Weight Status and Sexual Orientation: Differences by Age and Within Racial and Ethnic Subgroups

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Objectives. We determined differences in weight at age 18 years and at current age and weight change by sexual orientation within different racial/ethnic populations, stratifying by gender.

Methods. We used 2001–2007 data from the California Health Interview Survey, resulting in an unweighted sample of 120 274 individuals aged 18 to 74 years. Using regression models, we examined overweight status and change in weight by sexual orientation, stratifying by race/ethnicity and gender.

Results. Compared with heterosexual women of the same race/ethnicity, White and African American lesbians and bisexuals had increased likelihood of being overweight at age 18 years and maintaining overweight status during adulthood. Sexual minority status was unrelated to weight among Latinas and inconsistently linked to weight among Asian women compared with heterosexual women of the same race/ethnicity. Sexual minority status was protective against unhealthy weight among White, African American, Asian, and Latino men compared with heterosexual counterparts of the same race/ethnicity. This protective effect was seen after age 18 years except among African American bisexual men.

Conclusions. Our findings indicate a need for age- and culture-sensitive interventions that reduce weight or prevent weight gain in sexual minority women and men. (*Am J Public Health.* 2014;104:103–109. doi:10.2105/AJPH.2013.301391)

Obesity is among the most pressing public health issues facing the nation because of the numerous health risks associated with this condition.[1] Despite public health efforts, the prevalence of obesity has continued to increase, rising to 68% in the general population.[2] Obesity affects some population groups more than others, in that it has been linked to gender, race/ethnicity, and socioeconomic status.[3–6] More women than men are obese. Among both genders, Asian individuals have the lowest prevalence of obesity (11.6% for both sexes), followed by non-Hispanic Whites (33% for women and 31% for men) and Mexican Americans (43% for women and 32% for men); non-Hispanic Blacks have the highest prevalence of obesity (51% in women and 37% in men).[4,7] The prevalence of obesity among men is about the same for all income and educational levels; among women, those with higher income and greater educational attainment are less likely to be obese than women with less education and lower income.[6]

Research has also linked obesity to sexual orientation. Compared with heterosexual men, gay and bisexual men have a lower body mass index (BMI; defined as weight in kilograms divided by the square of height in meters)[8,9] and decreased odds of being overweight or obese.[10,11] For women, the relationship between sexual orientation and weight is inverse: studies have consistently concluded that lesbian women have an increased likelihood of overweight and obesity compared with heterosexual women.[12–19] Some evidence suggests that the weight disparity between sexual orientation groups may begin at an early age. In a group of predominantly White adolescents, sexual minority females had consistently increased BMI throughout adolescence compared with heterosexual females, whereas sexual minority males had decreased BMI in late adolescence compared with heterosexual males.[20] Moreover, data from the Nurses' Health Study II, a predominantly White cohort, showed that lesbian and bisexual women had significantly greater prevalence of overweight or obesity at age 18 years[14] and had an adverse weight gain trajectory from ages 25 to 59 years[21] compared with heterosexual women in this cohort.

The available evidence establishes the existence of weight disparities by sexual orientation and a need for interventions for sexual minority women. However, there is insufficient information for the planning of targeted interventions, because we know little about the onset of the weight disparity by sexual orientation within a generalizable population of men and women. Furthermore, the racial/ethnic patterns of obesity are understudied in sexual minority populations. To assist program planners in the development of interventions for the most appropriate target groups, we sought to improve the knowledge on these 2 aspects.

To generate information about the most appropriate age cohort to be targeted by interventions, we focused first on the relationship between sexual minority status and weight at age 18 years and subsequently assessed this relationship at current adult age. This approach identified whether adult lesbians' greater likelihood, and gay and bisexual men's lower likelihood, of overweight and obesity compared with heterosexual populations is already present at age 18 years or acquired during adulthood. Consistent with the recent Institute of Medicine report on lesbian, gay, bisexual, and transgender health, we sought to advance knowledge about obesity by focusing on the intersection of sexual minority status and race/ethnicity.[22] This approach recognizes the diversity of sexual minorities, and that among both female and male sexual minorities, the prevalence of obesity may differ by race and ethnicity. To provide data on the intersection of sexual minority status and race/ethnicity for men and women, we examined weight differences by sexual orientation within each racial and ethnic group, focusing on the time periods age 18 years and current age.

METHODS

Our data source was the California Health Interview Survey (CHIS), the largest state health survey conducted in the United States. The CHIS employs a 2-stage geographically stratified random-digit-dial sample design to produce population-based estimates of California's noninstitutionalized population living in households. Using standard telephone interviews, the CHIS collects demographic data and information on hundreds of health topics, including height, weight, and weight at age 18 years. The CHIS has been conducted every 2 years since 2001. Our study used pooled data from the 2001–2007 survey cycles. In accordance with CHIS recommendations, we weighted all analyses to obtain estimates that were representative of the California population. More information about the survey and the weighting of data is available from the CHIS Web site (http://www.chis.ucla.edu).

