Sexual Orientation Disparities in Preventable Disease: A Fundamental Cause Perspective

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Objectives. To determine whether fundamental cause theory (which posits that, in societal conditions of unequal power and resources, members of higher-status groups experience better health than members of lower-status groups because of their disproportionate access to health-protective factors) might be relevant in explaining health disparities related to sexual orientation.

Methods. We used 2001 to 2011 morbidity data from the Stockholm Public Health Cohort, a representative general population–based study in Sweden. A total of 66 604 (92.0%) individuals identified as heterosexual, 848 (1.2%) as homosexual, and 806 (1.1%) as bisexual. To test fundamental cause theory, we classified diseases in terms of preventability potential (low vs high).

Results. There were no sexual orientation differences in morbidity from low-preventable diseases. By contrast, gay or bisexual men (adjusted odds ratio [OR] = 1.48; 95% confidence interval [CI] = 1.13, 1.93) and lesbian or bisexual women (adjusted OR = 1.64; 95% CI = 1.28, 2.10) had a greater risk of high-preventable morbidity than heterosexual men and women, respectively. These differences were sustained in analyses adjusted for covariates.

Conclusions. Our findings support fundamental cause theory and suggest that unequal distribution of health-protective resources, including knowledge, prestige, power, and supportive social connections, might explain sexual orientation health disparities. (*Am J Public Health.* 2016;106:1109–1115. doi:10.2105/AJPH.2016.303051)

Evidence of substantial health disparities between sexual minority individuals (i.e., those who identify as lesbian, gay, and bisexual [LGB] or engage in same-sex sexual behavior) and heterosexual individuals exists across multiple health outcomes.[1] One of the most troubling possibilities raised by these substantial disparities is that members of sexual minority groups succumb to higher rates of illnesses that could have been prevented.

This possibility is suggested by the fundamental cause theory, which predicts that disparities between advantaged and disadvantaged groups will be greater for preventable diseases than for nonpreventable diseases.[2] The reasoning behind this prediction is that when diseases can be prevented or effectively treated, advantaged groups can leverage resources to access preventive benefits, whereas disadvantaged and or stigmatized groups may be blocked from doing so. In contrast, in the case of diseases that cannot be as effectively prevented or cured, resources and discrimination are less important because there is no effective prevention or treatment to procure.

This theory raises the possibility that some of the significant disparity that exists between sexual minority and heterosexual individuals is attributable to conditions that could have been prevented. Rigorously testing this hypothesis requires representative samples of LGB and heterosexual populations followed over time with the capacity to identify illnesses that can be classified as to whether they could have been prevented. Data with these features are extremely rare. In fact, to our knowledge, the study described here is the first test of this theory-driven hypothesis of disparities by minority sexual status.

Specifically, we took advantage of data from classifications of disease preventability and treatability[3] combined with morbidity data from the Stockholm Public Health Cohort,[4] a representative general population–based study in Stockholm, Sweden. The cohort consists of more than 70 000 individuals (aged 18 years or older) followed via regular self-report questionnaires as well as registry-based archival data. Sweden is characterized by comparably low levels of legal discrimination and high social acceptance of sexual minorities,[5] thereby offering a relatively strong test of fundamental cause theory as applied to sexual minority health.

METHODS

The Stockholm Public Health Cohort is a prospective study managed by the Stockholm County Council. In 2002, 2006, and 2010, population-based health surveys were conducted in random samples of the population among individuals aged 18 years or older. At each year of assessment, approximately 50 000 area-stratified random individuals from Stockholm's 39 municipalities were invited to participate, and those already included in the cohort (i.e., in 2006 and 2010) were asked to respond to a follow-up

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questionnaire.[4] In the 2010 survey, 1 question regarding self-identification of sexual orientation was included.

Our study is based on the 72 393 individuals who responded to the 2010 survey via paper-and-pencil mailed questionnaires or self-administered Web surveys (a cohort flowchart is shown in Figure A, available as a supplement to the online version of this article at http://www.ajph.org); this information has been supplemented with national administrative registry data on income, nation of birth, and migration. All participants are followed up longitudinally through linkages between questionnaire responses and data regarding health care use from national health registries. The latest update of registry data on health care usage included information for all cohort members from January 1, 2001, to December 31, 2011.

