

# Sexual Orientation and Mental and Physical Health Status: Findings From a Dutch Population Survey

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Several studies have shown that gay, lesbian, and bisexual people have an increased risk for mental health problems.<sup>1-5</sup> With the exception of HIV infection, differences in physical health status by sexual orientation have hardly been investigated, although some studies suggest that such differences exist.<sup>6,7</sup> This is the first study to assess the relationship between sexual orientation and physical health in a national population-based sample.

Initially, conclusions about the increased risk for mental health problems in gay and lesbian people were drawn on the basis of research carried out in nonprobability samples. More recent, rigorously designed studies, using representative samples of the general population, led, however, to the same conclusions.<sup>1-3,8</sup> The association between sexual orientation and mental health has been demonstrated for certain conditions, including suicide attempts, eating disorders, substance-use disorders, panic attacks, depression, and anxiety disorders.<sup>1,2,5,9-12</sup>

Disparities in mental health in relation to sexual orientation are primarily understood as a consequence of so-called minority stress.<sup>3,13</sup> Minority stress involves a distal-proximal dimension, with stress resulting from objective, external events and conditions, the expectations of such events and the vigilance this expectation requires, the internalization of negative social attitudes, and the concealment of one's sexual orientation. Findings in samples of gay and lesbian men and women that experiences of stigma, prejudice, and discrimination were indeed related to mental health status support this model.<sup>13-20</sup>

Gay and lesbian people might also be at an increased risk for physical health problems for several reasons. First of all, just as positive emotional states may promote physical well-being,<sup>21</sup> mental health problems such as depression might negatively affect one's physical health via immune functioning.<sup>22-25</sup> Studies in other minority groups suggest that physical

**Objectives.** We sought to determine whether sexual orientation is related to mental and physical health and health behaviors in the general population.

**Methods.** Data was derived from a health interview survey that was part of the second Dutch National Survey of General Practice, carried out in 2001 among an all-age random sample of the population. Of the 19 685 persons invited to participate, 65% took part in the survey. Sexual orientation was assessed in persons aged 18 years and older and reported by 98.2% of 9684 participants. The respondents' characteristics are comparable with those of the Dutch general population.

**Results.** Gay/lesbian participants reported more acute mental health symptoms than heterosexual people and their general mental health also was poorer. Gay/lesbian people more frequently reported acute physical symptoms and chronic conditions than heterosexual people. Differences in smoking, alcohol use, and drug use were less prominent.

**Conclusions.** We found that sexual orientation was associated with mental as well as physical health. The causal processes responsible for these differences by sexual orientation need further exploration. (*Am J Public Health.* 2006;96:1119-1125. doi:10.2105/AJPH.2004.058891)

health problems could result from discrimination, independently from associated socioeconomic factors.<sup>26-28</sup> The most likely pathways for such negative effects in gay and lesbian persons are socially inflicted trauma and inadequate health care.<sup>29-32</sup> Differences in physical health might also result from various lifestyle factors. Alcohol use might be more encouraged in the gay community than among heterosexual people. The fact that lesbian women are less likely to bear children than heterosexual women might result in increased risk for breast cancer in lesbian women.

Little research has been done about physical health and sexual orientation, except for studies on sexually transmitted diseases, predominantly focusing on men.<sup>33</sup> Relationships have been demonstrated between anal intercourse and anal cancer in gay men.<sup>34-36</sup> Lesbian and bisexual women seem more likely than heterosexual women to report a diagnosis of heart disease.<sup>37</sup> One study found lesbians to be at an elevated risk for breast cancer<sup>38</sup> although another study found no such difference.<sup>36</sup> Use of tobacco products was significantly more frequent among gay and bi-

sexual men and women in several population-based studies.<sup>6,37,39-43</sup> The same differences were found for rates of alcohol use.<sup>37,41,44-46</sup> Some studies suggest that substance use in gay and lesbian populations is higher than in heterosexual populations.<sup>47-51</sup> Finally, there is evidence suggesting that obesity is more likely among lesbian women and less likely among gay men in comparison to their respective heterosexual counterparts.<sup>52</sup>

Even though research into sexual orientation and health has become more rigorous, various conceptual and methodological issues limit the solidity of our current knowledge.<sup>53</sup> Most studies, especially those on physical health and health behaviors, still use convenience samples, limiting the findings' generalizability.<sup>33</sup> Studies using population-based samples are usually not designed to investigate sexual orientation-related health differences, limiting the possibility to sort out underlying causes. Furthermore, because of small sample sizes, bisexual persons are usually included in gay/lesbian categories, even though studies suggest the importance of keeping them separate.<sup>5,54,55</sup> Because of the diverse ways in which sexual orientation is assessed, it is not

always clear what kind of people are grouped together in sexual minority categories, hindering an understanding of the established differences and an integration of the findings.

