



Original article

A Systematic Review of the Literature on Weight in Sexual Minority Women



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A B S T R A C T

Background: Over the past 20 years, a growing literature has demonstrated that sexual minority women have greater weight than heterosexual women, prompting concern that they may be at high risk for disparities in physical disorders. In 2008, Bowen et al. published a review of the existing research on sexual minority women and obesity, finding no methodologically strong studies with representative sampling procedures.

Method: We conducted a systematic review of the literature covering the period of July 2006 to February 2014 on the relationship between sexual orientation and weight. The review includes 20 population-based and 17 nonprobability sample studies.

Conclusions: The majority of these studies found that lesbian and bisexual women had significantly greater body mass index (BMI) or a higher percentage with a BMI over 30 than heterosexual women. The difference in BMI was fairly consistent across the lifespan, with the weight differences beginning in adolescence. The studies, however, did not show a higher prevalence of physical disorders thought to be associated with weight. This potentially paradoxical finding warrants further research to compare prevalence of chronic disease by BMI category and sexual orientation.

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In the past two decades, biomedical researchers have noted a substantial increase in body mass index (BMI) among women, and warned of a wide range of negative health consequences associated with this weight gain (Jun et al., 2012). On the other hand, less research has focused on the health of sexual minority women, that is, those who identify as lesbian, bisexual, queer, not completely heterosexual, or do not use labels for their sexuality but engage in same-sex behaviors. A recent Institute on Medicine

report on Lesbian, Gay, Bisexual, and Transgender (LGBT) health (Institute of Medicine, 2011) listed obesity as one of the health disparities found in sexual minority women. Sexual minority women face enormous pressures to be thin from mainstream society and often a conflicting message from lesbian and feminist communities to accept their physical bodies as they are (Kelly, 2007). From birth, all women in the United States are subjected to constant messages to be thin from popular media, health and beauty industries, families, peers, teachers, and health care providers (Donaghue & Clemmitshaw, 2012), although there have always been some cultural challenges to the thinness imperative (Antin & Hunt, 2013). In the past, being thin was cast in the media primarily as a marker of ideal heterosexual beauty, but in recent years, as an indicator of health and personal responsibility (Tischner, 2013). By contrast, lesbian and feminist community

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norms have urged women to accept themselves at any size and to resist the potentially dangerous messages about the body from popular culture.

In the 1990s, articles in the biomedical and social science literature suggested that sexual minority women were more likely to be overweight or obese than heterosexual women. Bowen, Balsam, and Ender (2008) reviewed the literature from 1993 to mid 2006 and found 19 studies; 4 were categorized as “large samples” (>500 lesbian/bisexual respondents), 2 as medical record reviews, and 13 as convenience samples. They noted that 9 of the 14 studies with comparison groups found significantly greater weight in sexual minority women, although the actual differences were rather small, on the order of 1 to 5 pounds. The authors noted that none of the studies had representative population samples, all were cross-sectional, five had no comparison groups, and different definitions and measures of sexual identity were used in each study. Many studies omitted bisexual women and/or combined them with lesbians, obscuring possible differences. In this article, we examine critically the research since the review by Bowen et al. (2008) on weight measures by sexual orientation, including mean BMI and percentage of the sample that was considered obese.

Methods

We used the same search terms as Bowen et al. (lesbian, bisexual women, sexual minority, sexual orientation, obesity, body mass index), but searched more databases than they included. We searched PubMed, PsycInfo, CINAHL, Dissertation Abstracts Online, LGBT-Life, Web of Science, and Google Scholar. This search revealed several new sources of information from July 2006 to August 2014. After excluding sources that did not report data separately for women and men, we identified 20 population-based studies and 17 convenience sample studies. Many of the studies reported data for men and women, but we report only findings for women in this article.

Results

Population-Based Studies

Table 1 summarizes the findings from the 20 probability sample studies. Eighteen studies were from the United States, of which eight were drawn from national samples (Blosnich, Farmer, Lee, Silenzio, & Bowen, 2014; Blosnich, Foyne, & Shiperd, 2013; Boehmer, Bowen, & Bauer, 2007; Everett & Mollburn, 2013; Farmer, Jabson, Bucholz & Bowen, 2013; Hatzenbuehler, McLaughlin, & Slopen, 2013; Richmond, Walls, & Austin, 2012; Ward, Dahlhamer, Galinsky & Joestl, 2014). Eight were from statewide health surveillance primarily the Behavioral Risk Factor Surveillance Survey (BRFSS; Boehmer & Bowen, 2009; Conron, Miamiaga, & Landers, 2010; Dilley, Simmons, Boysun, Pizacani, & Stark, 2010; Deputy & Boehmer, 2013; Fredriksen-Goldsen, Kim, Barkan, Balsam, & Mincer, 2010; Fredriksen-Goldsen, Kim, & Barkan, 2012b; Fredriksen-Goldsen, Kim, Barkan, Muraco, & Hoy-Ellis, 2013; Garland-Forshee, Fiala, Ngo, & Moseley, 2014; Kim & Fredriksen-Goldsen, 2012) and one was a hybrid of the Youth Risk Behavior Surveillance Survey data from four cities and five states (Austin, Nelson, Birkett, Calzo, & Everett, 2013a). The non-U.S. studies were random population studies from Great Britain (Bogaert, 2010) and Australia (Polimeni, Austin, &

Kavanaugh, 2009). Six studies found no differences in weight by sexual orientation (Blosnich et al., 2013, 2014; Bogaert, 2010; Farmer et al., 2013; Hatzenbuehler et al., 2013; Polimeni et al., 2009; Richmond et al., 2012). The remainder found lesbian/bisexual women to be significantly heavier or more likely to be obese with the exception of one study that had no heterosexual comparison group (Fredriksen-Goldsen et al., 2012a). Ward et al. (2014) found bisexual women to be more likely to be obese than heterosexual women, but other comparisons were not significant. Deputy and Boehmer's (2013) study found White and African-American lesbian and bisexual women were significantly heavier at age 18 than their heterosexual counterparts (by retrospective recall), but current weight did not vary by sexual orientation in any ethnicity subgroup.

Much of the research on obesity status for women comes from state-based population data. The data from four states (California, Massachusetts, Oregon, and Washington) found higher obesity prevalence for lesbian and/or bisexual women compared with heterosexual women, although lesbian and bisexual women sometimes differed from each other in some studies (Boehmer et al., 2007; Conron, et al., 2010; Dilley, et al., 2010; Fredriksen-Goldsen, et al., 2010; Ward et al., 2014). Using California-based population data, sexual orientation contributed independently to the risk of obesity among lesbian and bisexual women after controlling for other health factors (Boehmer & Bowen, 2009). On the other hand, when BRFSS data from 10 states for the 2010 were pooled, the difference in weight between sexual minority and heterosexual women was not significant (Blosnich et al., 2014).

