The Link between Behavioral Risk Factors, Access to Care, and Sexual Minority Health: Observing the Intersection Effects of Sexual and Gender Identities

Ning Hsieh, University of Chicago, Matt Ruther, University of Louisville

ABSTRACT

Disparities in health and behavioral risk factors by sexual orientation are richly documented in the literature. However, few studies have examined how health disparities by sexual orientation are attributed to differential exposure to health risks and access to care, or how gender interacts with sexual orientation to create health gaps. Using data from the 2013 National Health Interview Survey, this study shows that the gender-sexual identity interaction is significant. Relative to heterosexual men, gay men report similar self-rated health (SRH) and functional health (FH), but heterosexual women and bisexual men report moderately poorer SRH and/or FH and lesbian and bisexual women report substantially worse SRH and FH. Although heterosexual women exhibit generally better health behaviors than straight men, all females, regardless of sexual identity have more limited access to care. The disparities in SRH by gender-sexual identity disappear when differences in health behaviors and access to care are considered. However, gender-sexual identity health gaps in functional limitation remain.

While disparities in health and exposure to health risk factors by sexual orientation are richly documented in the literature, few studies have examined the link between health outcomes and risk factors across sexual orientation groups (Institute of Medicine 2011). Past studies indicate that sexual minorities have poorer physical and mental health compared to heterosexuals, including general self-rated health, cardiovascular conditions (e.g., hypertension and high cholesterol), diabetes, functional limitations, and lifetime mood and anxiety disorders (Conron, Mimiaga, and Landers 2010; Diamant et al. 2000; Bostwick et al. 2010; Institute of Medicine 2011; Fredriksen-Goldsen, Kim, and Barkan 2012). Sexual minorities are also more likely to exhibit health risks, such as smoking, heavy drinking, limited access to health care services, unmet medical needs, and obesity (particularly among sexual minority women) (Boehmer et al. 2011; Buchmueller and Carpenter 2010; Conron, Mimiaga, and Landers 2010; Ponce et al. 2010; McCabe et al. 2009). Although most research attributes the patterns of health and health risks, respectively, to stress related to stigma and discrimination based on sexual orientation, less is known about how the various behavioral risk factors, as potential proximal determinants of health, contribute to health disparities by sexual orientation.

The present study aims to fill this gap by examining the relationship between health risk and health status and identifying those risk factors that contribute most heavily to health disparities between sexual orientation groups. Given that sexual minorities are disadvantaged within a wide array of health risks, results of this study will help policymakers, health practitioners, and health researchers prioritize interventions that focus on the types of risks most strongly linked to the current health gaps. Recognizing that sexual orientation does not influence health or expose individuals to health risks equally for men and women (McCabe et al. 2009; Conron, Mimiaga, and Landers 2010; Ponce et al. 2010), the study compares six sexual/gender

identity groups (including straight/gay/bisexual men and women) to show that gender amplifies the differences in health experience across sexual orientation groups. As previous research often relies on gender-specific analyses, it is unclear to what extent gender may interact with sexual orientation to affect health and exposure to health risks. This study supports the concept of intersectionality (Bowleg 2012; Crenshaw 1991; Grollman 2014) by showing that individuals with "double disadvantage" (in sexual minority and gender status) experience much poorer health than their privileged or singly disadvantaged counterparts. Notably, the effects of disadvantaged statuses (being a sexual minority and a woman) are not additive but mutually reinforcing. Finally, by using a nationally representative sample that identifies sexual minorities through personal sexual identity rather than same-sex union, this study addresses the generalizability concerns of previous research that focuses on a single state or city or on sexual minorities in a union.

METHODS

Sample

The study uses data from the 2013 National Health Interview Survey (NHIS), collected by the National Center for Health Statistics under the U.S. Centers for Disease Control and Prevention. The NHIS is a household health survey conducted annually since 1957, with questions on sexual orientation first asked in 2013. The NHIS covers a broad range of health topics, including health status and limitation of activity, health behaviors, and health care access and utilization. The survey generates representative samples of the civilian non-institutionalized population residing in the U.S. using multistage sampling techniques. The 2013 survey was conducted through face-

to-face interviews in respondents' homes using computer-assisted personal interviewing (CAPI). The household response rate in 2013 was 75.7%.