With this study, we aimed to assess in a representative general population sample whether there are indeed sexual orientation-related differences in physical health status and health behaviors, and to see whether there is additional support for differences in mental health. This study was conducted in the Netherlands, which has a social climate toward sexual minorities that is less intolerant than that in the United States, although homophobia still exists.<sup>32,56-58</sup> The Netherlands also has a lower prevalence of HIV compared with the United States.<sup>59</sup> Consequently, differences in health status in relation to sexual orientation might be smaller in the Netherlands than elsewhere.

## METHODS

### Sample

The data used for this study originate from the second Dutch National Survey of General Practice, carried out in 2001—a health interview survey in which an all-age random sample of the Dutch general population was invited to participate.<sup>60</sup> These people were randomly selected among 399 068 persons registered in the 104 participating general medical practices, regardless of their health status or doctor visit. Because virtually every noninstitutionalized Netherlands inhabitant is registered in a general medical practice, the total practice population is representative for the Dutch noninstitutionalized population.

Of the 19 685 invited persons, 12 699 participated (65% response). Nonresponse was attributable to refusals in two thirds of the cases. The respondents' characteristics are comparable with those of the original study population, and, therefore, the Dutch population, in terms of age, level of education, and type of health insurance (public vs private); however, migrants of non-Western origin were underrepresented because of their limited mastery of the Dutch language. The 90-minute interview took place at the persons' homes by a trained interviewer with help of a lap-top computer. Interviews took place over 12 months (December 2000 to December

2001), with random allocation of 25% of the sample to each quarter of the year.

### Measures

Sexual orientation was assessed in respondents aged 18 years and older with the question, "Would you please indicate your sexual preference? You only have to mention the number that stands in front of your answer on this card." The card listed the following 5 options: (1) women exclusively, (2) women predominantly, (3) both women and men, (4) men predominantly, and (5) men exclusively. "Preference" was used to avoid the more technical "orientation." Exclusive or predominant preference for same or other sex was categorized as gay/lesbian or heterosexual, respectively. Respondents with a preference for both women and men were categorized as bisexual.

Acute mental health problems were assessed by means of the General Health Questionnaire.<sup>61</sup> Responses were scored in binary format, resulting in values ranging from 0 to 12,<sup>62</sup> a high score indicating higher risk for serious psychopathology.

General mental and physical health were assessed with the 36-Item Short-Form Health Survey (SF-36),<sup>63</sup> designed as a generic indicator of health status for use in population surveys, with proven reliability and validity.<sup>64,65</sup> Responses to the SF-36 items were summarized in 2 sum scores according to standard procedures,<sup>65,66</sup> with higher scores indicating better general mental and physical health.

The experience of 37 acute physical symptoms during the preceding 14 days and the presence of 19 chronic conditions were assessed with a checklist. The acute physical symptoms included headache, sore throat, heartburn, and fever. Chronic conditions included diabetes, migraine, asthma, and high blood pressure. Total numbers of both acute physical symptoms and chronic conditions were calculated, as well as proportions of participants with 2 or more acute physical symptoms and 1 or more chronic conditions.

Several aspects of tobacco and alcohol use were assessed, including ever and current use, and frequency of use. In addition, use of soft and hard drugs was assessed. "Hard" and "soft" drugs refer to a distinction in Dutch law between type-1 drugs, such as heroin, co-

caine, and amphetamines, which involve an unacceptable risk ("hard"), and type-2 drugs, such as marijuana or hashish, which are considered to be less risky ("soft"). To assess body weight-related health risks and potential differences in eating disorders we calculated the Body Mass Index (BMI).

### Data Analysis

Bisexual and gay/lesbian participants were compared with heterosexual participants on age and sociodemographic variables using univariate analyses of variance (repeated-measures analysis of variance) with least-significant-difference post-hoc tests and  $\chi^2$  tests. Association of sexual orientation with health behaviors and outcomes were examined with multiple logistic regression models for dichotomous variables (e.g., drug use, having 1 or more chronic conditions), Poisson regression analyses for the count variables to account for overdispersion (total numbers of acute physical symptoms and chronic conditions), and multiple linear regression models for continuous variables (e.g., BMI, general mental health).