Measures

Sexual orientation. A single item ("What is your sexual orientation?") was used to classify individuals with respect to their self-identified sexual orientation. Response categories were "heterosexual," "bisexual," "homosexual," and "not sure." A total of 66 604 (92.0%) individuals identified as heterosexual, 848 (1.2%) as homosexual, and 806 (1.1%) as bisexual. We excluded 859 (1.2%) individuals who responded that they were not sure of their sexual orientation, as well as the 3276 (4.5%) participants who did not respond to the question. Those who did not respond to the question regarding sexual orientation were more likely than those who did to be older, female, and born outside of Sweden and to have lower income and educational levels. To increase our statistical power, we combined LGB respondents into a single category.

Health outcome variables. We used personal identification numbers to link survey results to national health and administrative registry data for all individuals included in the cohort. Health-related morbidity was measured as frequency of health care use for inpatient care and outpatient specialist visits, classified according to the diagnostic codes of the *International Statistical Classification of Diseases and Related Health Problems, Tenth Revision* (*ICD-10*).[6] Our main outcome was use of health care services between January 1, 2001, and December 31, 2011, for high- and low-preventable diseases (defined subsequently) among individuals who had ever been diagnosed with a specific disease. Each individual could be categorized under several diagnoses and, thus, could potentially be included in both the high- and low-preventable morbidity groups.

By tracking illness during the 10-year period before the 2010 survey, we gained a larger number of person-years of observation and thus the power to detect differences. An obvious disadvantage of this approach is that illnesses occurring before ascertainment of sexual orientation were included, but it is highly unlikely that prior illness causes sexual orientation. However, in our sensitivity analyses, we used prospective data on health care use during the year following the initial assessment of self-identified sexual orientation (January 1 to December 31, 2011).

To test our hypothesis, we needed to classify diagnoses according to preventability through previously validated classifications of preventable and treatable diseases. Preventable diseases generally relate to diseases considered to be preventable through individual behaviors or public health actions or considered to be treatable via medical intervention.

In our main analyses, we used a classification of diseases employed by Phelan et al., who asked independent raters to categorize diseases into varying degrees of preventability.[3] Using these ratings, the authors generated an overall categorization of diagnoses into high-preventable versus low-preventable diseases. The authors made several attempts to verify their final categorization by comparing their disease ratings with previously published categorizations of disease preventability and treatability.[3] The categorization of high-preventable diseases included diagnoses such as pneumonia and influenza, accidents, chronic liver disease and cirrhosis, and hypertensive heart disease. The low-preventable-disease category included diagnoses such as pancreatic cancer, cardiomyopathy, and multiple sclerosis.

For validation purposes, we employed 2 previously published alternative classifications of preventability and treatability in sensitivity analyses,[7,8] one of preventable diseases and one of treatment-amenable diseases. Specifically, Page et al. used a classification of preventable diseases including conditions such as hepatitis, smoking-related cancers, and external causes of morbidity,[8,9] whereas Nolte and MacKee used a classification of diseases considered largely or partly amenable to health care, including conditions such as infections, treatable cancers, diabetes, cerebrovascular diseases, hypertension, and ischemic heart disease.[7,10]

Covariates. Sociodemographic data included yearly individual income and nation of birth, collected from national registries and linked to the questionnaire data, as well as self-reported educational level. We used HIV status, coded according to the health care registry data and the relevant *ICD-10* code for HIV treatment, as a covariate among men.

Statistical Analysis

Differences between sexual orientation groups on sociodemographic variables and self-reported psychological distress were examined via analysis of variance (continuous variables) and the χ^2 test (categorical variables); appropriate post hoc tests were used to identify specific subgroup differences. We used logistic regression models to examine sexual orientation identity differences in health outcomes, stratified by gender. Although formal tests of effect modification by gender did not show significant differences between men and women, separate analyses for men and women were motivated by previous research showing gender differences in health risk behaviors between sexual minority individuals and heterosexuals.[11–14]

Our main analyses were adjusted for 2 separate sets of covariates: age and HIV status (HIV status was used as a covariate only among men) and income, education, and ethnicity. Our inclusion of HIV status in analyses focusing on men was motivated by the increased prevalence of HIV among gay and bisexual men relative to heterosexual men and our intention to specifically explore differences in preventable diseases other than the well-established increased ill health related to HIV.[15] Only fully adjusted models are presented here (results of all of the analyses are shown in Table A, available as a supplement to the online version of this article at http://www.ajph.org).