Measures

Our main outcome of interest was BMI, assessed at the time of the health survey (referred to as "current BMI") and retrospectively at age 18 years. Current BMI was derived from respondents' self-reported weight and height at the time of the survey; we used these data to calculate BMI at age 18 years using self-reported height at the time of the survey and self-reported weight at age 18 years. We categorized BMI into healthy weight (BMI $\geq$ 18.5 kg/m^2 and $<$ 25 kg/m^2) versus overweight or obese (BMI $\geq$ 25 kg/m^2; hereafter referred to as "overweight"). Because our objective was to examine the association between sexual orientation and overweight status compared with healthy weight, we excluded all individuals who were underweight at age 18 years or at current age (BMI $<$ 18.5 kg/m^2). We further limited our sample to individuals who were aged 74 years or younger, because of differences in the relationship between BMI and health and survival in the elderly.[23]

Our main independent measure was one dimension of sexual orientation—respondents' sexual identity. The CHIS assesses sexual identity by asking participants if they are straight or heterosexual, gay or lesbian, or bisexual. Of the 136 377 respondents aged 18 to 74 years, 8450 had no available sexual orientation data and 548 reported their sexual identity as "other" or "celibate/not sexual," both of which were removed from analysis.

We used race/ethnicity to explore the association between sexual orientation and overweight within different racial/ethnic groups. The CHIS summarizes respondents' self-reported race and ethnicity into 7 categories: White, Latino, Asian, African American, Pacific Islander, American Indian/Alaskan Native, and other, with the "other" category encompassing other single or multiple self-reported races/ethnicities. In this analysis, we considered respondents who self-reported race/ethnicity as exclusively White, Latino, Asian, or African American, excluding 7105 respondents of mixed or other race/ethnicity.

We included as confounders the following other measures that have a proven association with overweight and obesity[6,11,18,19,24]: education, categorized into 4 groups (high school or lower, some college or vocational school, completed college, and greater than college); household annual income, categorized into 4 groups ($\leq$ $30 000, $30 001–$70 000, $70 001–$100 000, and $>$ $100 000); and insurance status, differentiating between currently insured and uninsured. We also included nativity, distinguishing between US-born and foreign-born participants.

Analysis

We performed all statistical analyses using the SURVEY procedures in SAS version 9.2 (SAS Institute, Cary, NC), which incorporated the final sampling weight and the replicate weights to account for the complex sampling design of the CHIS. We used the jackknife repeated replication method to obtain accurate standard errors of the estimates of the means, proportions, and odds ratios. We used the Rao-Scott χ^2 test or F statistic to test for demographic differences in frequencies or means by sexual orientation groups, stratified by gender. We used the same procedures to test for differences in weight by sexual orientation (i.e., differences in BMI or rates of overweight) at age 18 years and at current age while stratifying by gender and race/ethnicity. For each gender, we computed 2 logistic regression models predicting overweight, stratified by race/ethnicity. When overweight at age 18 years was the outcome, we adjusted only for nativity because this measure remained consistent despite being reported at current age. When overweight at current age was the outcome, nativity, education, income, insurance status, and age centered at 18 years (i.e., current age minus 18) were considered as confounders. We estimated annualized change in BMI since age 18 years ([current BMI − BMI at 18] / [current age − 18]). We also used multinomial logistic regression to estimate change in weight status by comparing individuals who retained a healthy weight from age 18 years to current age, those with a healthy weight at age 18 years who were overweight at current age, and those who retained overweight status from age 18 years to current age.

RESULTS

Table 1 displays demographic characteristics of our sample of heterosexual, lesbian/gay, and bisexual California men and women. Within the female population, we found significant differences between the sexual orientation groups with respect to all demographic characteristics. Lesbian women were on average 42 years old; compared with heterosexual women, they were more likely to report as White, were more educated, had a higher income, and were more likely to be US-born. Bisexual women were younger, with an average age of 35 years; compared with heterosexual women, they were more likely to report as White, had less income, were less likely to be insured, and were more likely to be US-born.

Within the male population, we found significant differences between the sexual orientation groups by race/ethnicity, education, income, and nativity. Compared with heterosexual men, more gay and bisexual men reported White race and being US-born. Compared with heterosexual men, gay men reported a higher level of education and bisexual men a lower income. Men of all sexual orientations reported an average age of 41 years.