Because the sexual orientation question is included only in the Sample Adult component of the NHIS, the current study focuses on adults aged 18 years or older. The sexual orientation question asked sample adults: "Which of the following best represents how you think of yourself? (1) Gay or lesbian, (2) Straight, that is, not gay or lesbian, (3) Bisexual, (4) Something else, and (5) I don't know the answer." Of the 33,784 adults who answered the question[1], 32,546 (96.7%) self-identified as straight, 571 (1.7%) as gay or lesbian, and 233 (0.7%) as bisexual. In addition, 56 (0.2%) individuals responded 'Something else', and 155 (0.5%) individuals responded 'I don't know the answer'. National Center for Health Statistics (2014) suggests that there is minimal classification error according to the quality assessment of sexual orientation data using follow-up questions that target people in the 'Something else' or 'I don't know the answer' categories[2]. This study focuses on the comparison of the self-identified straight, gay/lesbian, and bisexual groups and excludes the two ambiguous groups from the analysis. Approximately 7% (N=2,222) of records contain missing values for one or more of the health, behavioral risk, or sociodemographic variables. Because a large percentage of Body Mass Index (BMI) records are missing (N=770), imputation based on sociodemographic characteristics is carried out for this variable[3]; the remaining records with missing values were excluded from the analysis. The final analytical sample includes 31,128 straight-identified, 548 gay/lesbian-identified, and 222 bisexual-identified individuals.

[1] About 2% of the total adult sample of 34,557 declined or refused to provide an answer to the sexual orientation question.

Variables

Two health outcomes (dependent variables) are examined: self-rated health (SRH) and functional limitation. SRH has five ordinal response categories: excellent, very good, good, fair, and poor. Higher SRH values reflect poorer health. Functional limitation is a dummy variable indicating whether or not the respondent experiences any difficulty in the following activities: walking a quarter of a mile (about 3 city blocks), walking up 10 steps without resting, standing for 2 hours, sitting for 2 hours, stooping/bending/kneeling, reaching up over one's head, using fingers to grasp and handle small objects, lifting or carrying something as heavy as 10 pounds, pushing or pulling large objects, going out for shopping/movies/sporting events, participating in social activities, and doing things to relax at home or for leisure.

Two sets of health risk factors are considered, including health behaviors/indicators (smoking, drinking, obesity, exercise, and sleep problem) and health care access (preventive health checks and ability to afford health expenditures). Smoking indicates whether or not the respondent currently smokes cigarettes. Drinking is measured by the status of lifetime alcohol consumption, with the following four response categories: lifetime abstainer, former drinker (no drinking in the past year), current infrequent or light drinker, and current moderate or heavy drinker. Obesity is measured by BMI (weight (kg)/ height $(m)^2$) in four standard categories: underweight (below 18.5), normal (18.5-24.9), overweight (25.0-29.9), and obese (30 and above). Exercise is a dummy variable indicating whether the respondent does vigorous leisure-time physical activity 4 or more times a week. Sleep problem indicates whether or not the respondent has trouble falling asleep or staying asleep in the past week.

[2] The majority of the 'something else' group consists of individuals who do not use labels to identify themselves or do not think of themselves as having sexuality. The majority of the 'don't know' group consists of individuals who have not figured out or are in the process of figuring out sexuality, or do not understand the words.
[3] The results remain similar when the missing BMI records are excluded from the analysis.

Preventive health checks are three dummy variables indicating whether the respondent had a blood pressure, blood cholesterol, or high blood sugar test administered by a doctor, nurse, or other health professional during the past 12 months. Ability to afford health expenditures is evaluated using five variables. First, no health insurance indicates that the respondent is not covered by any kind of health insurance at the time of survey. Second, unmet need for medical care indicates whether there is any time when the respondent needed medical care but did not get it because s/he could not afford it. Third, delayed medical care indicates whether the respondent ever delays medical care because of worry about the cost. Fourth, inability to afford specific health services indicates whether there is any time when the respondent needed any of the following health care but did not get it: prescription medicines, mental health care or counseling, dental care including check-ups, eyeglasses, seeing a specialist, and having follow-up care. Lastly, saving money for medication indicates whether the respondent does any of the following to save money: skipping medication doses, taking less medicine, delaying filling a prescription, asking a doctor for a lower cost medication, buying prescription drugs from another country, and using alternative therapies.

In all regression analyses, age, educational attainment (no high school diploma, high school diploma, some college, and bachelor's degree and above), marital/cohabiting status, and race/ethnicity (non-Hispanic white, non-Hispanic black, and others) are included as covariates.

Statistical Analysis

Wald statistics are used to test for differences in sociodemographic characteristics, SRH, functional limitation, and exposure to behavioral risks across the six sexual-gender identity groups. Ordered logistic regression models (for SRH) and binary logistic regression models (for

functional limitation) are run to examine how disparities in the health outcomes are related to and explained by differences in exposure to behavioral risks. Wald tests are used to determine whether the health disparities are significantly reduced when sets of risk factors are taken into account. All statistical analyses are conducted with the Stata statistical software, and adjusted to account for survey design.

RESULTS

Table 1 displays the characteristics of the NHIS sample, by gender and sexual identity. Sexual minorities are less likely to be married or living with a partner, relative to straight men (the reference group). Gay men and lesbians exhibit the highest levels of educational attainment, while self-identified bisexual men and women are younger than straight men and straight women, respectively. The six groups are similarly distributed among the three racial categories.