To test our hypothesis, we computed odds ratios (ORs) and 95% confidence intervals (CIs) relating to sexual orientation differences

in the likelihood that individuals had or had not been diagnosed with a high-preventable disease during the specified follow-up period. We also examined sexual orientation differences in diagnoses of low-preventable diseases. In addition, we compared these estimates using tests of interaction in terms of heterogeneity of associations (as described by Altman and Bland[16]). Through this approach, the difference between the 2 odds ratios on a log scale and its standard error was used to test the significance of the interaction.

Five sets of sensitivity analyses augmented our main analyses. First, because individuals could be included in both high- and low-preventable morbidity groups, we tested whether inclusion of individuals with low-preventable morbidity affected the results related to high-preventable morbidity and, conversely, whether the inclusion of high-preventable morbidity affected the results related to low-preventable morbidity. To do so, we included low-preventable morbidity and its interaction with sexual orientation as covariates in the analyses with high-preventable diseases as the outcome (and vice versa).

Second, because sexual orientation identity was measured only in 2010 and is known to potentially change over time, particularly among women,[17] we examined the predictive influence of sexual orientation identity on high- versus low-preventable diseases only between January 1 and December 31, 2011. If these results were similar to the primary analyses, we would have evidence that the timing of sexual orientation measurement did not influence our findings. In addition, in these analyses, we controlled for current psychological distress because emotional instability increases self-reporting of physical symptoms[18] and because elevated psychological distress has been consistently reported among LGB individuals relative to heterosexuals.[19] We used the General Health Questionnaire,[20] which has demonstrated adequate validity in both clinical and general population samples, to assess self-reported psychological distress in the preceding few weeks. A recommended and previously validated coding of the scale with cutoff scores of 3 or fewer (vs 4 or more) psychological distress symptoms was used.[21]

Third, to further validate our results, we used alternative classifications of preventable and treatment-amenable diseases to conduct additional analyses of sexual orientation identity differences in preventable diseases.[7,8] Because these classifications of diseases identified only high-preventable or treatment-amenable diseases, this set of analyses was structured differently, and we were thus unable to compare odds ratios for high- and low-preventable diseases. Instead, we compared odds ratios for high-preventable and high-treatment-amenable diseases, as specified in the alternative classifications, with odds ratios for all-cause morbidity. Using all-cause morbidity as a comparison provided a stricter test of our hypothesis because it enabled us to test whether elevated morbidity among LGB individuals was specific to high-preventable diseases rather than a result of overall poorer health in this group.

TABLE 1—Demographic Characteristics and Self-Reported Psychological Distress, by Self-Reported Sexual Orientation Identity: Stockholm Public Health Cohort, Sweden, 2001–2011

