13.4 (0.73)	16.7 (3.67)	22.5 (8.66)	13.3 (0.49)	21.0 (5.82)	19.7 (4.80)	<.001
White, non-Hispanic	65.6 (0.92)	71.3 (4.56)	56.6 (8.71)	60.3 (0.62)	46.6 (6.55)	52.0 (5.05)	
Black, non-Hispanic	16.3 (0.76)	8.7 (2.89)	8.4 (4.11)	20.6 (0.5)	14.8 (4.71)	19.1 (3.82)	
Other, non-Hispanic	4.8 (0.4)	3.3 (1.38)	12.4 (6.24)	5.7 (0.35)	17.6 (7.35)	9.2 (2.73)	
Educational attainment, % (SE)							
High school or less	48.3 (0.94)	35.1 (5.73)	48.4 (8.47)	45.9 (0.68)	50.8 (6.68)	42.3 (4.90)	
Some college	26.2 (0.80)	27.8 (4.56)	28.4 (7.19)	30.2 (0.62)	23.1 (4.80)	45.5 (5.09)	<.001
College graduate	25.4 (0.71)	37.2 (4.79)	23.3 (5.39)	23.9 (0.50)	26.1 (4.52)	12.3 (2.45)	
Household income, % (SE)							
<$25 000	32.5 (0.93)	37.6 (5.07)	37.5 (8.26)	42.3 (0.69)	41.5 (6.47)	68.2 (4.53)	
$25 000–$49 999	26.8 (0.85)	17.1 (3.38)	34.7 (8.60)	24.1 (0.59)	34.7 (7.36)	18.9 (3.84)	<.001
$50 000–$74 999	16.3 (0.65)	14.4 (3.14)	18.4 (5.75)	15.7 (0.50)	7.4 (2.08)	7.8 (2.34)	
≥$75 000	24.4 (0.76)	30.8 (5.86)	9.4 (3.65)	17.9 (0.48)	16.3 (3.69)	5.0 (2.06)	
Healthy eating/physical activity environment							
Availability of fruit and vegetables in *community*,[b] % (SE)	75.9 (0.82)	71.2 (5.56)	69.1 (8.47)	72.3 (0.62)	68.8 (6.26)	75.3 (4.02)	.02
Availability of fruit and vegetables at *home*,[c] % (SE)	57.6 (0.94)	48.5 (5.35)	59.8 (7.94)	63.7 (0.65)	56.7 (6.87)	53.5 (4.94)	<.001
Walking and Cycling Environment subscale,[d] mean (SE)	2.6 (0.03)	3.1 (0.17)	2.7 (0.25)	2.5 (0.02)	3.1 (0.15)	2.8 (0.15)	<.001
Rural, % (SE)	18.5 (0.53)	5.0 (1.60)	9.8 (3.43)	18.8 (0.36)	9.7 (2.79)	16.0 (3.24)	<.001
Social vulnerability indicators at census tract level, % (SE)							
Population below poverty	18.2 (0.25)	22.8 (1.93)	20.0 (4.36)	19.3 (0.19)	21.8 (1.70)	24.8 (1.70)	<.001
Population aged 25 y or older with less than high school education	17.0 (0.28)	17.1 (1.23)	17.3 (2.61)	17.8 (0.18)	20.5 (2.11)	20.5 (1.75)	.08

Characteristic	Men			Women			*P* [a]
	Straight (n = 6970)	Gay (n = 236)	Bisexual (n = 79)	Straight (n = 13 601)	Lesbian (n = 195)	Bisexual (n = 241)	
Population aged 16 y or older who are employed	89.7 (0.13)	88.3 (0.68)	89.9 (1.48)	89.2 (0.09)	89.2 (0.73)	88.0 (1.04)	.01

Abbreviation: SE, standard error.

[a] *P* value reflects a test of differences across the 6 sexual orientation and sex subgroups.

[b] Respondents who agree or strongly agree to having (1) a wide variety, (2) good prices, and (3) good quality of fruit and vegetables where respondents shop.

[c] Respondents who indicate having fruit and vegetables in the home “always” or “most of the time.”

[d] The number of agree or strongly agree responses to having (1) sidewalks in neighborhood, (2) well-maintained sidewalks, (3) sidewalks separated from traffic by parked cars, (4) grass/dirt strip that separate streets from sidewalks, and (5) bicycle or pedestrian trails in neighborhood.