In Table 2, we display BMI and overweight status as it relates to sexual orientation for each race/ethnicity, stratifying by gender. Among women, White and African American lesbian and bisexual women had a significantly higher prevalence of overweight at age 18 years than did their heterosexual counterparts. White lesbians had a higher BMI at current age than

TABLE 1—Demographic Characteristics of California Women and Men by Sexual Orientation: California Health Interview Survey, 2001–2007

Characteristic	Female Population (n = 66 179)				Male Population (n = 54 095)			
	Heterosexual, No., Mean ±SE, or % (SE)	Lesbian, No., Mean ±SE, or % (SE)	Bisexual, No., Mean ±SE, or % (SE)	*P*[a]	Heterosexual, No., Mean ±SE, or % (SE)	Gay, No., Mean ±SE, or % (SE)	Bisexual, No., Mean ±SE, or % (SE)	*P*[a]
Unweighted sample size	64 150	990	1039		51 874	1639	582	
Age, y (range = 18–74)	41.2 ±0.1	42.2 ±0.6	34.7 ±0.6	< .001	40.7 ±0.0	40.7 ±0.4	40.1 ±0.9	.916
Race/ethnicity, %				< .001				< .001
White	54.7 (0.2)	74.4 (2.8)	62.9 (2.7)		55.2 (0.2)	68.4 (1.9)	62.9 (3.0)	
Latino	27.6 (0.2)	13.8 (2.4)	19.8 (2.5)		28.2 (0.2)	17.3 (1.6)	22.4 (2.7)	
Asian	10.4 (0.1)	3.9 (1.1)	9.7 (1.5)		10.3 (0.1)	7.3 (1.2)	9.2 (2.1)	
African American	7.3 (0.1)	7.8 (1.8)	7.6 (1.3)		6.3 (0.1)	7.0 (1.2)	5.6 (1.3)	
Education, %				< .001				< .001
≤ high school	39.6 (0.3)	20.2 (1.9)	32.6 (2.5)		41.0 (0.3)	21.1 (1.7)	36.1 (3.1)	
Some college or vocational school	19.6 (0.2)	15.9 (2.0)	24.1 (2.2)		17.3 (0.3)	17.6 (1.6)	18.7 (2.4)	
Completed college	28.8 (0.2)	39.1 (2.6)	28.8 (2.5)		27.7 (0.3)	38.6 (1.8)	33.5 (2.8)	
> college	12.0 (0.2)	24.7 (1.9)	15.4 (1.6)		14.0 (0.2)	22.8 (1.4)	11.7 (2.0)	
Household annual income, $				< .001				< .001
≤ 30 000	33.0 (0.3)	22.0 (2.1)	38.7 (2.5)		27.1 (0.3)	23.5 (1.7)	36.9 (3.1)	
30 001–70 000	32.5 (0.3)	32.5 (2.4)	29.8 (2.2)		31.8 (0.3)	33.4 (1.8)	33.4 (3.2)	
70 001–100 000	16.9 (0.2)	17.0 (1.7)	14.0 (1.6)		18.0 (0.2)	17.1 (1.3)	12.7 (1.9)	
> 100 000	17.7 (0.2)	28.5 (2.2)	17.5 (2.4)		23.2 (0.3)	25.9 (1.6)	17.0 (2.4)	
Insurance				.025				.16
Insured	85.1 (0.2)	87.3 (1.8)	80.4 (2.2)		81.1 (0.3)	83.9 (1.6)	78.7 (2.7)	
Not insured	14.9 (0.2)	12.7 (1.8)	19.6 (2.2)		18.9 (0.3)	16.1 (1.6)	21.3 (2.7)	
Nativity				< .001				< .001
US-born	69.5 (0.3)	88.0 (1.8)	81.7 (2.1)		68.8 (0.3)	83.1 (1.6)	75.9 (2.6)	
Foreign-born	30.5 (0.3)	12.0 (1.8)	18.3 (2.1)		31.2 (0.3)	16.9 (1.6)	24.1 (2.6)	

[a]*P* values were calculated from the Rao–Scott χ^2 test or F statistic.

did heterosexual White women. Among Latina, Asian, and African American women, BMI or overweight status at current age did not differ by sexual orientation.

Among men of any race/ethnicity, neither BMI nor overweight status at age 18 years significantly differed by sexual orientation. At current age, White gay and bisexual men had significantly lower BMI and fewer were overweight compared with their heterosexual counterparts. Compared with heterosexual men of the same race/ethnicity, Latino gay men had lower BMI and Latino and Asian gay men had a lower prevalence of overweight status at current age.

In Table 3, we display adjusted odds ratios of overweight status at age 18 years and at current age for each race/ethnicity, stratified by gender. White and African American lesbian and bisexual women had significantly greater odds of being overweight at age 18 years than did their heterosexual counterparts, whereas overweight status at age 18 years did not differ by sexual orientation among Latina and Asian women. The odds of being overweight at current age differed only among White women, in that lesbians had significantly greater odds of being overweight than did White heterosexual women.

Among men, the odds of being overweight at age 18 years did not significantly differ by sexual orientation, with the exception of African American bisexuals, who had significantly lower odds of being overweight than did heterosexual African American men. At current age, gay and bisexual White men, gay Latino men, and gay Asian men had significantly lower odds of being overweight than heterosexual men of the same race/ethnicity.