	Men				Women			
Characteristic	Gay (n = 509), No. (%) or Mean ±SD	Bisexual (n = 282), No. (%) or Mean ±SD	Heterosexual (n = 29 435), No. (%) or Mean ±SD	*F* or χ^2	Lesbian (n = 339), No. (%) or Mean ±SD	Bisexual (n = 524), No. (%) or Mean ±SD	Heterosexual (n = 37 169), No. (%) or Mean ±SD	*F* or χ^2
Age, y				24.82***				209.03***
18–29	44 (8.6)	42 (14.9)	2 416 (8.2)		48 (14.2)	183 (34.9)	3 311 (8.9)	
30–44	152 (29.9)	75 (26.6)	6 760 (23.0)		123 (36.3)	179 (34.2)	9 647 (26.0)	
45–64	222 (43.6)	98 (34.8)	11 353 (38.6)		120 (35.4)	126 (24.0)	14 278 (38.4)	
≥ 65	91 (17.9)	67 (23.8)	8 906 (30.3)		48 (14.2)	36 (6.9)	9 933 (26.7)	
Education				34.82***				57.29***
Elementary school	129 (25.8)	97 (34.8)	10 746 (36.8)		74 (21.9)	155 (30.5)	13 733 (37.3)	
High school	105 (21.0)	69 (24.7)	6 139 (21.0)		61 (18.0)	119 (23.4)	6 166 (16.7)	
College, < 2 y	88 (17.6)	37 (13.3)	4 442 (15.2)		78 (23.1)	98 (19.3)	6 319 (17.1)	
College, > 2 y	178 (35.6)	76 (27.2)	7 837 (26.9)		125 (37.0)	137 (26.9)	10 641 (28.9)	
Yearly income, tSEK[a]	356.9 ±530	314.6 ±253	383.2 ±413	4.77**	272.8 ±202	192.4 ±155	271.8 ±190	45.23***
Living with partner/spouse	267 (52.5)	148 (52.5)	21 403 (72.7)	157.27***	212 (62.5)	288 (55.0)	24 289 (65.3)	25.61***
Nation of birth				28.71***				5.71
Sweden	398 (78.2)	222 (78.7)	25 095 (85.3)		278 (82.0)	423 (80.7)	31 285 (84.2)	
Other	111 (21.8)	60 (21.3)	4 340 (14.7)		61 (18.0)	101 (19.3)	5 884 (15.8)	
Psychological distress score > 3 (range = 0–12)	83 ±16.9	52 ±19.2	3 048 ±10.7	45.56***	83 ±25.5	161 ±31.6	5 711 ±15.9	126.37***

Note. Percentages may not add to 100 because of rounding.

[a]Swedish kronor, in thousands.

*P < .05; **P < .01; ***P < .001.

Fourth, because several of the diagnoses included in the classification of preventable diseases are strongly linked to tobacco smoking, and because members of sexual minority groups smoke more than heterosexual individuals,[11] we also controlled for self-reported daily smoking via the question "Do you currently smoke more or less daily?" (yes or no). If the results remained robust after adjustment for smoking, this would suggest that smoking is not a mechanism that could explain any of the observed sexual orientation differences in low- and high-preventable diseases.

Finally, because some sexual minority individuals born outside of Sweden might have migrated as a result of exposure to psychosocial stressors related to their sexual orientation in their country of origin, we performed sensitivity analyses by conducting our main analyses only among individuals born in Sweden. If the results remained robust among individuals born in Sweden, this would suggest that our results were not confounded by selection factors related to LGB migration patterns.

In all analyses, we used poststratification weights to adjust for selection probabilities and nonresponse and to account for the complex sample design. Analyses were performed with SPSS version 22 (IBM, Somers, NY).

RESULTS

Table 1 presents, separately for men and women, results related to sociodemographic characteristics and psychological distress by sexual orientation identity. Gay or bisexual men were more likely than heterosexual men to have low incomes, to be born outside of Sweden, and to be younger; they were less likely to live with a partner. Lesbian or bisexual women were more likely than heterosexual women to be younger. Bisexual women were less likely to live with a partner than homosexual and heterosexual women. Gay men and lesbians had more education than bisexuals and heterosexuals. Bisexual women had lower incomes than lesbian and heterosexual women. Both gay or bisexual men and lesbian or bisexual women reported more psychological distress than heterosexual men and women.

Sexual Orientation Differences in Morbidity

There were no sexual orientation differences in morbidity from low-preventable diseases (Table 2). However, in our fully adjusted models, gay or bisexual men had higher odds of high-preventable-disease morbidity than heterosexual men (adjusted OR = 1.48; 95% CI = 1.13, 1.93), and lesbian or bisexual women had higher odds than heterosexual women (adjusted OR = 1.64; 95% CI = 1.28, 2.10). The tests of interaction comparing differences in odds ratios between low- and high-preventable diseases were statistically significant for both men ($z = 2.87$; $P = .002$) and women ($z = 2.92$; $P = .002$). These findings indicate that the significant disparity identified, showing a higher prevalence of high-preventable diseases among sexual minority individuals than among heterosexuals, was not accompanied by a sexual orientation–based difference in low-preventable diseases.