Females, regardless of sexual identity, are more likely to report a functional limitation than are straight men, and straight women also report lower SRH than do straight men. The health outcomes for males are similar among the different sexual identity groups.

There are only a few significant differences between sexual minority men and straight men on health behaviors and access to care. Gay men are more likely to exercise 4+ times weekly than are straight men, but are also more likely to drink alcohol heavily or moderately. Bisexual men have more trouble sleeping and are less likely to have their blood sugar checked relative to straight men. In addition, both gay and bisexual men are more likely to have delayed medical care due to cost.

Lesbian and bisexual women not only exhibit worse health behaviors than do straight women in terms of smoking, drinking, obesity, and trouble sleeping, but also report more

problems with obesity and sleeping than do straight men. Although bisexual women are much more likely to be obese than straight men and women, they are less likely to have their cholesterol and blood sugar checked. Moreover, all women, regardless of sexual identity, report more difficulties in paying for health care than do straight men. However, lesbian and bisexual women are even more financially disadvantaged; in particular, bisexual women struggle to afford health expenses the most.

Self-Rated Health

The SRH outcome was regressed on the sexual/gender identity of the respondent, controlling for differences in sociodemographic characteristics, using an ordered logistic regression model; the results from this analysis are displayed in the first panel of Table 2. The similar levels of SRH reported by gay, bisexual, and straight men remain when the sociodemographic controls are included. Conditional on sociodemographic factors, females, regardless of sexual identity, report significantly worse SRH than straight men. In addition, lesbians and bisexual women also report worse SRH than straight women.

With the exception of bisexual females, the SRH gaps between straight men and women are eliminated when controls for differences in health behaviors are included in the model (Model 2). For bisexual females, the SRH gap with straight men is reduced, but remains marginally significant. The disparities between females of different sexual identities are fully explained by differences in health behaviors. In Model 3 the health behavior controls are removed from the regression and controls for health care access are added. Conditional on the different patterns of health care access, SRH disparities between straight men and straight or bisexual women are eliminated. Lesbians continue to report significantly worse SRH than

straight men and women when the health care access controls are added. The results from the full model, with simultaneous controls for health behaviors and access to health care, are displayed in Model 4. In this full model no gender gaps in reported SRH remain, nor are there any outstanding differences between respondents of different sexual identities.

Functional Limitation

The results from the logistic regression of functional limitation on sexual/gender identity and other sociodemographic factors are shown in the first panel of Table 3. While gay men are similarly likely to report a functional limitation as straight men, bisexual men exhibit higher likelihood of functional limitation than straight men. Furthermore, women of all sexual identities are significantly more likely to report a functional limitation, relative to straight men. The odds of having functional limitation are particularly high among lesbian and bisexual women, exceeding the odds for either straight men or women.

The functional limitation gaps between men and women remain significant when controls for health behaviors are added (Model 2). For lesbians and bisexual women, health behaviors explain some, but not all, of the functional limitation gap with straight men. Controlling for health care access (Model 3) likewise does not explain away all the functional limitation gaps between men and women, although the gaps are significantly reduced when these controls are added. The final panel of Table 3 displays the full model with controls for health behaviors and health care access (Model 4). Although the odds, relative to those of straight men, of straight women, lesbians, and bisexual women reporting a functional limitation are reduced from the base model, all three female groups remain significantly more likely to report a functional limitation.

The odds ratios for the health behavior and health care access variables in the final regression models of both SRH and functional limitation are mostly consistent with expectations. Current smokers, former drinkers, obese (but not overweight) respondents, individuals who exercise more frequently, individuals who have trouble sleeping, and individuals who can't afford or delay medical services all report lower SRH and are at increased likelihood of reporting a functional limitation. When sociodemographic characteristics are accounted for, having blood pressure/cholesterol/blood sugar exams is related to poorer health outcomes. This suggests that less healthy individuals may be more likely to seek out medical services. Similarly, having no insurance coverage is related to lower rates of functional limitation. The finding reflects that less healthy individuals are more likely to obtain health insurance, and that elder adults above age 65 (who are particularly prone to functional limitation) and younger adults who live with disabilities are mostly covered by insurance provided by the government.