In Table 4, we present stratified models for each race/ethnicity and gender that examine annualized change in BMI and change in weight status from age 18 years to current age. Among women, the annualized change in BMI differed only for Asian bisexuals, who had a significant increase in BMI compared with heterosexual Asian women. When we assessed adverse change in weight from age 18 years to current age, compared with heterosexual White women, White lesbians had increased odds of changing from healthy to overweight and of being consistently overweight. Compared with heterosexual women of the same race/ethnicity, African American and Asian lesbians had increased and decreased odds, respectively, of being consistently overweight since age 18 years.

Among men, compared with heterosexual men of the same race/ethnicity, African American gay and bisexual men, White gay

TABLE 2—Mean Body Mass Index and Prevalence Estimates of Overweight Among California Women and Men by Sexual Orientation and Race/Ethnicity: California Health Interview Survey, 2001–2007

Variable	Female Population (n = 66 179)				Male Population (n = 54 095)			
	Heterosexual, No., Mean ±SE, or % (SE)	Lesbian, No., Mean ±SE, or % (SE)	Bisexual, No., Mean ±SE, or % (SE)	*P*[a]	Heterosexual, No., Mean ±SE, or % (SE)	Gay, No., Mean ±SE, or % (SE)	Bisexual, No., Mean ±SE, or % (SE)	*P*[a]
White								
Sample size	43 861	841	783		35 839	1315	418	
BMI at age 18 y	22.0 ±0.0	23.0 ±0.2	23.0 ±0.3	.12	23.3 ±0.0	23.1 ±0.2	23.4 ±0.2	.308
BMI at current age	26.3 ±0.0	27.4 ±0.3	26.5 ±0.3	.018	27.4 ±0.0	26.3 ±0.2	26.7 ±0.3	.003
Overweight at age 18 y	13.0 (0.2)	21.2 (2.1)	21.0 (2.5)	< .001	25.1 (0.3)	22.1 (1.7)	28.0 (3.8)	.232
Overweight at current age	50.5 (0.3)	55.3 (2.5)	47.2 (2.9)	.097	69.4 (0.3)	56.6 (1.9)	59.0 (3.9)	< .001
Latino								
Sample size	11 641	76	129		9100	167	94	
BMI at age 18 y	23.6 ±0.1	22.6 ±0.6	24.5 ±1.0	.144	23.9 ±0.1	24.2 ±0.6	24.3 ±0.6	.994
BMI at current age	28.6 ±0.1	27.1 ±0.8	28.5 ±1.3	.303	28.6 ±0.1	26.5 ±0.6	27.9 ±0.6	.042
Overweight at age 18 y	23.7 (0.5)	15.4 (4.8)	30.4 (6.6)	.203	30.8 (0.7)	36.3 (6.4)	33.9 (7.2)	.593
Overweight at current age	67.3 (0.6)	60.1 (9.6)	56.2 (7.9)	.201	76.7 (0.6)	52.8 (6.0)	75.9 (5.6)	< .001
Asian								
Sample size	4657	22	61		4305	71	38	
BMI at age 18 y	21.3 ±0.1	21.3 ±0.6	21.3 ±0.5	.999	22.3 ±0.1	22.1 ±0.5	22.2 ±0.4	.966
BMI at current age	23.9 ±0.1	23.9 ±1.2	25.0 ±0.6	.921	25.6 ±0.1	24.5 ±0.7	24.9 ±0.4	.626
Overweight at age 18 y	7.4 (0.6)	3.5 (2.5)	5.7 (3.2)	.634	15.8 (0.8)	16.6 (6.0)	6.4 (3.7)	.428
Overweight at current age	30.7 (1.0)	29.9 (13.7)	39.5 (7.8)	.486	51.1 (1.1)	31.0 (7.0)	40.2 (11.3)	.026
African American								
Sample size	3991	51	66		2630	86	32	
BMI at age 18 y	22.8 ±0.1	24.2 ±0.8	25.8 ±1.0	.989	23.8 ±0.1	23.8 ±0.5	21.7 ±0.5	.178
BMI at current age	29.3 ±0.2	30.8 ±1.3	29.7 ±1.1	.657	28.6 ±0.2	27.1 ±0.7	26.3 ±0.8	.916
Overweight at age 18 y	21.6 (1.0)	42.7 (11.5)	43.7 (8.9)	.003	28.9 (1.4)	31.0 (9.4)	10.6 (6.0)	.355
Overweight at current age	70.8 (1.1)	75.7 (8.1)	69.6 (7.7)	.836	73.2 (1.3)	71.3 (7.0)	51.3 (13.5)	.172

Note. BMI = body mass index, defined as weight in kilograms divided by the square of height in meters. Height at current age was used to calculate both BMI at age 18 years and BMI at current age.
[a]*P* value was calculated from Rao-Scott χ^2 test or F statistic.