Interaction analyses exploring potential effect modification by age group showed a significant interaction effect of sexual orientation by age group for high-preventable morbidity among men but no significant effect for women. Among men, a stronger disparity in high-preventable diseases among gay or bisexual men as compared with heterosexual men was found for the younger age group (18–45 years) than for the older age group (> 45 years; adjusted OR = 1.78; 95% CI = 1.11, 2.86). No education effect modification was observed for either men or women.

Sensitivity Analyses

We conducted 5 sets of sensitivity analyses. First, inclusion of individuals with low-preventable morbidity in analyses with high-preventable morbidity as the outcome did not alter our findings (gay or bisexual men: adjusted OR = 1.52; 95% CI = 1.16, 1.99; lesbian or bisexual women: adjusted OR = 1.66; 95% CI = 1.29, 2.14). Similarly, inclusion of individuals with high-preventable morbidity in analyses with low-preventable morbidity as the outcome did not change the findings (gay or bisexual men: adjusted OR = 0.82; 95% CI = 0.64, 1.06;

TABLE 2—Adjusted Odds Ratios for Morbidity From Low-Preventable and High-Preventable Diseases Between 2001 and 2011, by Sexual Orientation: Stockholm Public Health Cohort, Sweden

Disease Category and Group	No.	%[a] (SE)	AOR[b] (95% CI)
Men			
Low-preventable diseases[c]			
Heterosexual	6576	17.2 (0.3)	1 (Ref)
Gay/bisexual	133	12.4 (1.3)	0.87 (0.67, 1.13)
High-preventable diseases[c]			
Heterosexual	7562	21.5 (0.3)	1 (Ref)
Gay/bisexual	214	25.5 (2.2)	1.48 (1.13, 1.93)
Women			
Low-preventable diseases[c]			
Heterosexual	6568	16.8 (0.2)	1 (Ref)
Lesbian/bisexual	92	10.3 (1.3)	0.93 (0.70, 1.25)
High-preventable diseases[c]			
Heterosexual	8726	22.7 (0.3)	1 (Ref)
Lesbian/bisexual	187	23.7 (2.1)	1.64 (1.28, 2.10)

Note. AOR = adjusted odds ratio; CI = confidence interval. Logistic regressions were conducted in which gay or bisexual men and lesbian or bisexual women were compared with heterosexuals (the reference category); analyses were stratified by gender. Analyses took into account sample weights and the complex sample design.

[a]Weighted values taking into account the complex sample design and nonresponse.

[b]Adjusted for age, education, income, nation of birth, and, among men, HIV status.

[c]According to the classification in Phelan et al.[3]

lesbian or bisexual women: adjusted OR = 0.85; 95% CI = 0.63, 1.15).

Second, to verify the results found in our analyses incorporating data from 2001 to 2011, we reran the analyses using data for the same individuals during 2011, the year after assessment of self-identified sexual orientation identity. In these prospective analyses exploring the predictive influence of sexual orientation identity on high- and low-preventable diseases over time, the same pattern of results was found (Table 3). There were no sexual orientation identity differences in morbidity from low-preventable diseases. By contrast, both gay or bisexual men and lesbian or bisexual women exhibited higher levels of high-preventable diseases than heterosexuals. Inclusion of psychological distress slightly reduced the odds ratios, but the pattern of results remained. Statistical tests of interaction regarding differences in odds ratios between low- and high-preventable diseases in these prospective analyses showed no statistical significance among women ($z = 1.64$; $P = .10$) or men ($z = 0.92$; $P = .36$).

Third, we complemented our primary analyses based on classification of disease preventability by examining whether previously published classifications of disease preventability and amenability would yield similar patterns (Table 4). These alternate classifications of disease preventability confirmed our primary findings showing a significantly elevated risk of high-preventable diseases, but no elevated risk of all-cause morbidity, among gay or bisexual men and lesbian or bisexual women relative to heterosexuals. Tests of interaction comparing differences in odds ratios between high-preventable diseases and all-cause morbidity were significant among men ($z = 2.26$; $P = .024$) but not among women ($z = 1.63$; $P = .10$). No significant sexual orientation identity disparities were found when diseases were categorized in terms of treatment amenability.[7,10]

Fourth, when we also adjusted our main analyses for daily smoking, the interpretation of the results remained unchanged, although the estimates were somewhat reduced among men while remaining approximately the same among women (Table B, available as a supplement to the online version of this article at http://www.ajph.org).