Studies of sexual minority youth showed slightly different trends between lesbian, bisexual, and heterosexual females when they were divided by race. Bisexual girls had the highest obesity prevalence among White, Latina, and African-American groups, but Latina lesbians were less likely to be obese than Latina heterosexuals (Austin et al., 2013a). A study of young adults reported that lesbians were more likely to be identified as morbidly obese than bisexual or heterosexual females (Everett & Mollborn, 2013). Differences in BMI or obesity in lesbian compared with bisexual women cannot be determined from these data. Six studies combined lesbian and bisexual women; four studies found lesbians to be heavier than bisexual women, and seven studies found no differences or mixed findings (i.e., differences by ethnicity).

Nonprobability Sample Studies

Table 2 summarizes the 17 nonprobability sample studies. The two largest of the studies were the Nurses' Health Study, a national longitudinal study of a nonrepresentative sample of more than 90,000 U.S. women who are or were nurses (Jun et al., 2012), and the Growing Up Today study, consisting of grown children of the Nurses' Health Study participants (Austin et al., 2009). Another national study included more than 30,000 college students, and most of the 123 participating campuses used random sampling procedures (Struble, Lindley, Montgomery, Hardin, & Burcin, 2010). Eight were national samples, mostly using online surveys (Austin et al., 2009; Brittain, Dinger, & Hutchinson, 2013; Davids & Green, 2011; Fredriksen-Goldsen et al., 2012a; Jun et al., 2012; McElroy & Jordan, 2014; Struble et al., 2010; Zaritsky & Dibble, 2010). Four studies drew samples from a broad geographic region such as a state or region (Austin & Irwin, 2010; Boehmer et al., 2011; Dibble, Eliason, & Crawford,

Table 1
Probability Sample Studies of Weight by Sexual Orientation

Authors (year)	Source of Data and Sample	Measures of Sexual Orientation and Weight	Weight Findings
Austin et al. (2013a)	Source: YRBSS (2005, 2007) from four cities (Boston, Chicago, NYC, SF) and five states (DE, ME, MA, VT, RI) Sample: 12,132 girls (mean age of 15.9, range 13–18, not reported separately by sexuality). 137 L; 626 B; 11,064 H	What identity label best describes you? –Heterosexual/straight –Bisexual –Lesbian or gay –Unsure Self-reported height and weight BMI guidelines from CDC (obese = $\frac{3}{4}$ of 95th percentile for age and sex)	% Obese: Asian American L = 0; B = 0; H = 2.3% African American L = 19%; B = 27%; H = 12% Latina L = 5%; B = 17%; H = 9% White L = 17%; B = 11%; H = 11%
Blosnich et al. (2014)	Source: BRFSS data from 2010 pooled from 10 states Sample: 51,639 H (mean age 47); 615 L (age 43); 451 B (age 35)	Self-report of sexual orientation; each state had slightly different questions Self-reported height and weight Obesity = BMI \geq 30	% Obese (ns*): H = 24% L = 27% B = 25%
Blosnich et al. (2013)	Source: BRFSS (2010) for 10 states, compared by veteran status and sexual orientation Sample: 53 LB vets (mean age 54.0); 1,010 LB nonvets (mean age 48.4); 845 H vets (mean age 58.2); no age range reported	Slight variation in the way the sexual orientation question was asked by state, but all used the same response options: heterosexual/straight, bisexual, lesbian or gay, unsure, or other Obesity = BMI \geq 30	% Obese (ns): LB vets = 36% LB nonvets = 33% H vets = 27%
Boehmer et al. (2007)	Source: National Survey of Family Growth (2002) Sample: $N = 5,979$ noninstitutionalized, nonpregnant U.S. women, ages 20–44 years. 5,460 H (mean age, 32.7); 87 L (mean age, 33.4); 180 B (mean age, 29.1)	Self-identification of sexual orientation Self-reported weight and height Obese = BMI \geq 30	L were more likely to be overweight (OR* = 2.25; 95% [CI* = 1.22, 4.16]) and obese (OR = 2.25; 95% [CI = 1.12, 4.53]) compared with H women % Obese ($p = .028$): L = 34%; B = 22%; H = 25% Mean BMI* (ns): L = 27.6; B = 26.2; H = 26.1
Boehmer & Bowen (2009)	Source: CHIS (2001–2005) Sample: $N = 14,197$ women, age 18–88; average age 31 (not reported separately by sexuality); 98% had male sex partner, 1.4% female, 0.4% both	Gender of sex partners in past year Self-reported height/weight Obese = BMI \geq 30	Female partners: OR 3.30 for obesity Both male/female partners: OR = 0.75. Sexual orientation independently contributed to obesity
Bogaert (2010)	Source: National probability sample from Great Britain (England, Wales, & Scotland) Sample: Young adult women ages 16–44. 5,378 H (mean age 30.6); 75 LB (mean age, 30.2)	Measured attraction and behavior in face-to-face interviews; other measures via computer; averaged attraction and behavior questions to get a sample of 75 LB women Self-reported weight/height	LB women did not differ from heterosexual women on height or weight, but were more variable on weight and BMI BMI mean (SD): LB = 24.6 (6.4) H = 23.6 (5.5)
Conron et al. (2010)	Source: Massachusetts BRFSS (62% response rate; 2001–2008) Sample: 29,701 H women; 719 L; 432 B; no mean ages reported; range 18–64. By age group: H: 18–33, 33%; 34–49, 40%; 50+, 27% L: 18–33, 30%; 34–49, 49%; 50+, 21% B: 18–33, 65%; 34–49, 27%; 50+, 8%	Do you consider yourself to be: –Heterosexual/straight –Homo/gay/lesbian –Bisexual –Other Self-reported height and weight; CDC BMI categories	L more likely to be obese (OR = 2.1), no difference between H and B women % Overweight: L = 26.3%; B = 26.7%; H = 26.3% % Obese: L = 26.4%; B = 19.6%; H = 17.4%

Table 1 (continued)