TABLE 3—Adjusted Odds Ratios of Overweight Among California Women and Men by Sexual Orientation and Race/Ethnicity: California Health Interview Survey, 2001–2007

	Female Population		Male Population	
Characteristic	Model 1: Overweight at Age 18 Years, OR (95% CI)	Model 2: Overweight at Current Age, OR (95% CI)	Model 1: Overweight at Age 18 Years, OR (95% CI)	Model 2: Overweight at Current Age, OR (95% CI)
White				
Heterosexual (Ref)	1.0	1.0	1.0	1.0
Lesbian/gay	1.8 (1.4, 2.3)	1.4 (1.1, 1.7)	0.8, (0.7, 1.0)	0.6 (0.5, 0.7)
Bisexual	1.8 (1.3, 2.4)	1.0 (0.8, 1.3)	1.2 (0.8, 1.7)	0.7 (0.5, 0.9)
Latino				
Heterosexual (Ref)	1.0	1.0	1.0	1.0
Lesbian/gay	0.6 (0.3, 1.2)	1.0 (0.4, 2.1)	1.1 (0.6, 2.0)	0.4 (0.2, 0.6)
Bisexual	1.4 (0.7, 2.6)	0.8 (0.5, 1.4)	1.2 (0.7, 2.2)	1.1 (0.6, 2.1)
Asian				
Heterosexual (Ref)	1.0	1.0	1.0	1.0
Lesbian/gay	0.4 (0.1, 1.6)	1.2 (0.3, 4.7)	0.9 (0.4, 2.1)	0.4 (0.2, 0.8)
Bisexual	0.7 (0.2, 2.5)	1.8 (0.9, 3.3)	0.3 (0.1, 1.2)	0.6 (0.2, 1.6)
African American				
Heterosexual (Ref)	1.0	1.0	1.0	1.0
Lesbian/gay	2.7 (1.1, 6.8)	1.3 (0.5, 3.0)	1.1 (0.4, 3.1)	0.9 (0.5, 1.9)
Bisexual	2.8 (1.4, 5.7)	1.1 (0.6, 2.3)	0.3 (0.1, 0.9)	0.3 (0.1, 1.0)

Note. CI = confidence interval; OR = odds ratio. Logistic regression model 1 was adjusted for nativity. Logistic regression model 2 was adjusted for nativity, education, income, insurance, and current age centered at 18 years (i.e., current age minus 18).

men, and Latino gay men had a significant decrease in annualized BMI, whereas White gay and bisexual men, Latino gay men, and Asian gay men had decreased odds of changing from healthy weight to overweight. Compared with heterosexual men of the same race/ethnicity, White gay men and African American bisexual men had decreased odds of retaining overweight status from age 18 years to current age.

DISCUSSION

We used representative data of the California population to investigate weight differences by sexual orientation, focusing on the intersection of sexual orientation and race/ethnicity for each gender. Although we confirm gay and bisexual men's greater prevalence of healthy weight[10,11] compared with heterosexual men, this study adds novel information about weight patterns in sexual minority men. Specifically, White gay and bisexual men, and Latino and Asian gay men, have greater odds of healthy weight at a mean age of 41 years, and these men are less likely to change from healthy to overweight compared with heterosexual men of the same race/ethnicity and age. This racial pattern of healthier weight during adulthood is consistent with results from a convenience sample, suggesting that gay men who report White or Mexican descent have a lower prevalence of overweight and obesity than do heterosexual men of the same race/ethnicity.[9] African American men are an exception to this pattern, in that bisexual men are less likely to be overweight at age 18 years, have a decrease in annualized BMI, and have decreased odds of being consistently overweight compared with heterosexual African American men. Furthermore, African American gay men show a decrease in their annualized BMI, yet they have similar odds of being overweight at current age, of changing from a healthy weight to overweight, or of being consistently overweight compared with African American heterosexual men of the same age.

Women have a different weight pattern than men. Weight disparities exist at an early age, in that White and African American lesbian and bisexual women are more likely to be overweight at age 18 years compared with heterosexual women of the same age and race/ethnicity. Moreover, in adulthood, White lesbians have greater odds of changing from healthy weight to overweight and both White and African American lesbians are more likely to retain overweight status compared with heterosexual women of the same race/ethnicity. The timing of women's weight disparity is consistent with results from the mostly White cohort of the Nurses' Health Study II, which showed that lesbian and bisexual women are more likely to be overweight or obese at age 18 years than are heterosexual women.[14] Additionally, findings from the Growing Up Today Study, a mostly White adolescent cohort, showed an increased BMI in adolescent sexual minority females compared with heterosexual females,[20] which probably explains our finding of a greater prevalence of overweight status at age 18 years among sexual minority females.