Finally, although we controlled for nation of birth in our original analyses, as a further sensitivity test we ran the analyses only among those born in Sweden. The interpretation of the results remained unchanged in these analyses, although estimates of increased likelihood of high-preventable diseases among sexual minority individuals relative to heterosexuals decreased somewhat among men and increased somewhat among women (Table C, available as a supplement to the online version of this article at http://www.ajph.org).

TABLE 3—Adjusted Odds Ratios for Morbidity From Low-Preventable and High-Preventable Diseases in 2011, by Sexual Orientation: Stockholm Public Health Cohort, Sweden

Disease Category and Group	No.	%[a] (SE)	AOR[b] (95% CI)
Men			
Low-preventable diseases[c]			
Heterosexual	2512	6.3 (0.2)	1 (Ref)
Gay/bisexual	57	6.0 (0.9)	1.18 (0.83, 1.68)
High-preventable diseases[c]			
Heterosexual	2327	6.7 (0.2)	1 (Ref)
Gay/bisexual	72	8.3 (1.3)	1.47 (1.02, 2.13)
Women			
Low-preventable diseases[c]			
Heterosexual	1850	4.9 (0.1)	1 (Ref)
Lesbian/bisexual	27	3.3 (0.8)	0.98 (0.58, 1.66)
High-preventable diseases[c]			
Heterosexual	2297	6.0 (0.1)	1 (Ref)
Lesbian/bisexual	54	6.4 (1.1)	1.68 (1.16, 2.44)

Note. AOR = adjusted odds ratio; CI = confidence interval. Logistic regressions were conducted in which gay or bisexual men and lesbian or bisexual women were compared with heterosexuals (the reference category); analyses were stratified by gender. Analyses took into account sample weights and the complex sample design.

[a]Weighted values taking into account the complex sample design and nonresponse.

[b]Adjusted for age, education, income, nation of birth, psychological distress, and, among men, HIV status.

[c]According to the classification in Phelan et al.[3]

DISCUSSION

Health disparities according to sexual orientation identity have largely been explained through minority stress theory, which describes the excess stress that sexual minority individuals experience relative to heterosexual individuals by virtue of their stigmatized social status.[19] We explored a different, although complementary, theory for explaining these disparities, namely fundamental cause theory.[2] According to this theory, health inequalities persist even though health-relevant mechanisms and risk factors change over time and place because members of higher-status groups have access to more health-protective resources—including knowledge, prestige, power, and supportive social connections—than members of lower-status groups.[3]

Our results lend support to fundamental cause theory, showing an increased prevalence of high-preventable diseases among sexual minority individuals as compared with heterosexuals and no sexual orientation identity differences with respect to low-preventable diseases. The increased morbidity associated with high-preventable diseases among sexual minority individuals relative to heterosexuals was found for both men and women. These results were robust after control for other health-relevant factors such as income, education, and country of birth. In addition, in sensitivity analyses, the results remained significant after adjustment for psychological distress and smoking, indicating

TABLE 4—Adjusted Odds Ratios for Morbidity from Treatable Diseases in 2011 According to Different Measures of Amenable/Preventable Diagnoses and All-Cause Morbidity: Stockholm Public Health Cohort, Sweden

Disease Category and Group	No.	%[a] (SE)	AOR[b] (95% CI)
Men			
High-amenable diseases[c]			
Heterosexual	3 217	9.1 (0.2)	1 (Ref)
Gay/bisexual	84	10.2 (1.6)	1.38 (0.92, 2.05)
High-preventable diseases[d]			
Heterosexual	821	2.5 (0.1)	1 (Ref)
Gay/bisexual	71	9.3 (1.3)	1.92 (1.29, 2.85)
All-cause morbidity[e]			
Heterosexual	10 591	31.5 (0.4)	1 (Ref)
Gay/bisexual	269	33.3 (2.4)	1.12 (0.88, 1.44)
Women			
High-amenable diseases[c]			
Heterosexual	3 052	8.2 (0.2)	1 (Ref)
Lesbian/bisexual	52	6.2 (1.2)	1.01 (0.67, 1.52)
High-preventable diseases[d]			
Heterosexual	656	1.7 (0.1)	1 (Ref)
Lesbian/bisexual	21	2.2 (0.5)	1.78 (1.06, 2.99)
All-cause morbidity[e]			
Heterosexual	14 792	38.4 (0.3)	1 (Ref)
Lesbian/bisexual	313	36.0 (2.2)	1.12 (0.91, 1.36)