Authors (year)	Source of Data and Sample	Measures of Sexual Orientation and Weight	Weight Findings
Deputy & Boehmer (2013)	Source: CHIS (2001–2007) Sample: 64,150 H (age 41); 990 L (age 42); 1039 B (age 35)	Self-report sexual orientation Self-reported height and weight, currently and retrospectively at age 18 Grouped overweight and obesity together at BMI ≥ 25	% BMI ≥ 25 : age 18: White: H = 13%; L = 21%; B = 21%. Latina: H = 24%; L = 15%; B = 30%. Asian: H = 7%; L = 4%; B = 6%. Af Am: H = 22%; L = 43%; B = 44% % BMI ≥ 25 : Current: White: H = 51%; L = 55%; B = 47%. Latina: H = 67%; L = 60%; B = 56%. Asian: H = 31%; L = 30%; B = 40%. Af Am: H = 71%; L = 76%; B = 70%
Dilley et al. (2010)	Source: Washington State BRFSS (2003–2006) Sample: 48,655 women; 47,505 H (mean age, 46.3); 589 L (mean age, 40.0); 561 B (mean age, 32.9)	Do you consider yourself to be: –Heterosexual/straight –Homosexual, gay, lesbian –Bisexual –Something else?	% with BMI ≥ 25 : L = 28.8% B = 29.7% H = 22.3%
Everett & Mollborn (2013)	Source: Ad Health Wave IV (93% of original sample found, interviewed 80%), 80 high schools and 52 middle schools across the U.S. Sample: 7,555 women, mean age 28.7; means not reported by sexuality; 1,345 bisexual/mostly heterosexual; 138 lesbian/mostly lesbian.	Self-reported height/weight Overweight = BMI of ≥ 25 Choose the description that best fits how you think about yourself: –100% H –Mostly H but somewhat attracted to same sex –B –Mostly homosexual but somewhat attracted to opposite sex –100% homosexual Collapsed B and mostly heterosexual, and mostly and 100% homosexual Height and weight measured directly Obese I = BMI 30–34.99 Obese II = BMI 35–39.99 Obese III \geq BMI 40	% Obese I: L = 17% B = 17% H = 17% Obese II: L = 15% B = 9% H = 11% Obese III: L = 17% B = 10% H = 10%
Farmer et al. (2013)	Source: NHANES (2001–2008) Sample: 5,356 H and 437 LB women. No mean ages reported, age range 20–69. By age group: H: 20–29 (36%), 30–39 (27%), 40–49 (27%), 50+ (9%). LB: 20–29 (49%), 30–39 (27%), 40–49 (18%), ≥ 50 (5%)	Do you consider yourself: –heterosexual or straight –homosexual or lesbian –bisexual –something else –not sure? Combined with behavior question so women with sexual minority identification or any same-sex partners in lifetime were listed as sexual minority women Self-reported height and weight Obesity = BMI ≥ 30	% Obese: LB = 30% H = 26% Mean BMI: LB = 29.1 H = 28.3
Fredriksen-Goldsen et al. (2010)	Source: BRFSS Washington State (2003–2007) Sample: 1,496 lesbians and bisexual women age ≥ 18 ; no mean ages reported by sexuality; by age group: L: 18–29 (22%), 30–49 (53%), 50+ (25%) B: 18–29 (49%), 30–49 (40%), 50+ (12%)	Self-reported orientation as heterosexual, homosexual, bisexual, or other; responses of “other” or “don’t know or not sure” or a refusal to answer were considered missing data Self-reported height and weight Obesity = BMI ≥ 30	The rates of obesity were not significantly different between L and B women (no numbers provided)
Fredriksen-Goldsen et al. (2012b)	Source: BRFSS Washington State (2003, 2005, 2007, 2009) Sample: 97% H ($n = 49,092$); 1.4% L ($n = 626$); 1.6% B ($n = 536$). Mean age: L = 43; B = 33; and H = 47 Age range ≥ 18	See above	% with BMI ≥ 30 ($p = .001$): L = 32.8% B = 27.1 H = 23.7%

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Table 1 (continued)

Authors (year)	Source of Data and Sample	Measures of Sexual Orientation and Weight	Weight Findings
Fredriksen-Goldsen et al. (2013)	Source: BRFSS Washington State (2003–2010). Only included ages ≥ 50 Sample: 562 L (mean age 58.1); 291 B (mean age 59.7); about 58,000 H (mean age 63.8); Age range, 50–98	Do you consider yourself: heterosexual or straight, homosexual, gay or lesbian, bisexual, or something else? Combined lesbian and bisexual Self-reported height and weight Obesity = BMI ≥ 30	% Obese: LB = 36.3% H = 25.9%
Garland-Forshee et al. 2014	Source: BRFSS, Oregon, 2005–2008 Sample: N = 347 L; 322 B; 25,502 H women, mean age not reported	Sexual orientation: Do you consider yourself to be a) heterosexual, that is straight; b) homosexual that is gay or lesbian; c) bisexual, or d) other? Height/weight self-reported Obesity = BMI ≥ 30	% Obese ($p < .001$) L = 33% B = 34% H = 24%
Hatzenbuehler et al. (2013)	Source: Ad Health Wave IV, respondents age 24–32 Sample: N = 12,451. 307 LB women (mean age 28.52); >12,000 H (mean age, 28.95)	Sexual orientation: see Everett & Mollborn (2013) Height/weight measured directly	Mean BMI (ns): LB = 30.9 H = 29.1
Kim & Fredriksen-Goldsen (2012)	Source: BRFSS Washington State (2003–2009) Sample: 4,506 H Hispanic (age 58); 41 L Hispanic (age 37); 60 B Hispanic (age 60); 936 White L (age 43); 795 B White (age 28)	Do you consider yourself: Heterosexual or straight, homosexual, gay, lesbian, bisexual, or something else? Self-reported height and weight Obese = BMI ≥ 30	% Obese: Hispanic L = 40% Hispanic B = 19% Hispanic H = 28% White L = 32% White B = 27%
Polimeni et al. (2009)	Source: Australian data. Random sampling from national database of 9,683 women ages 22–27 Sample: 8,526 H (age 24.5); 579 mainly H (no mean age reported); 69 B (no age reported); 29 mainly L (no age reported); 57 exclusively L (mean age 25.0)	Combined mainly and exclusively homosexual into “lesbian” Self-reported height and weight	BMI means (ns): L = 24.2 B = 24.8 Mainly H = 23.7 Exclusively H = 23.8
Richmond et al. (2012)	Source: Ad Health Wave III (2001–2002) Sample: 5,650 H (age 21.7); 675 mostly H (age 21.7); 167 B (age 21.4); 72 L (age 22.0); ages 18–26	See Ad Health (Everett & Mollborn, 2013) Both self-report and measured BMI	Measured BMI (ns): L = 26.8 B = 28.7 H = 26.3 Self-report based BMI: L = 26.3 B = 27.7 H = 25.3 % obese: measured BMI: L = 50% B = 53% Mostly H = 41% H = 46%
Ward et al. 2014	Source: NHIS 2013 Sample: N+1,729 L, 1,033 B, 116,071 H women, mean age not reported	Sexual orientation: Which of the following best represents how you think of yourself? Lesbian or gay, straight, that is, not lesbian or gay, bisexual, something else, I don't know the answer Height/weight self-reported Obese = BMI ≥ 30	% Obese of women ≥ 18 : L = 37% B = 41% H = 28% (bisexual women significantly different from heterosexual; other comparisons ns)

Abbreviations: Ad Health, National Longitudinal Study of Adolescent Health; B, bisexual; BMI, body mass index; BRFSS, Behavioral Risk Factors Surveillance Survey; CDC, U.S. Centers for Disease Control and Prevention; CHIS, California Health Interview Survey; H, heterosexual; L, lesbian; LB, combined sexual-minority categories; NHANES, National Health and Nutrition Examination Survey; NHIS, National Health Interview Survey; ns, not significant; OR, odds ratio; SD, standard deviation; YRBSS, Youth Risk Factors Surveillance Survey.