Two dummy variables were created for comparison purposes: bisexual versus rest (BIREST), and gay/lesbian versus rest (HOREST). We considered heterosexual participants as the reference group. Dummy variables were entered in the models with the potentially confounding variables of gender, age, level of education, and urbanicity. In the multiple logistic regression models, the coefficients for BIREST represent the logarithm of adjusted odds ratios between bisexual and heterosexual participants; in the multiple linear regression models, the regression coefficients for BIREST represent the mean difference of 2 groups (bisexual vs heterosexual) on the outcome variables, adjusted for potential confounders.

To test the interaction effects between sexual orientation and gender, we added the interaction terms (BIREST\*GENDER and HOREST\*GENDER) to the above models. The coefficients for BIREST\*GENDER in the logistic regression models represent the logarithm of the ratio of the 2 adjusted odds ratios, that is, the logarithm of adjusted odds ratio (bisexual vs heterosexual) for men divided by the adjusted odds ratios (bisexual vs heterosexual) for women. In the linear regression models, the interpretation of the regression coefficients for

BIREST\*GENDER becomes the difference of mean differences between 2 groups, i.e., the mean difference (bisexual-heterosexual) in an outcome variable for men minus the mean difference (bisexual-heterosexual) for women. Two-tailed *P*-values less than or equal to .05 were considered to reflect statistically significant differences in adjusted odds ratios, ratio of adjusted odds ratios, and nonstandardized regression coefficients.

**RESULTS**

Of all respondents aged 18 years and older (*n*=9684), 98.2% could be classified as heterosexual, bisexual, or gay/lesbian. Nonclassification was attributable to missing or inconsistent data. (Nonresponse to the question about sexual orientation was 0.8% and resulted primarily from not knowing the answer [46.7%] or a refusal to answer the question [18.7%]; the reason for nonresponse in the remaining cases is not clear. The mean age of participants who refused to answer the question was significantly lower than the mean age of those who answered the question [31.6 vs 48.9 years], and the mean age of

participants who answered "don't know" was significantly higher [58.7 years;  $F_{3, 9668} = 19.97$ ;  $P < .001$ ; all post-hoc comparisons  $P < .05$ ]. Nonresponse to the sexual orientation question was higher than that of other questions; nonresponse to the question about indications of sexually transmitted diseases was 0.3%, whereas most other questions had an even lower nonresponse. An additional 1.0% responded to the sexual orientation question in a way that was inconsistent with other variables in the data set and were therefore excluded from the analysis.)

Demographic characteristics for these 9511 participants are shown in Table 1. More than half of the participants were aged between 36 and 65 years, 3.3% were 81 years or older, and the oldest participant was aged 97 years; 55.5% of the sample was female. Of the 9511 participants, 0.9% (*n*=90) were categorized as bisexual and 1.5% (*n*=143) as gay/lesbian. A bisexual orientation was more frequent among women than men (1.2% and 0.6%, respectively;  $\chi^2 = 10.25$ ;  $P < .01$ ). Sexual orientation was related to age: bisexual participants were older than heterosexual participants. Substantially more heterosexual

than gay/lesbian or bisexual persons reported to be married and/or to be living with a steady partner. A larger proportion of bisexual or gay/lesbian participants were highly educated compared with heterosexual participants. Finally, bisexual and gay/lesbian persons were more likely to live in highly urbanized areas compared with heterosexual persons. Table 2 shows mean scores and proportions of health behaviors and outcomes by sexual orientation.

**Mental and Physical Health**

Acute mental health problems as measured with the General Health Questionnaire were more frequently reported by gay/lesbian than heterosexual people (Table 3). Compared with heterosexual people, gay and lesbian people also scored lower on the general mental health scale as measured by the SF-36, indicating poorer mental health.

Compared with heterosexual people, gay and lesbian people had experienced a higher total number of acute physical symptoms during the preceding 14 days (Table 3); the proportion of participants with 2 or more acute physical symptoms did not differ by sexual orientation (Table 4). Sexual orientation was also related to the prevalence of chronic conditions (Tables 3 and 4). Compared with heterosexual people, gay and lesbian people reported on average more chronic conditions and a larger proportion of gay/lesbian persons also reported 1 or more chronic conditions. A bisexual orientation was related to the prevalence of chronic conditions in men but not in women; bisexual men reported fewer chronic conditions compared with heterosexual men, and a smaller proportion of bisexual men reported 1 or more chronic conditions (Tables 3 and 4). Sexual orientation was not significantly associated with the overall physical health score as measured with the SF-36 (Table 3).