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TABLE 2

Prevalence of "Any Leisure Physical Activity in the Past Month" and "Engaging in 150 Minutes of Activity per Week" by Sexual Orientation and Sex Controlling for Demographic Variables, Community Walking and Bicycling Environment, and Community Social Vulnerability Indicators[a]

	Any Leisure Physical Activity		Engaging in 150 min of Activity per Week	
Sexual Orientation	**Prevalence (SE)**	**Odds Ratio (95% CI)**	**Prevalence (SE)**	**Odds Ratio (95% CI)**
Men				
Straight	73.7 (0.87)	Ref	44.5 (1.00)	Ref
Gay	70.1 (4.60)	0.83 (0.52–1.32)	51.3 (5.39)	1.32 (0.85–2.04)
Bisexual	80.5 (6.23)	1.51 (0.66–3.42)	71.0 (7.04)	3.10 (1.57–6.14)[b]
Women				
Straight	73.0 (0.62)	Ref	37.7 (0.70)	Ref
Lesbian	82.6 (4.39)	1.81 (0.96–3.39)	47.8 (7.08)	1.52 (0.86–2.69)
Bisexual	72.6 (4.24)	0.98 (0.63–1.53)	52.4 (5.22)	1.84 (1.20–2.80)[c]

Abbreviations: CI, confidence interval; SE, standard error.

[a] Prevalence values and odds ratios, along with 95% CI and *P* values were estimated using logistic regression. Estimates were adjusted for age, sex, race/ethnicity, educational attainment, household income, perceptions of the walking and cycling environment, and 3 census tract–level measures of socioeconomic vulnerability.

[b] $P < .001$.

[c] $P < .01$.

TABLE 3

Mean Frequency of Consumption of Fruit and Vegetables and Meals Prepared Away From Home by Sexual Orientation and Sex Adjusted for Demographic Variables, Healthy Eating Environment, and Community Social Vulnerability Indicators[a]

Sexual Orientation	Consumption of Fruit (Times per Day), Mean (SE)	Consumption of Vegetables (Times per Day), Mean (SE)	Consumption of Meals Prepared Away From Home (Times per Week), Mean (SE)
Men			
Straight (ref)	1.47 (0.03)	1.86 (0.03)	2.63 (0.05)
Gay	1.39 (0.09)	1.92 (0.12)	3.17 (0.21)
Difference (95% CI)	−0.08 (−0.24 to 0.09)	0.07 (−0.17 to 0.30)	0.53 (0.11–0.95)[b]
Bisexual	1.88 (0.21)	1.93 (0.14)	2.63 (0.26)
Difference (95% CI)	0.41 (0.003–0.82)[b]	0.07 (−0.34 to 0.21)	0.00 (−0.51 to 0.51)
Women			
Straight (ref)	1.55 (0.02)	2.00 (0.02)	2.27 (0.04)
Lesbian	1.45 (0.12)	1.79 (0.09)	2.68 (0.27)
Difference (95% CI)	−0.09 (−0.34 to 0.15)	−0.21 (−0.38 to −0.03)[b]	0.40 (−0.11 to 0.93)
Bisexual	1.58 (0.13)	1.89 (0.11)	2.46 (0.24)
Difference (95% CI)	0.03 (−0.23 to 0.28)	−0.12 (−0.33 to 0.10)	0.18 (−0.27 to 0.64)

Abbreviations: CI, confidence interval; SE, standard error.

[a]Mean values and differences, along with 95% CI and *P* values were estimated using linear regression. Estimates were adjusted for age, sex, race/ethnicity, educational attainment, household income, perceptions of the healthy eating environment in the home and neighborhood, and 3 census tract–level measures of socioeconomic vulnerability.

[b]$P < .05$.

TABLE 4

Prevalence of Any Consumption of Sugar-Sweetened Beverages by Sexual Orientation and Sex Adjusted for Demographic Variables, Healthy Eating Environment, and Community Social Vulnerability Indicators[a]

	Any Consumption of Sugar-Sweetened Beverages in Past Week	
Sexual Orientation	**Prevalence (SE)**	**Odds Ratio (95% CI)**
Men		
Straight	79.3 (0.69)	Ref
Gay	85.6 (2.68)	1.62 (1.01, 2.59)[b]
Bisexual	79.8 (5.32)	1.03 (0.50, 2.13)
Women		
Straight	71.8 (0.60)	Ref
Lesbian	80.2 (3.51)	1.68 (1.04, 2.71)[b]
Bisexual	82.1 (3.60)	1.93 (1.14, 3.28)[b]

Abbreviations: CI, confidence interval; SE, standard error.

[a]Prevalence values and odds ratios, along with 95% CI and *P* values were estimated using logistic regression. Estimates were adjusted for age, sex, race/ethnicity, educational attainment, household income, perceptions of the healthy eating environment in the home and neighborhood, and 3 census tract–level measures of socioeconomic vulnerability.

[b]$P < .05$.