DISCUSSION

Research on health disparities by sexual orientation has rarely examined the relationship between health outcomes and health risk factors, even though both poorer health and higher exposure to health risks among sexual minorities are richly documented in the literature. Moreover, while most studies to date recognize that men and women differentially experience such disparities, few have demonstrated how gender interacts with sexual orientation to affect health experiences. The current study shows that lesbian and bisexual women report the poorest health and functional limitation relative to straight men. Straight women and bisexual men show moderately higher rates of functional limitation relative to straight men, although their self-rated health does not differ much from straight men's. Gay men exhibit comparable levels of self-rated health and

functional limitation with their straight male counterparts. These findings are consistent with both the intersectionality and the double disadvantage theses that multiple social identities intersect with one another to produce health disparities and that the effects of marginalized statuses on health are not additive but interactive (Bowleg 2012; Grollman 2014; Mays et al. 2002; Williams et al. 2012). In fact, the odds of experiencing poor physical or functional health for lesbian/bisexual women are significantly higher than the odds for gay/bisexual men and straight women combined. The results therefore suggest that research focusing on one-dimensional status (e.g., gender *or* sexual orientation) may miss the elevated risk for health problems among individuals with multiple social disadvantages, even when controlling for other statuses.

The distribution of health behaviors and access to health care by sexual/gender identity generally follows a similar pattern: lesbian and bisexual women are at the greatest risk of unhealthy behaviors and financial barriers to health care, followed by straight women and bisexual men. Importantly, these differences in health behaviors and health care resources fully explain the gaps in self-rated health by sexual/gender identity and partly explain the gaps in functional limitation. In particular, health behaviors contribute more to the health disparity between lesbians and straight men, while health care access contributes more to the disparity between bisexual women and straight men. This finding implies that the major pathway through which sexual minority status influences health may differ between lesbian and bisexual women. Indeed, according to previous studies, the lack of an identifiable and resource-rich community and the lower level of financial support among bisexual-identified individuals may explain the relative importance of health care access in their health (Bostwick et al. 2010; Hsieh 2014; Israel

and Mohr 2004). The current study thus highlights the need for health promotion programs to be tailored to specific sexual minority groups.

As mentioned above, the disparities in functional limitation by sexual and gender identity remain large, though significantly reduced, after behavioral risk factors and health care access are accounted for. Prior research suggests that functional limitations may take a longer time to develop and manifest (Grollman 2014; Pavalko, Mossakowski, and Hamilton 2003). Therefore, proximal contributors to health, such as current health behaviors and access to health services, may not be expected to fully explain the gaps in functional limitation. Relatedly, interventions targeting behavioral change or enhancement of health care access may become less effective once physical functions are impaired.

A few limitations of the study should be noted. First, the data are cross-sectional, and the causal direction of relationship between health risk factors and health outcomes cannot be determined. Although the relationship is most likely bi-directional, prior studies based on longitudinal data have validated the direction from exposure to risks to health. For example, sleep disturbance or deprivation may rouse inflammatory responses and increase the severity of physical disorders (Irwin et al. 2006; Peppard et al. 2000). Also, barriers to primary and preventive care predict declines in health and function and premature mortality (Hoffman and Paradise 2008). Second, the sample size for bisexual men and women, while comparable to similar studies (Bostwick et al. 2010; Cochran and Mays 2011), is relatively small. As such, the estimated odds for these two groups typically have wider confidence intervals. It is difficult to assess whether bisexual men are indeed only moderately less healthy than their straight counterparts, and whether bisexual women have significantly poorer health than their lesbian counterparts. Moreover, though the study examines the intersection effects of sexual and gender

identities, the analysis does not have the necessary power to intersect sexual orientation and gender with other social statuses, such as race/ethnicity, that may further complicate the understanding of health disparities. Finally, the definition of gender is restricted and unable to reflect the plurality of gender identities. The study unfortunately cannot address the health concerns of transgender and other gender populations.

Despite the limitations, this study advances the understanding of the link between health behavior, health care access, and health outcomes among groups with different sexual and gender identities. It emphasizes that the intersection of identities is critical for health policies that target to narrow health disparities and differences in exposure to health risks. Future research should continue the efforts to investigate the heterogeneity of health experiences by attending to multiply intersecting social statuses.

REFERENCES

Boehmer, Ulrike, Xiaopeng Miao, Crystal Linkletter, and Melissa A. Clark. 2011. "Adult Health Behaviors Over the Life Course by Sexual Orientation." *American Journal of Public Health* 102 (2): 292–300. doi:10.2105/AJPH.2011.300334.

Bostwick, Wendy B., Carol J. Boyd, Tonda L. Hughes, and Sean E. McCabe. 2010. "Dimensions of Sexual Orientation and the Prevalence of Mood and Anxiety Disorders in the United States." *American Journal of Public Health* 100 (3): 468–75. doi:10.2105/AJPH.2008.152942.

Bowleg, Lisa. 2012. "The Problem With the Phrase Women and Minorities: Intersectionality—an Important Theoretical Framework for Public Health." *American Journal of Public Health* 102 (7): 1267–73. doi:10.2105/AJPH.2012.300750.