In those cases where we found significant effects of sexual orientation on physical health status, we explored which specific acute physical complaints or chronic conditions might be responsible for the overall differences. Compared with heterosexual participants, more gay/lesbian participants reported that they had experienced symptoms of nervousness and anxiety (adjusted odds ratio [AOR]=1.87;

**TABLE 1—Demographic Characteristics by Self-Reported Sexual Orientation**

	Heterosexual ( <i>n</i> =9278)	Bisexual ( <i>n</i> =90)	Gay/Lesbian ( <i>n</i> =143)	<i>F</i> or $\chi^2$
Gender				
Male, % ( <i>n</i> )	97.9 (4140)	0.6 <sup>a</sup> (25)	1.5 (64)	
Female, % ( <i>n</i> )	97.3 (5138)	1.2 <sup>b</sup> (65)	1.5 (79)	
Mean age, y (SD)	48.8 <sup>a</sup> (16.94)	54.52 <sup>b</sup> (19.58)	48.03 <sup>a</sup> (18.17)	5.21*
Lives with a steady partner, %	73.1 <sup>a</sup>	39.8 <sup>b</sup>	33.6 <sup>b</sup>	156.32**
Educational level, %				32.76**
Primary, basic vocational	35.2	32.2	29.6	
Lower secondary	36.3 <sup>a</sup>	28.9	24.6 <sup>b</sup>	
Higher secondary	7.5	7.8	7.0	
Higher professional, university	21.0 <sup>b</sup>	31.1 <sup>a</sup>	38.7 <sup>a</sup>	
Urbanicity, %				61.24**
Lowest	18.8	21.1	12.6 <sup>b</sup>	
Lower	26.2	12.2 <sup>b</sup>	16.1 <sup>b</sup>	
Medium	20.3	11.1 <sup>b</sup>	15.4	
Higher	18.9 <sup>b</sup>	28.9 <sup>a</sup>	21.7	
Highest	15.9 <sup>b</sup>	26.7 <sup>a</sup>	34.3 <sup>a</sup>	

Notes. SD = standard deviation. Mean scores with different superscripts differ significantly from each other.

<sup>a</sup>Proportions are lower than expected.

<sup>b</sup>Proportions are higher than expected.

\**P* = .01; \*\**P* = .001.

**TABLE 2—Health Behavior and Outcomes by Self-Reported Sexual Orientation: Means (SD) and Proportions**

	Heterosexual (n = 9265)	Bisexual (n = 90)	Gay/Lesbian (n = 143)
Acute mental health problems <sup>a</sup>	1.16 (2.25)	1.46 (2.35)	2.06 (3.045)
General mental health <sup>b</sup>	53.53 (8.64)	52.17 (9.72)	49.17 (11.08)
Total acute physical symptoms	4.34 (3.87)	4.72 (4.91)	5.33 (4.90)
Two or more acute physical complaints, %	75.3	71.1	80.4
Total chronic conditions	1.45 (1.63)	1.86 (2.06)	1.73 (1.87)
At least 1 chronic condition, %	65.1	65.6	75.5
General physical health <sup>c</sup>	49.45 (9.88)	48.20 (10.28)	48.17 (10.70)
Currently smoking, %	30.9	27.8	38.5
Currently using alcohol, %	80.1	70.0	74.1
Soft drug use, ever, %	6.7	14.4	9.1
Hard drug <sup>d</sup> use, ever, %	2.1	4.4	2.8
Body mass index	25.19 (4.23)	24.72 (3.86)	24.54 (4.25)

<sup>a</sup>General Health Questionnaire.<sup>b</sup>General mental health score on the 36-Item Short-Form Health Survey.<sup>c</sup>General physical health score on the 36-Item Short-Form Health Survey.<sup>d</sup>Such as heroin, cocaine, amphetamines, or ecstasy.**TABLE 3—Multiple Linear Regression Analysis of Self-Reported Sexual Orientation on Health Behaviors and Outcomes: Nonstandardized Regression Coefficients b (SE)<sup>a</sup>**

	Main Effects		Interaction With Gender	
	Bisexual <sup>b</sup>	Gay/Lesbian <sup>b</sup>	Bisexuality	Homosexuality
Acute mental health problems <sup>c</sup>	0.242 (0.238)	0.796*** (0.190)	-0.475 (0.531)	0.476 (0.383)
General mental health <sup>d</sup>	-0.976 (0.916)	-3.982*** (0.729)	-0.094 (2.052)	-0.178 (1.467)
Total acute physical symptoms <sup>e</sup>	0.014 (0.106)	0.175* (0.077)	-0.221 (0.248)	0.147 (0.155)
Total chronic conditions <sup>e</sup>	0.077 (0.116)	0.181* (0.085)	-0.848** (0.309)	0.212 (0.178)
General physical health <sup>f</sup>	-0.221 (1.005)	-1.389 (0.799)	-2.074 (2.249)	0.204 (1.608)
Body mass index	-0.523 (0.441)	-0.342 (0.354)	-0.140 (0.987)	0.066 (0.711)

<sup>a</sup>After control for gender, age, education, and urbanicity.<sup>b</sup>Reference group is heterosexual participants.<sup>c</sup>General Health Questionnaire.<sup>d</sup>General mental health scale on the 36-Item Short-Form Health Survey.<sup>e</sup>Differences were tested with Poisson regression analysis to account for overdispersion.<sup>f</sup>General physical health score on the 36-Item Short-Form Health Survey.\**P* = .05; \*\**P* = .01; \*\*\**P* = .001.