Our study did not show significant weight differences by sexual orientation groups among Latina women, which is consistent with the findings of a previous population-based study of Latina women.[25] Among Asian women, differences in weight only emerged when we assessed weight change during adulthood. However, the direction was inconsistent: compared with Asian heterosexual women, Asian bisexual women showed an increase in annualized BMI whereas Asian lesbians had decreased odds of being consistently overweight. This novel finding points to the importance of analyzing lesbians and bisexuals as separate groups, rather than combining them into a single sexual minority group, which may hide differences between these 2 subgroups.[22,26]

This study's focus on weight status at 2 time points and weight change during adulthood provides important information for public health professionals when prioritizing and planning interventions. Our findings suggest that, compared with heterosexual women of the same race/ethnicity, White and African American lesbian and bisexual women have a disproportionate risk of being overweight at age 18 years and that this adverse weight trajectory continues during adulthood. This suggests a critical need for interventions targeting White and African American lesbian and bisexual adolescents to prevent overweight

TABLE 4—Change in Annualized Body Mass Index and Weight Status Among California Women and Men by Sexual Orientation and Race/Ethnicity: California Health Interview Survey, 2001–2007

	Female Population				Male Population			
	Annualized BMI[a]		Change From Healthy to Overweight, OR (95% CI)	Consistently Overweight, OR (95% CI)	Annualized BMI[a]		Change From Healthy to Overweight, OR (95% CI)	Consistently Overweight, OR (95% CI)
Characteristic	b (SE)	*P*[b]			b (SE)	*P*[b]		
White								
Heterosexual (Ref)			1.00	1.00			1.00	1.00
Lesbian/gay	0.01 (0.02)	.441	1.30 (1.03, 1.64)	2.08 (1.50, 2.89)	−0.08 (0.02)	< .001	0.65 (0.48, 0.74)	0.59 (0.47, 0.74)
Bisexual	−0.07 (0.06)	.23	0.97 (0.76, 1.24)	1.23 (0.88, 1.72)	0.03 (0.07)	.611	0.70 (0.49, 0.99)	0.77 (0.52, 1.13)
Latino								
Heterosexual (Ref)			1.00	1.00			1.00	1.00
Lesbian/gay	0.03 (0.14)	.823	1.00 (0.40, 2.53)	0.74 (0.33, 1.66)	−0.19 (0.05)	< .001	0.29 (0.18, 0.49)	0.54 (0.27, 1.04)
Bisexual	−0.03 (0.18)	.866	0.82 (0.44, 1.54)	1.05 (0.54, 2.06)	−0.15 (0.08)	.051	1.03 (0.53, 2.01)	1.22 (0.58, 2.59)
Asian								
Heterosexual (Ref)			1.00	1.00			1.00	1.00
Lesbian/gay	0.09 (0.12)	.428	1.63 (0.35, 7.52)	0.14 (0.03, 0.70)	−0.09 (0.07)	.312	0.39 (0.20, 0.75)	0.58 (0.23, 1.44)
Bisexual	0.20 (0.07)	.008	1.85 (0.92, 3.73)	1.14 (0.34, 3.89)	−0.09 (0.05)	.078	0.74 (0.27, 2.03)	0.25 (0.05, 1.26)
African American								
Heterosexual (Ref)			1.00	1.00			1.00	1.00
Lesbian/gay	−0.02 (0.04)	.654	0.66 (0.29, 1.54)	2.78 (1.04, 7.48)	−0.13 (0.05)	.005	0.85 (0.37, 1.95)	1.04 (0.35, 3.06)
Bisexual	−0.11 (0.08)	.177	0.54 (0.25, 1.18)	2.00 (0.93, 4.33)	−0.12 (0.04)	.008	0.38 (0.12, 1.18)	0.20 (0.05, 0.81)

Note. BMI = body mass index; CI = confidence interval; OR = odds ratio. Individuals who were overweight at age 18 years and reported a healthy weight at current age were excluded because of 0 values in some race/ethnicity-by-sexual-orientation groups. Multivariable linear and logistic regressions are adjusted for nativity, education, income, insurance, and current age centered at 18 years (i.e., current age minus 18).

[a]Multivariable linear regression of annualized change in BMI since age 18 years.

[b]*P* values refer to the corresponding tests for parameter estimates.

status by age 18 years and interventions during adulthood to reverse these women's adverse weight trajectory.

Although White and African American lesbian and bisexual women should be prioritized for interventions, about 60% of Latinas and about one third of Asian women are currently overweight, irrespective of sexual orientation, suggesting a need for weight-reducing interventions for all women. Among men, more than 50% of White, Latino, and African American men are overweight, irrespective of sexual orientation, suggesting a similar need for weight-reducing interventions. Despite the high prevalence of overweight in all men, the mechanisms underlying the ability of sexual minority men to maintain a healthy weight in an obesogenic society compared with heterosexual men warrant study to provide information for weight-reducing interventions or healthy lifestyle campaigns focused on all men.