Note. AOR = adjusted odds ratio; CI = confidence interval.

[a]Weighted values taking into account the complex sample design and nonresponse.

[b]Logistic regressions were conducted in which gay or bisexual men and lesbian or bisexual women were compared with heterosexuals (the reference category); analyses were stratified by gender. Analyses were adjusted for age, education, income, nation of birth, psychological distress, and, among men, HIV status and took into account sample weights and the complex sample design.

[c]According to the classification of diseases in Nolte and McKee.[7]

[d]According to the classification of diseases in Page et al.[9]

[e]Excluding pregnancy/childbirth-related care.

that these factors were not mechanisms that could explain the observed results.

The validity of our results is supported by a number of methodological strengths. First, we used a representative, population-based cohort sample and analyzed data from administrative and medical records rather than self-report data for most covariates, including income, country of birth, and HIV status, and for our outcomes of interest. Second, we validated our results by analyzing data prospectively, which enabled us to examine the predictive influence of sexual orientation identity on future morbidity. These findings indicated that any identity fluctuation regarding sexual orientation identity that occurred over time in the sample is unlikely to have biased our results. Third, our use of alternative categorizations of disease preventability further verified our findings.

Finally, we derived our data from a study conducted in Sweden, a country with a universal health care system. This social context helps mitigate potential confounding attributable to sexual orientation differences in health care access, which have been observed in the United States.[22,23] The fact that we identified sexual orientation identity differences in preventable morbidity within the Swedish context of relatively equitable health care access strongly suggests that differences in access to adequate health care between sexual minority and heterosexual individuals are less likely to contribute to disparities in high-preventable morbidity than are other fundamental causes of health such as knowledge and power.[2]

Limitations

Our findings should also be considered in light of several limitations. In our calculation of high- versus low-preventable morbidity, we used a previously validated classification of diseases originally developed to predict mortality.[3] Thus, some of the diagnoses included in these classifications might be preventable in the sense of mortality (i.e., they should not lead to death if appropriately treated) but less so for morbidity (i.e., they might not have any clear avoidable risk factors). However, the number of diagnoses falling into this category is probably low given that the large majority of disease burden in westernized countries is attributable to illnesses with known risk factors.[24] We had access only to hospital-based health care use; thus, some individuals who might have been solely treated within the primary health care system were not included in our current analyses.

In addition, unlike several other studies,[25] our only measure relating to sexual orientation was a single item focusing on sexual orientation identity. Thus, future studies involving measurements of the multidimensional aspects of sexual minority status, including same-sex behavior and attraction, are needed to confirm whether our results are generalizable across different operationalizations of sexual orientation.

Conclusions

To ultimately alleviate sexual orientation health disparities, more knowledge is needed regarding the mechanisms underlying these disparities. Our findings suggest that the mechanisms outlined by fundamental cause theory, namely unequal distribution of health-protective resources such as knowledge, prestige, power, and supportive social connections, represent plausible mechanisms underlying health disparities. Future research can draw on our findings to further verify the relevance of fundamental cause theory as applied to sexual minority health and to ultimately reduce health-related disparities at their source in unequal and unjust societal conditions. AJPH

CONTRIBUTORS

R. Bränström conducted the statistical analyses. All of the authors participated in the conception of the study, made substantial contributions to the interpretation of the data, and contributed to drafting and revising the text.

HUMAN PARTICIPANT PROTECTION

This study was approved by the Regional Ethics Committee of the Karolinska Institute. All participants were given written information regarding the purpose of the study and provided informed consent.

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