Table 2
Nonprobability Sample Studies of Weight by Sexual Orientation

Authors	Source of Data and Sample	Measures of Sexual Orientation and Weight	Weight Findings
Aaron & Hughes (2007)	Source: Community convenience sample of diverse women in Chicago Sample: 416 L (ages 18–83; mean, 37.8)	Sexual orientation assessed by sexual behaviors within the past 5 years Self-reported height and weight used to calculate BMI and categorize women as normal weight, overweight, obese, or severely obese	Mean BMI = 27.8 % BMI > 30 = 30% (8% were ≥40 BMI) Black L had higher rates of obesity (BMI ≥ 30 = 44%) than Hispanic (28%) or white (22%) L
Austin et al. (2009)	Source: Growing Up Today study (children of women in Nurses' Health Study). Used 6 waves of longitudinal data Sample: N = 9,039 girls at baseline, 93% White; 166 L, 572 B Ages 21–23 at last wave Analysis was by age group, no means were reported	Which of the following best describes your feelings: –Completely heterosexual –Mostly heterosexual –Bisexual –Mostly homosexual –Completely homosexual/gay/lesbian Combined mostly and completely homosexual for L group Self-reported height/weight International Obesity Task Force standards: overweight = BMI ≥ 25	Found that sexual orientation weight discrepancies began in adolescence. L marginally heavier than H; B and mostly H significantly heavier than completely H Did not report BMI means or frequency, but did report relative risk (RR) using heterosexual as referent: Overweight: L RR = 1.1 B RR = 1.3 Mostly H RR = 1.1
Austin & Irwin (2010)	Source: Convenience sample of women from 13 southern states; no direct comparison group, but used BRFSS data for the same states Sample: 1,141 L; Age range of 19–77; no mean age reported, but 41% were ≥45	Sexual orientation measure not described Self-reported height/weight Used BMI ≥ 25 as overweight/obese category	% Overweight/obese: L = 76% BRFSS Southern women = 58%
Boehmer et al. (2011)	Source: Clinical sample of cancer survivors in statewide cancer registry, plus added 112 LB women from nationwide convenience sample Sample: 257 H (mean age 62.7) and 181 LB (age 55.4)	Sexual orientation measure not reported Self-reported height/weight	BMI in obese range (ns): LB = 27% H = 24%
Brittain et al. (2013)	Source: Convenience sample throughout U.S., web-based survey Sample: 847 L; mean age of 40.5; age range 18–74	Self-identity as lesbian (not described) Self-reported height/weight	BMI = ≥30: 25% of active L 48% of inactive L
Davids & Green (2011)	Source: Cross-sectional web survey representing 40 U.S. states recruited via listserves, community forum, Facebook Sample: 51 L (mean age 26.0), 139 B (mean age 27.5), 82 H (mean age 25.2); age range 18–80	Sexual orientation: Are you: –gay/lesbian –bisexual –heterosexual?	Mean BMI: L = 28.1 B = 27.0 H = 26.1
Dibble et al. (2012)	Source: Cross-sectional convenience sample from a Black lesbian conference in LA in 2003 Sample: 123 women, mean age of 51.6, range 22–79	Self-reported height and weight Self-identification as lesbian Self-reported weight/height Waist circumference directly measured	Did not report significance levels BMI categories: 18.5–25 = 15% 25–30 = 32% 30–40 = 40% 40+ = 13%
Engeln-Maddox et al. (2011)	Source: Convenience sample from Chicago Sample: 91 H (mean age 28); 95 L (mean age 33); no age range reported	7-Point Kinsey-type scale: exclusively heterosexual to exclusively homosexual; combined predominantly homosexual with exclusively homosexual to form lesbian group Self-reported height/weight	WC to hip ratio unhealthy = 69% Mean WC/hip = 0.85 Mean BMI: L = 30.5 (range 18.8–58.4) H = 24.8 (17–41.8)

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Table 2 (continued)

Authors	Source of Data and Sample	Measures of Sexual Orientation and Weight	Weight Findings
Fredriksen-Goldsen et al. (2012a)	Source: Convenience sample drawn from mailing lists of 11 agencies across the U.S. Sample: 770 L (mean, age 64.8) and 59 B (mean age, 64.5); no age range reported	Sexual orientation and gender questions not reported Self-reported height and weight Obesity = BMI \geq 30	% Obese: L = 34.3% B = 34.5%
Jun et al. (2012)	Source: Nurses' Health Study (1989–2005). Sample included 90,713 women Sample: 3.6% L ($n = 693$), 1.7% B ($n = 318$); age range 25–59; no mean ages reported	Self-identified sexual orientation: (a) heterosexual, (b) homosexual (lesbian or gay), (c) bisexual, (d) none of these, (e) prefer not to answer Self-reported height and weight Age-specific BMIs were averaged in 5-year groupings (ages 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, and 55–59), and then categorized as underweight (BMI < 18.5), healthy weight (18.5 \leq BMI < 25), overweight (25 \leq BMI < 30), and obese (BMI \geq 30) BMI values were excluded if participants were pregnant	L women were more likely to be in the moderate weight gain group (OR = 1.3, 95% CI = 1.1, 1.6), rapid weight gain group (OR = 1.8, 95% CI = 1.4, 2.2), and obese to overweight group (OR = 1.8, 95% CI = 1.1, 3.0); B women were more likely to be in the moderate weight gain (OR = 1.6, 95% CI = 1.2, 2.0) and rapid weight gain groups (OR = 1.7, 95% CI = 1.3, 2.3) and 2.4 times more likely (95% CI = 1.3, 4.7) to be in obese-to-overweight group relative to H women
Markey & Markey (2013)	Source: Cross-sectional convenience plus snowball sampling Sample: 72 female same-sex couples ($n = 144$ individuals); mean age of 33.4, range of 18–61	Klein sexual orientation Grid: 0–6 scale (exclusively heterosexual to exclusively homosexual); mean score of 5.39 Measured height and weight three times and took average	Average BMI = 29.4 BMI > 30: 38%
McElroy & Jordan (2014)	Source: National College Health Assessment, 2010 Sample: 17,362 H (age 21); 238 L (age 22); 610 B (age 21)	Self-report sexual orientation: Options heterosexual, gay/lesbian, bisexual, unsure Self-reported height and weight Obesity = BMI \geq 30	% Obese: H = 10%; L = 24%; B = 20%
Smith et al. (2010)	Source: ESTHER study in Pittsburgh; convenience sample; data collected at clinic visit Sample: $N = 867$. African American (31 H, 38 L); White (361 H, 437 L). Mean age (L = 47, H = 48); age range 35–65	Sexual Orientation: Self-identity –H = only male partners since age 18 –L = only physical, emotional, romantic attractions or partnerships with women in past 5 years Height/weight directly measured Same as Smith et al., 2010	BMI \geq 30: L = 40% H = 30%
Smith et al. (2011)	Source: Subset of the ESTHER study aged 35–45 who were evaluated for polycystic ovary syndrome Sample: 114 L and 97 H, mean age of 40		BMI > 30 (ns): L = 36.8% H = 34%
Struble et al. (2010)	Source: 2006 Spring National College Health Assessment at 123 schools (117 had random sampling) Sample: 30126 H (age 22.1), 301 L (age 23.2), and 1,073 B women (age 22.4); age range 18–25	Which of the following best describes you: heterosexual, gay/lesbian, bisexual, transgendered, unsure BMI calculated from self-reported height and weight Obese = BMI \geq 30	B more likely to be overweight/obese than H; no differences in prevalence of overweight or obesity between L and B women % Obese: L = 35.2%; B = 35.1%; H = 22.8% Mean BMI: L = 24.8; B = 24.5; H = 23.1
Thayer (2010)	Source: Purposive sample recruited from social networks and online forums Sample: 200 lesbians. Mean age of 36; 63% were ages 30–65	Self-report of both sexual orientation and weight/height BMI categories from CDC	Mean BMI = 28.1 BMI \geq 30 = 36% Age \geq 30: 50% had BMI > 30
Zaritsky & Dibble (2010)	Source: Respondent-driven sample of 370 lesbian/sister pairs. Secondary data analysis of women >50 Sample: $N = 42$ sister pairs; mean ages: L = 63.9; sisters = 64.2	Self-identity as lesbian, nominated a heterosexual sister Self-reported height/weight	Mean BMI (ns): L = 30.4 H Sisters = 28.4 Waist/hip ratio ($p = .03$): L = 0.84 H Sisters = 0.81