Buchmueller, Thomas, and Christopher S. Carpenter. 2010. “Disparities in Health Insurance Coverage, Access, and Outcomes for Individuals in Same-Sex Versus Different-Sex Relationships, 2000-2007.” *American Journal of Public Health* 100 (3): 489–95. doi:10.2105/AJPH.2009.160804.

Cochran, SD, and VM Mays. 2011. “Sexual Orientation and Mortality Among US Men Aged 17 to 59 Years: Results From the National Health and Nutrition Examination Survey III.” *American Journal of Public Health* 101 (6): 1133–38. doi:10.2105/AJPH.2010.300013.

Conron, Kerith J., Matthew J. Mimiaga, and Stewart J. Landers. 2010. “A Population-Based Study of Sexual Orientation Identity and Gender Differences in Adult Health.” *American Journal of Public Health* 100 (10): 1953–60. doi:10.2105/AJPH.2009.174169.

Crenshaw, Kimberle. 1991. “Mapping the Margins: Intersectionality, Identity Politics, and Violence against Women of Color.” *Stanford Law Review* 43 (6): 1241–99. doi:10.2307/1229039.

Diamant, A. L, C. Wold, K. Spritzer, and L. Gelberg. 2000. “Health Behaviors, Health Status, and Access to and Use of Health Care: A Population-Based Study of Lesbian, Bisexual, and Heterosexual Women.” *Archives of Family Medicine* 9 (10): 1043.

Fredriksen-Goldsen, Karen I., Hyun-Jun Kim, and Susan E. Barkan. 2012. “Disability Among Lesbian, Gay, and Bisexual Adults: Disparities in Prevalence and Risk.” *American Journal of Public Health* 102 (1): e16–21. doi:10.2105/AJPH.2011.300379.

Grollman, Eric Anthony. 2014. “Multiple Disadvantaged Statuses and Health The Role of Multiple Forms of Discrimination.” *Journal of Health and Social Behavior* 55 (1): 3–19. doi:10.1177/0022146514521215.

Hoffman, Catherine, and Julia Paradise. 2008. “Health Insurance and Access to Health Care in the United States.” *Annals of the New York Academy of Sciences* 1136 (1): 149–60. doi:10.1196/annals.1425.007.

Hsieh, Ning. 2014. “Explaining the Mental Health Disparity by Sexual Orientation: The Importance of Social Resources.” *Society and Mental Health* 4 (2): 129–46. doi:10.1177/2156869314524959.

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

Irwin, Michael R., Minge Wang, Capella O. Campomayor, Alicia Collado-Hidalgo, and Steve Cole. 2006. “Sleep Deprivation and Activation of Morning Levels of Cellular and Genomic Markers of Inflammation.” *Archives of Internal Medicine* 166 (16): 1756–62.

Israel, Tania, and Jonathan J. Mohr. 2004. “Attitudes Toward Bisexual Women and Men.” *Journal of Bisexuality* 4 (1-2): 117–34. doi:10.1300/J159v04n01_09.

Mays, VM, AK Yancey, SD Cochran, M Weber, and JE Fielding. 2002. “Heterogeneity of Health Disparities among African American, Hispanic, and Asian American Women: Unrecognized Influences of Sexual Orientation.” *American Journal of Public Health* 92 (4): 632–39.

McCabe, Sean Esteban, Tonda L. Hughes, Wendy B. Bostwick, Brady T. West, and Carol J. Boyd. 2009. “Sexual Orientation, Substance Use Behaviors and Substance Dependence in the United States.” *Addiction* 104 (8): 1333–45. doi:10.1111/j.1360-0443.2009.02596.x.

National Center for Health Statistics. 2014. *A Brief Quality Assessment of the NHIS Sexual Orientation Data*. Hyattsville, MD: National Center for Health Statistics. http://www.cdc.gov/nchs/data/nhis/qualityso2013508.pdf.

Pavalko, Eliza K., Krysia N. Mossakowski, and Vanessa J. Hamilton. 2003. "Does Perceived Discrimination Affect Health? Longitudinal Relationships between Work Discrimination and Women's Physical and Emotional Health." *Journal of Health and Social Behavior* 44 (1): 18–33. doi:10.2307/1519813.

Peppard, Paul E., Terry Young, Mari Palta, and James Skatrud. 2000. "Prospective Study of the Association between Sleep-Disordered Breathing and Hypertension." *New England Journal of Medicine* 342 (19): 1378–84. doi:10.1056/NEJM200005113421901.

Ponce, Ninez A., Susan D. Cochran, Jennifer C. Pizer, and Vickie M. Mays. 2010. "The Effects Of Unequal Access To Health Insurance For Same-Sex Couples In California." *Health Affairs* 29 (8): 1539–48. doi:10.1377/hlthaff.2009.0583.