To develop effective interventions that are culturally appropriate for at-risk White and African American lesbian and bisexual women, more information is needed about how race and sexual orientation interact to influence BMI.[27] To our knowledge, no such information exists; however, there are similar mechanisms that are thought to contribute to different weight patterns in both sexual minorities and racial/ethnic minorities. One possible explanation for the different weight patterns seen in sexual minorities and their heterosexual peers is a difference in body image perception.[28] Specifically, gay men have been found to have lower body satisfaction than heterosexual men, whereas lesbian and heterosexual women appear to have a similar level of body satisfaction.[28–30] Weight perception and body image have also been proposed to explain different weight patterns between racial/ethnic subgroups. Overweight African American women have been found to possess a more positive body image compared with White women[31,32] and racial/ethnic minority men have more body image concerns than White men.[33] Future research should explore the intersection of race/ethnicity and minority sexual orientation to assist in the development of culturally appropriate and effective interventions.

Potential biases introduced by the measures are limitations of this study. All measures of height and weight were self-reported. Recent research concluded that sexual orientation groups do not differ in reporting BMI except for gay men who are more likely to underreport their BMI compared to their heterosexual peers[34]; this may have affected our finding of decreased odds of overweight among gay compared with heterosexual men. Bias may exist when respondents are asked to report their past weight at age 18 years, and this bias may be more prominent among older respondents. However, this retrospective reporting of weight at age 18 years is common and has been shown to have good validity.[35,36]

When assessing change in weight, ideally, we would have further stratified our analyses by age cohort. Unfortunately, this was not

possible because of sample size limitations. The use of BMI as a measure of adiposity may limit our results, as the correlation between BMI and adiposity may vary by age, race/ethnicity, and muscularity.[37,38] The measure of nativity identifies individuals who are US-born, but it may not capture individuals born in the United States to immigrant parents, who retain strong cultural ties. Sexual identity is only one measure of sexual orientation, and therefore does not capture individuals with same-gender behaviors or attractions who do not identify as gay, lesbian, or bisexual. Furthermore, sexual identity was assessed at the respondents' current age and not at age 18 years, a practice that has been used in a previous study.[14]

Despite these shortcomings, this study has considerable strengths. To our knowledge, this analysis is the first to use population-based data to investigate weight differences and change in weight by sexual orientation within race/ethnicity. These novel findings indicate the need for culturally appropriate interventions and suggest at which life stage sexual minorities should be targeted to prevent overweight and the life stage at which interventions should focus on weight reduction. ■

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Contributors

N. P. Deputy conducted the analysis, helped to interpret the findings, and led the writing. U. Boehmer originated the study, interpreted the findings, and participated in the writing. Both authors contributed in significant ways to the final article by reviewing and discussing earlier drafts.

Human Participant Protection

The Boston University Medical Campus institutional review board deemed this study exempt from protocol review.

References

1. *The Surgeon General's Vision for a Healthy and Fit Nation, 2010.* Rockville, MD: US Dept of Health and Human Services; 2010.

2. Flegal KM, Carroll MD, Ogden CL, Curtin LR. Prevalence and trends in obesity among US adults, 1999–2008. *JAMA.* 2010;303(3):235–241.

3. Centers for Disease Control and Prevention. Differences in prevalence of obesity among black, white, and Hispanic adults—United States, 2006–2008. *MMWR Morb Mortal Wkly Rep.* 2009;58(27):740–744.

4. Freedman DS. Obesity—United States, 1988–2008. *MMWR Surveill Summ.* 2011;60(suppl):73–77.

5. *The Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity.* Washington, DC: US Dept of Health and Human Services; 2001.

6. Ogden CL, Lamb MM, Carroll MD, Flegal KM. Obesity and socioeconomic status in adults: United States, 2005–2008. *NCHS Data Brief.* 2010;(50):1–8.

7. Schiller JS, Lucas JW, Ward BW, Peregoy JA. Summary health statistics for US adults: National Health Interview Survey, 2010. *Vital Health Stat 10.* 2012;(252):1–207.

8. Blanchard R, Bogaert AF. Biodemographic comparisons of homosexual and heterosexual men in the Kinsey Interview Data. *Arch Sex Behav.* 1996;25(6):551–579.

9. Kipke MD, Kubicek K, Weiss G, et al. The health and health behaviors of young men who have sex with men. *J Adolesc Health.* 2007;40(4):342–350.

10. 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.

11. Deputy NP, Boehmer U. Determinants of body weight among men of different sexual orientation. *Prev Med.* 2010;51(2):129–131.

12. Aaron DJ, Markovic N, Danielson ME, Honnold JA, Janosky JE, Schmidt NJ. Behavioral risk factors for disease and preventive health practices among lesbians. *Am J Public Health.* 2001;91(6):972–975.

13. Bowen DJ, Balsam KF, Ender SR. A review of obesity issues in sexual minority women. *Obesity (Silver Spring).* 2008;16(2):221–228.

14. Case P, Austin SB, Hunter DJ, et al. Sexual orientation, health risk factors, and physical functioning in the Nurses' Health Study II. *J Womens Health (Larchmt).* 2004;13(9):1033–1047.