Abbreviations: B, bisexual; BMI, body mass index; BRFSS, Behavioral Risk Factors Surveillance Survey; CDC, U.S. Centers for Disease Control and Prevention; H, heterosexual; L, lesbian; LB, combined sexual-minority categories; ns, not significant; OR, odds ratio; SD, standard deviation.

2012; Thayer, 2010; Zaritsky & Dibble, 2010). Finally, five drew samples primarily from single cities (Aaron & Hughes, 2007; Engeln-Maddox, Miller, & Doyle, 2011; Markey & Markey, 2013; Smith et al., 2010; Smith et al., 2011).

Nonprobability studies of the relationship between obesity and sexual orientation mirror findings from the probability studies, although more of the nonprobability studies were of lesbian-only populations without comparison within sexual orientation groups. Of these 17 studies, 9 had a heterosexual comparison group and 1 used data for women in general from the BRFSS for the same states as their participants were drawn (Austin & Irwin, 2010). Among the 10 studies with a comparison group, 7 found a significant difference in weight, with sexual minority women heavier, albeit modestly so. In the only longitudinal study in this set, Jun et al. (2012) found that lesbian and bisexual women were more likely to be in the moderate or rapid weight gain trajectories, but also more likely to lose weight compared with heterosexual women who were mostly represented in a slow weight gain trajectory. Almost one half of the women in three different cross-sectional studies of lesbians were currently obese, according to BMI category (Thayer, 2010; Dibble et al., 2012; Markey & Markey, 2013).

Methodological Issues

Since Bowen et al.' review in 2008, there are more convincing data that sexual minority women in the United States are heavier than comparable heterosexual women. Combining our findings with those of Bowen et al., there have been at least 56 studies reporting weight among sexual minority women; 43 had heterosexual comparison groups, and 28 (65% of the studies) found significant differences showing sexual minority women to be heavier. Bowen et al. noted five limitations of the literature. We now consider whether those limitations have been addressed in the articles published since their review. First, they noted a lack of representative or population-based sampling. This has been addressed; we found 20 studies with population-based sampling. Second, they noted a lack of longitudinal data. This is still a concern, because only one study (Jun et al., 2012) reported any longitudinal findings. Third, they reported a lack of heterosexual comparison groups. This limitation has been addressed, and the majority of the studies we reviewed did collect data from diverse sexual identity groups. The fourth concern they noted was related to inconsistent measures of sexual identity. This continues to be a problem, and the studies we reviewed varied in their measures from self-identity to behavioral measures. The terminology and the scales differed sufficiently across studies to make direct comparisons of findings difficult. Finally, Bowen et al. noted that there were too few studies that separated bisexual women from lesbian populations. This continues to be a problem. Although more studies examined the diversity of sexual identifications, many still "lumped" sexual minority women together to increase cell sizes. In addition, the diversity of measures of sexual identification made it difficult to compare across studies. In some studies, the addition of a category "mostly heterosexual" or "not entirely heterosexual" complicated the comparison of groups because sometimes this new category is lumped with bisexual and sometimes it is not.

The next section addresses other limitations that apply to the studies we reviewed. First, our selection process did not eliminate studies that were based, at least in part, on the same dataset; therefore, to some degree, the findings are not independent. Five of the probability studies cited here used the same

BRFSS dataset from the state of Washington in overlapping years and varying configurations (some used the whole adult dataset, whereas others focused on women over 50 or over 60). Two studies used the California Health Interview Survey. Three studies used the same dataset from the National Longitudinal Study of Adolescent Health (Ad Health). Two convenience sample studies were drawn from the same dataset of lesbians in Pittsburgh. We choose to include these studies with some overlap in samples because none used identical data sets. The rest of this section addresses three methodological issues: measurement variations, representativeness of the samples, and lack of statistical power to address the complexity of factors related to weight.

Definitions/measurement issues

There was some variation in the definitions of weight categories. A few studies lumped overweight and obese together, using a BMI of 25 or higher (mostly the studies of adolescents and young adults), whereas others used the more standard marker of adult obesity as BMI of 30 or higher. Consequently, these study findings cannot be compared directly. Most of the studies relied on self-report of height and weight. In the one study that compared self-reported with measured weight and height, lesbian and bisexual women were equally as likely to underreport their weight as heterosexual women (Richmond et al., 2012), but the magnitude of underreporting was not substantial (Table 1). In the general population, under-reporting of weight has been fairly well-studied (e.g., Lin, DeRoo, Jacobs, & Sandler, 2012), but less is known about sexual minority women's accuracy with self-report. Finally, few studies reported on frequency of morbid obesity, the level most clearly associated with negative health outcomes.

Sexual orientation was measured in diverse ways. Historically, four self-report methods have been used to assess sexual orientation: 1) self-identification, 2) Kinsey or Kinsey-type scales (these are usually on a continuum from exclusively heterosexual to exclusively gay/lesbian or homosexual with 3 or more points in between), 3) living in a lesbian relationship, sexual contact or experience with women, and 4) unique scales specific to particular studies (Crisp, 2002). Most papers ($n = 29$; 78%) provided some information on how the participants were identified as sexual minority women, but a few had no description of these measures beyond "self-identifies as a lesbian." Sexual orientation was measured by self-identification ($n = 18$), Kinsey-type scales ($n = 4$), both sexual behavior and attraction ($n = 4$), and both self-identification and behavior ($n = 2$). It is unclear whether participants might have varied on any crucial health-related outcomes depending on which form of measurement was used. Many of the studies did not report how sex (biologically male, female, or other) or gender (culturally influenced characteristics of femininity and masculinity) were ascertained. The study of health disparities among sexual minority women has long been hampered by a lack of standard measures of sexuality and gender (Eliason, 2014a), and only recently have studies tried to disentangle nuances of sexual and gender identities and presentations. Because sexual identity is largely invisible but gender presentations are public, it is quite possible that health outcomes are different for women who vary along a gender continuum. Gender presentation was not measured in any of these studies.