Williams, David R., Emily Z. Kontos, K. Viswanath, Jennifer S. Haas, Christopher S. Lathan, Laura E. MacConaill, Jarvis Chen, and John Z. Ayanian. 2012. "Integrating Multiple Social Statuses in Health Disparities Research: The Case of Lung Cancer." *Health Services Research* 47 (3 Pt 2): 1255–77. doi:10.1111/j.1475-6773.2012.01404.x.

Table 1. Characteristics of 2013 National Health Interview Survey Sample, by Gender and Sexual Orientation

	Male			Female		
	Straight	Gay	Bisexual	Straight	Lesbian	Bisexual
Sociodemographic						
Median Age	46	42	**39**	**47**	41†	**28**†
Educational Attainment: No HS Diploma	0.14	**0.05**	0.09	0.13	**0.05**†	0.20
Educational Attainment: HS Diploma	0.27	**0.18**	0.19	0.25	0.21	0.28
Educational Attainment: Some College	0.29	0.36	0.37	**0.32**	0.34	0.33
Educational Attainment: Bachelor's Degree	0.30	**0.41**	0.35	0.30	**0.40**†	**0.18**†
Married or Living w/Partner	0.65	**0.36**	**0.34**	**0.59**	**0.52**	**0.31**†
Race: White	0.82	0.82	0.69	**0.80**	0.82	0.77
Race: Black	0.11	0.13	0.11	**0.13**	0.14	0.18
Race: Other	0.07	0.05	**0.21**	0.07	0.04	0.05
Health Outcomes						
Self-Rated Health Less than Very Good	0.38	0.33	0.36	**0.40**	0.45	0.44
Functional Limitation	0.29	0.28	0.35	**0.39**	**0.43**	**0.51**†
Health Behaviors/Indicators						
Heavy/Moderate Drinker	0.28	**0.41**	0.42	**0.13**	**0.20**†	0.26†
BMI >30	0.29	0.23	0.27	**0.27**	0.35†	**0.43**†
Currently Smoke	0.20	0.24	0.29	**0.15**	0.26†	0.29†
Any Exercise 4+ Times Weekly	0.43	**0.53**	0.51	**0.39**	0.36	0.48
Have Trouble Sleeping	0.44	0.50	**0.58**	**0.53**	**0.65**†	**0.76**†
Healthcare Access						
Blood Pressure Check	0.76	0.80	0.79	**0.87**	**0.84**	**0.85**
Cholesterol Check	0.59	0.58	0.46	**0.67**	0.58†	**0.46**†
Blood Sugar Check	0.42	0.43	**0.26**	**0.49**	0.42	**0.32**†
No Health Insurance	0.18	0.15	0.20	**0.15**	0.18	0.25†
Medical Care Delayed Due to Cost	0.09	**0.14**	**0.26**	**0.11**	**0.19**†	**0.27**†
Medical Care Unmet Due to Cost	0.07	0.09	0.17	**0.08**	**0.15**†	**0.16**†
Can't Afford Health Services	0.15	0.20	0.27	**0.21**	**0.24**	**0.42**†
Save Medication to Save Money	0.17	0.17	0.31	**0.23**	**0.25**	**0.38**†
N	13,817	304	73	17,311	244	149

Numbers in bold indicate significant difference ($p<0.05$) from value for straight males. For lesbian and bisexual women, † indicates significant difference ($p<0.05$) from value for straight females. Except for median age, all significance tests based on sample-adjusted Wald statistics. For median age, significance test based on Mann Whitney test. For race and educational attainment, numbers may not sum to one due to rounding.

Table 2. Ordered Logistic Regression Analysis of Self Rated Health Outcome, by Gender and Sexual Orientation, National Health Interview Survey, 2013