15. Cochran SD, Mays VM, Bowen D, et al. Cancer-related risk indicators and preventive screening behaviors among lesbians and bisexual women. *Am J Public Health.* 2001;91(4):591–597.

16. Dibble SL, Roberts SA, Robertson PA, Paul SM. Risk factors for ovarian cancer: lesbian and heterosexual women. *Oncol Nurs Forum.* 2002;29(1):E1–E7.

17. Valanis BG, Bowen DJ, Bassford T, Whitlock E, Charney P, Carter RA. Sexual orientation and health: comparisons in the women's health initiative sample. *Arch Fam Med.* 2000;9(9):843–853.

18. Boehmer U, Bowen DJ. Examining factors linked to overweight and obesity in women of different sexual orientations. *Prev Med.* 2009;48(4):357–361.

19. Boehmer U, Bowen DJ, Bauer GR. Overweight and obesity in sexual-minority women: evidence from population-based data. *Am J Public Health.* 2007;97(6):1134–1140.

20. Austin SB, Ziyadeh NJ, Corliss HL, et al. Sexual orientation disparities in weight status in adolescence: findings from a prospective study. *Obesity (Silver Spring).* 2009;17(9):1776–1782.

21. Jun HJ, Corliss HL, Nichols LP, Pazaris MJ, Spiegelman D, Austin SB. Adult body mass index trajectories and sexual orientation: The Nurses' Health Study II. *Am J Prev Med.* 2012;42(4):348–354.

22. Institute of Medicine. *The Health of Lesbian, Gay, Bisexual, and Transgender People: Building a Foundation for Better Understanding.* Washington, DC: National Academies Press; 2011.

23. Oreopoulos A, Kalantar-Zadeh K, Sharma AM, Fonarow GC. The obesity paradox in the elderly: potential mechanisms and clinical implications. *Clin Geriatr Med.* 2009;25(4):643–659, viii.

24. Sundquist J, Winkleby M. Country of birth, acculturation status and abdominal obesity in a national sample of Mexican-American women and men. *Int J Epidemiol.* 2000;29(3):470–477.

25. Kim H-J, Fredriksen-Goldsen KI. Hispanic lesbians and bisexual women at heightened risk or health disparities. *Am J Public Health.* 2012;102(1):e9–e15.

26. Fredriksen-Goldsen KI, Kim H-J, Barkan SE, Balsam KF, Mincer SL. Disparities in health-related quality of life: a comparison of lesbians and bisexual women. *Am J Public Health.* 2010;100(11):2255–2261.

27. Kreuter MW, Lukwago SN, Bucholtz DC, Clark EM, Sanders-Thompson V. Achieving cultural appropriateness in health promotion programs: targeted and tailored approaches. *Health Educ Behav.* 2003;30(2):133–146.

28. Peplau LA, Frederick DA, Yee C, Maisel N, Lever J, Ghavami N. Body image satisfaction in heterosexual, gay, and lesbian adults. *Arch Sex Behav.* 2009;38(5):713–725.

29. Herzog DB, Newman KL, Warshaw M. Body image dissatisfaction in homosexual and heterosexual males. *J Nerv Ment Dis.* 1991;179(6):356–359.

30. Epel ES, Spanakos A, Kasl-Godley J, Brownell KD. Body shape ideals across gender, sexual orientation, socioeconomic status, race, and age in personal advertisements. *Int J Eat Disord.* 1996;19(3):265–273.

31. Davidson M, Knafl KA. Dimensional analysis of the concept of obesity. *J Adv Nurs.* 2006;54(3):342–350.

32. Foti K, Lowry R. Trends in perceived overweight status among overweight and nonoverweight adolescents. *Arch Pediatr Adolesc Med.* 2010;164(7):636–642.

33. Ricciardelli LA, McCabe MP, Williams RJ, Thompson JK. The role of ethnicity and culture in body image and disordered eating among males. *Clin Psychol Rev.* 2007;27(5):582–606.

34. Richmond TK, Walls CE, Austin SB. Sexual orientation and bias in self-reported BMI. *Obesity (Silver Spring).* 2012;20(8):1703–1709.

35. Huang Z, Willett WC, Manson JE, et al. Body weight, weight change, and risk for hypertension in women. *Ann Intern Med.* 1998;128(2):81–88.

36. Troy LM, Hunter DJ, Manson JE, Colditz GA, Stampfer MJ, Willett WC. The validity of recalled weight among younger women. *Int J Obes Relat Metab Disord.* 1995;19(8):570–572.

37. Gallagher D, Visser M, Sepulveda D, Pierson RN, Harris T, Heymsfield SB. How useful is body mass index for comparison of body fatness across age, sex, and ethnic groups? *Am J Epidemiol.* 1996;143(3):228–239.

38. Prentice AM, Jebb SA. Beyond body mass index. *Obes Rev.* 2001;2(3):141–147.