Questions about the representativeness of samples

Another limitation of the studies we reviewed is the inability to detect whether population-based sampling methods are

accurate in reaching and identifying representative samples of sexual minority women. Does stigma affect who responds to phone or other surveying techniques? Do response rates vary by sexual orientation? Because some studies find that lesbians are more likely to be employed or work longer hours than heterosexual women (Cochran & Mays, 2007; Ponce, Cochran, Pizer, & Mays, 2010), does this affect participation rates in phone surveys? Finally, are respondents likely to be truthful about sexual orientation with interviewers? White, middle-class, more highly educated, and more “out” sexual minority women are probably overrepresented in both probability and convenience sample studies. Women with even greater stigma associated with the intersections of sexuality and gender with minority race/ethnicity, lower social class, bisexual identity, and less education are less likely to be reached by typical recruitment methods or to volunteer for research studies (Crisp, 2002; Hughes, 2005; Mayer et al., 2008; Solarz, 1999), potentially resulting in underestimates of health risks. On the other hand, some authors suggest that LGBT people may overreport physical health problems, because the highly introspective process of coming out makes them more willing to share other vulnerable information (Lick, Durso, & Johnson, 2013). This issue of overreporting or underreporting of health problems cannot be addressed with self-report methods. We also have no way of knowing how selection bias for research studies affects the representativeness of samples of sexual minority women, because large-scale data collection tools such as the U.S. Census do not collect information about individual's sexual orientation.

Inadequate samples sizes

Although some studies had relatively large sample sizes, once respondents were divided by sexual orientation and gender, there were often inadequate cell sizes to explore potential individual-level predictors of greater weight. In the general population, age, race/ethnicity, income level, education, physical activity, nutrition, and adverse childhood experiences are associated with greater weight. It is possible that some of these factors are more potent predictors of greater body mass than sexual orientation. Sexual orientation and gender both adversely influence income level, but not necessarily education, resulting in samples of sexual minority women with higher education, but lower income than heterosexual women (Badgett, Durso, & Schneebaum, 2013).

One potential factor in weight is age. Few of the studies explicitly examined age as a factor for weight gain, although some population data shows a steady increase in weight across the lifespan for the majority of women (Jun et al., 2012). Figure 1 depicts data organized roughly by age, showing little variation in the percentage of women who were obese with advancing age. The difference in weight by sexual orientation seems to be present already in young adults. There may be a cohort effect, in that the highest rate of obesity was reported in some of the youngest samples, reflecting trends in the United States in general. Deputy and Boehmer (2013) also found that rates of overweight and obesity (BMI \geq 25) were significantly higher at age 18, but current weight categories were similar for all sexual identity groups when compared with ethnicity-matched counterparts. Table 3 shows the studies organized by age and Figure 1 graphically depicts data for percent of the samples with BMI of 30 or higher by age.

There is a fairly large research literature on body satisfaction or acceptance, factors that most likely play a major role in weight (see Morrison, Morrison, & Sager, 2004 for a review), but few of

the studies we reviewed considered psychological variables. Similarly, relatively little research has assessed other factors related to weight, such as the presence of the metabolic syndrome, parity, menopause, the effects of weight cycling, shame and guilt stemming from weight discrimination, experiences of sexual orientation discrimination, or other factors that may be more important in the development of chronic health problems than body mass (Bacon, 2010). Few of the studies were designed to assess the relationships between weight, sexual orientation, and health problems, nor did they have adequate sample size to study all the complex factors that influence weight.

Discussion

Despite limitations in study designs, the bulk of the studies reviewed here found that sexual minority women had a higher BMI and/or a higher prevalence of obesity than heterosexual women. However, statistical significance does not always translate into meaningful differences. Does the increased weight cause greater health problems? In recent years, there has been growing concern that weight per se may not be so closely tied to negative health outcomes as previously thought (Bacon & Aphramor, 2011; Campos, Saguy, Ernsberger, Oliver, & Gaesser, 2006; Flegal, Kit, Orpana, & Graubard, 2013; Lustig, Schmidt, & Brindis, 2012). In addition, there may be protective factors in sexual minority women's communities that moderate the effects of weight, such as physical fitness, involvement in body positive, size acceptance, and “Health At Every Size” movements, and less tendency to engage in dieting and weight cycling (e.g., Huxley, Clarke, & Halliwell, 2014). The studies reviewed here cannot address these issues. Many of the studies came from broad public health surveillance surveys, designed to gather a few data from a lot of people who are representative of the population. These studies give us some idea of prevalence of chronic illness, but not much about the factors that may underlie disease processes. We discuss two major themes in the study of body weight among sexual minority women that raise the question of paradox, or unexplained issues related to elevated weight among sexual minority women. The first is the “obesity paradox,” which challenges the usefulness of weight as a predictor for health outcomes in all populations; and the second is a proposed “lesbian paradox,” which suggests that factors related to lesbian or LGBT community norms and support may influence health independent of weight or body size.

Obesity Paradox

A growing body of literature is finding that overweight or obese people may have similar or even better outcomes than their normal-weight peers, contrary to the general perception that obesity is associated only with negative health outcomes. Obesity has been identified as a protective factor with health conditions such as acute heart problems and surgery recovery, and is even associated with lower mortality rates in some cases (Amundson, Djurkovic, & Matwiyoff, 2010; Childers & Allison, 2010; Flegal et al., 2013). Many of these findings of a protective factor of overweight or low-grade obesity (BMIs of 30–35) apply to morbidity among people with diabetes, stroke, and acute coronary syndrome (Curtis, 2005), and a recent study found that obese and overweight patients had better nutritional status than normal or underweight patients (Casas-Varas et al., 2012). Some research suggests that increased fat reserves might offer some benefit in times of illness or injury (Klein et al., 2007) and

omental fat (abdominal fat), which is increased among obese persons (Smith et al., 2001) is believed to have some beneficial immune-modulating effects in times of biological stress or trauma (Pond, 2001). The protective benefits of obesity may be even more pronounced for older adults in terms of bone breaks or other fall-related injuries (Oreopoulos, Kalantar-Zadeh, Sharma, & Fonarow, 2009). Other health paradoxes, such as the Latino (or Hispanic) Paradox, also lend support to the notion that weight is not the best predictor of health problems. Latinos in the United States are poorer, have lower education levels, are more likely to be obese, and yet have lower mortality rates than Whites (Turra & Goldman, 2007). These studies suggest that obesity is a complex phenomenon that is influenced by individual, interpersonal, and sociocultural factors that are not yet well understood.

Because of pervasive concerns in much of the biomedical literature that higher weight is associated with risk for chronic physical health problems (Reilly & Kelly, 2011), we examined the studies reviewed in this paper for prevalence of several chronic conditions thought to be related to obesity: diabetes, hypertension, cardiovascular disease (CVD), and reproductive system cancers. We were not able to find any studies that directly assessed the presence of chronic illnesses in women by both sexual identities and BMI category. The studies divided the samples by sexual orientation only, and not by the intersection of sexuality and weight categories.