	Model 1 (Base)		Model 2		Model 3		Model 4	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Straight Male	(ref)		(ref)		(ref)		(ref)	
Straight Female	1.07 *	(1.01, 1.13)	**1.04**	(0.97, 1.10)	**0.96**	(0.90, 1.02)	**0.95**	(0.89, 1.01)
Gay Male	1.15	(0.86, 1.54)	1.20	(0.91, 1.58)	**1.03**	(0.77, 1.39)	1.11	(0.83, 1.48)
Lesbian Female	1.71 ***	(1.27, 2.31)	**1.27**	(0.95, 1.70)	**1.41** *	(1.02, 1.95)	**1.14**	(0.84, 1.54)
Bisexual Male	1.40	(0.71, 2.76)	1.34	(0.65, 2.75)	**1.12**	(0.55, 2.27)	1.12	(0.53, 2.36)
Bisexual Female	1.93 ***	(1.40, 2.67)	**1.45** *	(1.01, 2.07)	**1.37**	(0.98, 1.92)	**1.15**	(0.80, 1.65)
Age	1.03 ***	(1.03, 1.03)	**1.03** ***	(1.03, 1.03)	**1.03** ***	(1.03, 1.03)	**1.03** ***	(1.03, 1.03)
Less than High School	(ref)		(ref)		(ref)		(ref)	
High School Diploma	0.59 ***	(0.54, 0.64)	0.60 ***	(0.55, 0.66)	0.59 ***	(0.53, 0.64)	0.60 ***	(0.55, 0.66)
Some College	0.46 ***	(0.42, 0.51)	**0.50** ***	(0.46, 0.55)	**0.44** ***	(0.40, 0.49)	**0.49** ***	(0.44, 0.54)
Bachelor's Degree	0.25 ***	(0.22, 0.27)	**0.32** ***	(0.29, 0.35)	0.25 ***	(0.22, 0.27)	0.32 ***	(0.29, 0.35)
Married	(ref)		(ref)		(ref)		(ref)	
Never Married	1.13 ***	(1.05, 1.21)	**1.22** ***	(1.13, 1.32)	**1.19** ***	(1.11, 1.28)	**1.26** ***	(1.17, 1.36)
Separated/Divorced	1.47 ***	(1.37, 1.58)	**1.34** ***	(1.24, 1.44)	**1.28** ***	(1.19, 1.38)	**1.21** ***	(1.13, 1.31)
Widowed	0.96	(0.85, 1.08)	1.00	(0.89, 1.12)	**1.03**	(0.91, 1.16)	**1.04**	(0.92, 1.17)
White	(ref)		(ref)		(ref)		(ref)	
Black	1.32 ***	(1.22, 1.42)	**1.23** ***	(1.13, 1.33)	**1.28** ***	(1.18, 1.38)	**1.19** ***	(1.10, 1.29)
Other	1.27 ***	(1.16, 1.41)	**1.45** ***	(1.32, 1.60)	**1.37** ***	(1.23, 1.51)	**1.49** ***	(1.35, 1.65)
Lifetime Abstainer			(ref)				(ref)	
Former Drinker			1.29 ***	(1.17, 1.42)			1.20 ***	(1.09, 1.33)
Light Drinker			0.85 ***	(0.79, 0.92)			0.82 ***	(0.76, 0.88)
Moderate/Heavy Drinker			0.72 ***	(0.66, 0.79)			0.71 ***	(0.65, 0.78)
Underweight			(ref)				(ref)	
Normal weight			0.68 ***	(0.53, 0.86)			0.68 **	(0.54, 0.87)
Overweight			0.89	(0.70, 1.13)			0.88	(0.69, 1.12)
Obese			1.69 ***	(1.33, 2.14)			1.57 ***	(1.24, 2.00)
Current Smoker			1.88 ***	(1.75, 2.01)			1.73 ***	(1.60, 1.86)
Exercise 4+ Times Weekly			0.65 ***	(0.61, 0.69)			0.64 ***	(0.61, 0.68)
Trouble Sleeping			1.80 ***	(1.70, 1.90)			1.56 ***	(1.47, 1.65)
Blood Pressure Check					1.15 ***	(1.06, 1.24)	1.15 ***	(1.06, 1.25)
Cholesterol Check					1.24 ***	(1.14, 1.34)	1.23 ***	(1.13, 1.34)
Blood Sugar Check					1.19 ***	(1.11, 1.28)	1.09 *	(1.02, 1.17)
No Health Insurance					0.94	(0.86, 1.01)	0.92	(0.85, 1.01)
Delayed Medical Care					1.49 ***	(1.32, 1.67)	1.43 ***	(1.27, 1.62)
Unmet Medical Care					1.50 ***	(1.30, 1.73)	1.42 ***	(1.23, 1.64)
Can't Afford Health Services					1.89 ***	(1.73, 2.06)	1.70 ***	(1.56, 1.86)
Save Medication					1.52 ***	(1.41, 1.63)	1.38 ***	(1.28, 1.48)
N	31,898		31,898		31,898		31,898	

* p <0.05, ** p <0.01, *** p <0.001. Asterisks indicate significance of coefficient within each separate equation. Values in bold are statistically different (p <0.05) from value in base equation, based on sample-adjusted Wald Tests.