Only one of the studies that reported prevalence of diabetes found any significant differences by sexual orientation (Ward et al., 2014) and six others found no difference (Blosnich et al., 2014; Conron et al., 2010; Dilley et al., 2010; Farmer et al., 2013; Fredriksen-Goldsen et al., 2013; Hatzenbuehler et al., 2013). There was no increase in the prevalence of hypertension by sexual orientation in women (Boehmer, Glickman, Winter, & Clark, 2013; Dilley et al., 2010; Everett & Mollborn, 2013; Farmer et al., 2013; Fredriksen-Goldsen et al., 2013; Hatzenbuehler et al., 2013; Ward et al., 2014). Some studies reported higher theoretical risk for CVD among sexual minority women, partly based on the higher BMI (Conron et al., 2010; Farmer et al., 2013), but they did not report actual prevalence of CVD. Two studies found no difference in symptoms of CVD (Blosnich et al., 2014; Ward et al., 2014). Four studies reported no differences in cholesterol levels in women by sexual orientation (Dilley et al., 2010; Farmer et al., 2013; Fredriksen-Goldsen et al., 2013; Ward

et al., 2014). One study found no difference in C-reactive protein, a marker for CVD, in young adult sexual minority compared with heterosexual women (Hatzenbuehler et al., 2013). Few of these studies reported cancer prevalence; one found no difference between older lesbians and their heterosexual sisters for breast cancer (Zaritsky & Dibble, 2010). These findings are also supported by another recent review of the literature of chronic physical health problems in sexual minority women (Eliason, 2014b), which found that, of 10 studies that reported diabetes, none found elevated rates among sexual minority women; and of 12 studies that reported hypertension, three found heterosexual women to have higher rates and none found higher prevalence among sexual minority women. Four studies reported on high cholesterol and one reported higher rates for heterosexuals; the other three found no differences. One study actually measured cholesterol levels and found no difference by sexual identity. Two studies found higher rates of CVD in lesbians, and four others reported no differences. These studies are limited by the wide age range of women in most of them; however, even those that focused on older women (e.g., Fredriksen-Goldsen et al., 2013; Valanis et al., 2000; Wallace et al., 2011) found few health differences by sexual orientation.

Lesbian Paradox

None of the studies we reviewed were designed to study the dual effects of sexual orientation and weight on health outcomes. Sexual minority women not represented in the samples of these studies may have higher rates of chronic physical health disorders related to the intersections of race/ethnicity, sexuality, gender, poverty, and other factors. Some studies find that lesbian and bisexual women are more likely to delay or avoid preventive health care (Boehmer, Miao, Linkletter, & Clark, 2012b; Hart & Bowen, 2009; Heck, Sell, Sheinfeld-Gorin, 2006; Steele, Timmouth, & Lu, 2006), so they may underreport health problems that are actually present but not diagnosed. On the other hand, Lick et al. (2013) suggested a number of reasons why LGBT people might overreport health problems, and more recent studies are suggesting that there is less of a gap between sexual minority and heterosexual women in obtaining preventive health screenings than previous studies indicated (Austin et al., 2013b; Boehmer et al., 2012b; Mosack, Brouwer, & Petroll, 2013). In the current state of research, we cannot address the

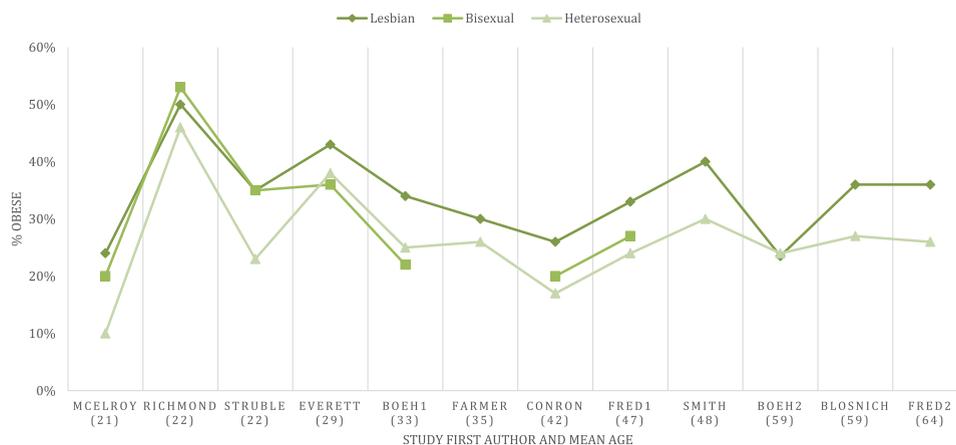


Figure 1. Percent obese by sexual orientation across the lifespan: Youngest samples on the left, oldest on the right. We limited the data to studies that reported percent who were obese using a body mass index of 30 or higher as the standard.

Table 3
Mean BMI and Percentage Obese by Sexual Orientation, Arranged by Age of Respondents

Authors	Mean Age	Mean BMI	% with BMI \geq 30
McElroy & Jordan (2014)	H = 21 L = 22 B = 21		H = 10% L = 24% B = 20%
Richmond et al. (2012)	H = 21.7 L = 22.0 B = 21.4	H = 26.3/25.3 (measured/self-report) L = 26.8/26.6 B = 28.7/27.7	H = 46% (measured) L = 50% B = 53%
Struble et al. (2010)	H = 22.1 L = 23.2 B = 22.4	H = 23.1 L = 24.8 B = 24.5	H = 23% L = 35% B = 35%
Polimeni et al. (2009)	H = 24.5 L = 25.0	H = 23.8 L = 24.2	—
Dauids & Green (2011)	H = 25.5 L = 26.0 B = 27.5	H = 26.1 L = 28.1 B = 26.1	—
Everett & Mollborn (2013)	All women = 28.7	—	H = 26% LB = 30%
Hatzenbuehler et al. (2013)	H = 28.9 LB = 28.5	H = 29.1 LB = 30.9	—
Engeln-Maddox et al. (2011)	H = 28 L = 33	H = 24.8 L = 30.5	—
Boehmer et al. (2007)	H = 32.7 L = 33.4 B = 29.1	—	H = 25% L = 34% B = 22%
Bogaert (2010)	H = 30.6 LB = 30.6	H = 23.6 LB = 24.6	—
Farmer et al. (2013)	Not reported, but 63% were <40	H = 28.3 LB = 29.1	—
Conron et al. (2010)	40% were 34–49	—	H = 17% L = 26% B = 20%
Fredriksen-Goldsen et al. (2012b)	H = 47 L = 43 B = 33	—	H = 24% L = 33% B = 27%
Blosnich et al. (2014)	H = 47 L = 43 B = 35	—	H = 24% L = 27% B = 25%
Smith et al. (2010)	H = 48 L = 47	—	H = 30% L = 40%
Blosnich et al. (2013)	H = 58.2 LB = 54 (Veterans only)	—	H = 27% LB = 36%
Boehmer et al. (2011)	H = 62.7 LB = 55.9	—	H = 24% LB = 24%
Fredriksen-Goldsen et al. (2013)	H = 64 L = 58 B = 60	—	H = 26% LB = 36%
Zaritsky & Dibble (2010)	H = 64.2 L = 63.9	H = 28.4 L = 30.4	—

Abbreviations: B, bisexual; H, heterosexual; L, lesbian; LB, lesbian and bisexual combined. Only studies that used a standard of BMI of \geq 30 for obesity are listed.

accuracy of self-reports of health problems or weight among sexual minority individuals, nor can we know what a representative sample of sexual minority women might look like.

Sexual minority women may also differ on physical activity levels, related to stereotypes about athleticism. Few of the studies we reviewed explicitly compared BMI to exercise patterns by sexual orientation. Most studies reported no differences in physical activity by sexual orientation (Blosnich et al., 2014; Boehmer & Bowen, 2009; Boehmer, Miao, & Ozonoff, 2012a; Davids & Green, 2011; Dilley et al., 2010; Everett & Mollborn, 2013; Fredriksen-Goldsen et al., 2010, 2012a, 2013; Hatzenbuehler et al., 2013; Polimeni et al., 2009). Two studies found lesbians to be less active than heterosexual women (McElroy & Jordan, 2014; Zaritsky & Dibble, 2010), and three studies found lesbian/bisexual women to be more active than heterosexual women (Austin & Irwin, 2010; Kim & Fredriksen-Goldsen, 2013; Richmond et al., 2012).

Although not reviewed in this paper, some older studies have also found sexual minority women to be more active (Aaron et al., 2001; Case et al., 2004; Harris Interactive, 2005; Patton et al., 1998; Roberts, Dibble, Nussey, & Casey, 2003). The Women's Health Initiative study reported that the percentage of women who had two or more episodes of moderate to strenuous activity per week was similar across sexuality groups: 44.5% of lesbians, 50.2% of bisexual, and 45% of heterosexual women (Valanis et al., 2000). A recent study of health promotion behaviors across the lifespan, using California state data (Boehmer et al., 2012b) reported that sexual minority women engaged in more vigorous and moderate activity than heterosexual women, but only at younger ages. Most of the other studies did not control for age.

There may be significant subsample differences among lesbian/bisexual women by age, race/ethnicity, social class, income, and education that confer different levels of risk for

weight gain as well as physical health problems. Two recent studies on the role of stress on health suggested that isolating groups by any one factor such as sexual orientation, gender, or ethnicity does not capture the complexity of factors that impact health negatively. Oppressive forces in society, such as sexism, heterosexism, racism, classism, and ageism, are not simply additive. Rather, they are multiplicative, meaning that stigma combines in unique ways for individuals who typically have multiple identities and dynamic relationships to the power structures of society (Veenstra, 2013). Therefore, we cannot have a clear picture of weight issues in sexual minority women without considering the impact of societal stigma on socioeconomic status or other critical factors (Thomeer, 2013). Few studies have stratified samples or covaried for income level in their analyses. If there is social class bias in responding to population-based survey recruitment techniques, lesbian/bisexual women with lower education, lower income, and/or from minority racial/ethnic groups may be less likely to be represented in such surveys, thus limiting the ability to identify the multiple levels of oppression that impact health. The study of multiplicative influences on health is relatively new and only recently applied to the study of sexual orientation.

Another possibility is that factors related to lesbian identity and community may serve as protective factors for chronic health problems (but not higher weight). Some propose that feminist and lesbian community norms (e.g., body positive, size acceptance) are protective factors for body dissatisfaction (Morrison et al., 2004; Rothblum, 2002; Yost & Chmeilewski, 2011). Body-positive messages and rejection of traditional gender norms may serve to motivate women to engage in more physical activity or healthier nutritional practices. Sexual minority women may be less likely to diet and weight cycle, factors that some researchers think are related to health problems rather than weight (Bacon & Aphramor, 2011). Female same-sex couples may be more supportive of each other's efforts to promote health than other-sex couples (Reczek, 2012). In addition, supportive lesbian or LGBT communities, aside from any messages about the physical body, may help to buffer women from the effects of minority stress and foster resilience (Kwon, 2013). There are simply not enough data to link weight and physical health problems with any lesbian/bisexual women's community factors at this point (see Eliason & Fogel, 2015).

Implications for Practice, Policy, and Future Research

Most of these studies were not based on any explicit theoretical framework and were descriptive rather than explanatory. Only four studies identified a theoretical or conceptual framework and presented explanatory findings. Two studies (Davids & Green, 2011; Engeln-Maddox et al., 2011) used objectification theory to study body image rather than trying to explain differences in weight. Markey and Markey (2013) created an Actor-Partner Interdependence Model to study the influence of the partner on weight concerns, and Thayer (2010) used a social-ecological model to organize the factors that might be associated with greater weight. Theoretical frameworks are useful tools for generating and testing hypotheses related to potential underlying factors that can then be addressed in future studies and inform interventions (Lick et al., 2013). Future research needs to tease out the differential impact of stress on physical and mental health symptoms, as well as develop theoretical frameworks to explain health disparities

and create culturally centered health interventions. The minority stress model may be particularly useful as a framework, because it includes both external and internal forms of heterosexism/oppression (Meyer, 2013).

Lesbian and bisexual women may be just as dissatisfied with their bodies as heterosexual women, but for different reasons, or they may have different responses to body dissatisfaction. Some of these differences may be rooted in internalized shame and guilt about one's sexuality (and physical body) stemming from societal stigma. In the minority stress model, social support from LGBT or women's communities might mediate or moderate the impact of stress on health, and might reduce the influence of societal pressures to be thinner. Obesity is a complex human response to individual and environmental factors, and only multifactorial approaches to research will provide useful answers about causation and association.

Future studies need to link weight and health problems, preferably in longitudinal designs, and examine societal, community, interpersonal, and individual level factors that may account for this larger, but possibly healthy physical status for sexual minority women. These studies must include "obesogenic" factors found in research with general populations, such as age, race/ethnicity, income level, adverse childhood experiences, poverty, neighborhood conditions, health policies, food access, nutrition knowledge, advertising, and others. Minority stress measures (sexism, heterosexism, discrimination, harassment, violence, social invalidation, micro-aggressions, lack of legal protections, and lesbian/bisexual women's community factors) need to be included in health studies. Future studies need to develop unique approaches to subject recruitment that may improve the representativeness of the samples, such as respondent-driven sampling or oversampling frames. Until we have better data about the factors associated with both greater body mass and physical health problems among sexual minority women, efforts to develop targeted interventions are hampered. In the meantime, more general efforts to reduce societal stigma related to sexual minority and gender status are warranted. Laws and policies that provide legal protections and education to reduce stigma are more likely to result in health improvements for sexual minority women than programs that focus primarily on individual behavior change.

In conclusion, we identified 37 research studies that examined weight in sexual minority women since the review by Bowen et al. (2008), and the majority of those with a heterosexual comparison group found lesbian/bisexual women to be heavier. Paradoxically, however, the same studies that we reviewed for weight data did not identify evidence of higher prevalence of physical health problems thought to be associated with greater weight, suggesting the possibility that weight may not be a significant driver of physical health disparities among sexual minority women. Further research is warranted that includes gathering more nuanced data on income, education, race/ethnicity, community norms, social support, type and intensity of minority stress, and other factors that might be better predictors of health problems, and that control for the potential effects of age. Researchers also need to use more innovative sampling procedures to recruit a wider diversity of sexual minority women.

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Author Descriptions

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For two decades, Suzanne Haynes has promoted lesbian health research in the Federal government and helped fund aspiring researchers through the Lesbian Health Fund Board. She currently represents lesbian issues on the HHS Coordinating Committee on LGBT health.