Table 3. Logistic Regression Analysis of Functional Limitation Reporting, by Gender and Sexual Orientation, National Health Interview Survey, 2013

	Model 1 (Base)		Model 2		Model 3		Model 4	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Straight Male	(ref)		(ref)		(ref)		(ref)	
Straight Female	1.54 ***	(1.44, 1.64)	1.50 ***	(1.39, 1.62)	**1.34** ***	(1.25, 1.44)	**1.34** ***	(1.23, 1.45)
Gay Male	1.31	(0.92, 1.88)	1.34	(0.95, 1.91)	**1.18**	(0.82, 1.70)	1.25	(0.87, 1.77)
Lesbian Female	2.95 ***	(2.03, 4.30)	**2.23** ***	(1.50, 3.30)	**2.48** ***	(1.64, 3.73)	**1.97** ***	(1.31, 2.97)
Bisexual Male	2.08 *	(1.08, 4.02)	1.88	(0.90, 3.94)	**1.55**	(0.74, 3.27)	**1.44**	(0.63, 3.26)
Bisexual Female	6.08 ***	(3.64, 10.15)	**4.77** ***	(2.99, 7.63)	**4.21** ***	(2.33, 7.60)	**3.66** ***	(2.20, 6.10)
Age	1.06 ***	(1.05, 1.06)	**1.06** ***	(1.06, 1.06)	1.06 ***	(1.05, 1.06)	**1.06** ***	(1.06, 1.06)
Less than High School	(ref)		(ref)		(ref)		(ref)	
High School Diploma	0.84 **	(0.76, 0.94)	0.85 **	(0.75, 0.95)	**0.80** ***	(0.71, 0.90)	0.81 ***	(0.71, 0.92)
Some College	0.76 ***	(0.68, 0.84)	0.78 ***	(0.69, 0.88)	**0.66** ***	(0.59, 0.74)	**0.70** ***	(0.61, 0.79)
Bachelor's Degree	0.46 ***	(0.41, 0.52)	**0.56** ***	(0.50, 0.64)	**0.44** ***	(0.39, 0.50)	**0.54** ***	(0.47, 0.62)
Married	(ref)		(ref)		(ref)		(ref)	
Never Married	1.23 ***	(1.12, 1.36)	**1.32** ***	(1.19, 1.47)	**1.33** ***	(1.19, 1.47)	**1.40** ***	(1.25, 1.56)
Separated/Divorced	1.39 ***	(1.28, 1.51)	**1.24** ***	(1.13, 1.36)	**1.23** ***	(1.12, 1.34)	**1.14** **	(1.03, 1.25)
Widowed	1.26 ***	(1.10, 1.44)	1.29 ***	(1.12, 1.48)	**1.34** ***	(1.17, 1.53)	**1.34** ***	(1.17, 1.54)
White	(ref)		(ref)		(ref)		(ref)	
Black	1.05	(0.95, 1.15)	**1.01**	(0.91, 1.12)	1.03	(0.93, 1.13)	**0.98**	(0.88, 1.08)
Other	0.67 ***	(0.58, 0.77)	**0.79** ***	(0.69, 0.91)	**0.71** ***	(0.61, 0.83)	**0.81** **	(0.69, 0.94)
Lifetime Abstainer			(ref)				(ref)	
Former Drinker			1.34 ***	(1.19, 1.51)			1.21 **	(1.07, 1.37)
Light Drinker			0.94	(0.84, 1.05)			0.88 *	(0.79, 0.99)
Moderate/Heavy Drinker			0.78 ***	(0.68, 0.88)			0.75 ***	(0.66, 0.85)
Underweight			(ref)				(ref)	
Normal weight			0.60 ***	(0.47, 0.79)			0.63 ***	(0.48, 0.82)
Overweight			0.77 *	(0.59, 1.00)			0.78	(0.60, 1.02)
Obese			1.46 **	(1.11, 1.91)			1.38 *	(1.04, 1.82)
Current Smoker			1.75 ***	(1.59, 1.93)			1.64 ***	(1.48, 1.81)
Exercise 4+ Times Weekly			0.70 ***	(0.65, 0.76)			0.69 ***	(0.64, 0.74)
Trouble Sleeping			2.91 ***	(2.73, 3.11)			2.41 ***	(2.26, 2.57)
Blood Pressure Check					1.75 ***	(1.53, 2.00)	1.71 ***	(1.49, 1.96)
Cholesterol Check					0.96	(0.85, 1.07)	0.93	(0.82, 1.05)
Blood Sugar Check					1.34 ***	(1.22, 1.47)	1.24 ***	(1.12, 1.36)
No Health Insurance					0.60 ***	(0.54, 0.68)	0.61 ***	(0.53, 0.69)
Delayed Medical Care					1.37 ***	(1.18, 1.59)	1.30 ***	(1.12, 1.52)
Unmet Medical Care					1.70 ***	(1.43, 2.02)	1.59 ***	(1.32, 1.91)
Can't Afford Health Services					2.28 ***	(2.04, 2.55)	1.98 ***	(1.76, 2.23)
Save Medication					2.01 ***	(1.82, 2.21)	1.78 ***	(1.61, 1.97)
N	31,898		31,898		31,898		31,898	

* p <0.05, ** p <0.01, *** p <0.001. Asterisks indicate significance of coefficient within each separate equation. Values in bold are statistically different (p <0.05) from value in base equation, based on sample-adjusted Wald Tests.