95% confidence interval [CI]=1.30, 2.70), respiratory problems (AOR=1.98; 95% CI=1.25, 3.14), itching (AOR=1.81; 95% CI=1.14, 2.87), and pain in neck or shoulders (AOR=1.51; 95% CI=1.06, 2.16). Regarding the 19 chronic conditions, gay and lesbian people, compared with heterosexual people, more frequently reported to suffer from dizziness followed by falling (AOR=2.06; 95% CI=1.09, 3.89) and symptoms of osteoarthritis in the hip or knee (AOR=1.69; 95% CI=1.06, 2.69).

Serious intestinal problems were also more frequently reported by gay/lesbian than by heterosexual people (AOR=2.27; 95% CI=1.21, 4.29) and especially by gay men (ratio of AORs=4.33; 95% CI=1.22, 15.39). Compared with heterosexual men, gay men also more frequently reported migraine or severe headache (ratio of AORs=2.26; 95% CI=1.02, 5.01) and urinary incontinence (ratio of AORs=8.66; 95% CI=1.78, 42.22). An exploration of the 19 chronic conditions did not

show any statistically significant differences between bisexual and heterosexual men.

Because emotional instability might lead to more reporting of physical problems,<sup>67</sup> the poorer physical health in gay/lesbian and bisexual populations might be an artifact. To check this, we ran the same analyses while controlling for mental health status by including the General Health Questionnaire score in the analyses. With this control, we found that the proportion of gay/lesbian persons with 1 or more chronic conditions remained significantly larger than the proportion of heterosexual persons. The effect of gay/lesbian orientation on the total numbers of acute physical complaints and chronic conditions disappeared. All effects of a bisexual orientation remained statistically significant.

### Health Behaviors

Sexual orientation was not significantly related to current cigarette smoking (Table 4) or ever having smoked, in either men or women. Among current smokers, the percentage of daily smokers did not differ significantly between heterosexual, bisexual, and gay/lesbian men and women, nor did the average number of cigarettes current smokers smoked daily.

Alcohol use was, however, related to sexual orientation. A smaller proportion of gay and lesbian men and women were currently using alcohol compared with heterosexual participants (Table 4). The proportion of participants that had ever used alcohol was also smaller in gay/lesbian than in heterosexual participants (AOR=1.75; 95% CI=1.12, 2.74). Among current alcohol users, gay/lesbian participants were more likely than heterosexual participants to report alcohol use during the week (AOR=1.87; 95% CI=1.17, 2.99), and having had more than 5 alcoholic drinks on 1 day in the preceding 6 months (AOR=1.72; 95% CI=1.09, 2.70); the latter was more strongly the case for lesbian women than for gay men (ratio of AORs=0.36; 95% CI=0.15, 0.86). Among current alcohol users, bisexual participants reported a higher number of alcoholic drinks per day than heterosexual participants (*b*=0.339, *SE*=0.171, *P*<.05). A significant interaction effect of sexual orientation (gay/lesbian vs heterosexual) and gender (*b*=2.789; *SE*=1.217; *P*<.05) indicated that gay men started using alcohol at a later age

**TABLE 4—Multiple Logistic Regression Analysis of Health Behaviors and Outcomes by Self-Reported Sexual Orientation<sup>a</sup>**

	Main Effects, AOR (95% CI)		Interaction With Gender, Ratio of AORs (95% CI)	
	Bisexual <sup>b</sup>	Gay/Lesbian <sup>b</sup>	Bisexuality	Homosexuality
Two or more acute physical symptoms	0.69 (0.43, 1.10)	1.23 (0.81, 1.88)	0.81 (0.45, 1.47)	1.03 (0.58, 1.85)
One or more chronic conditions	0.78 (0.49, 1.23)	1.82** (1.22, 2.72)	0.26* (0.09, 0.73)	1.01 (0.45, 2.24)
Currently smoking	1.07 (0.66, 1.72)	1.40 (0.98, 2.00)	0.95 (0.34, 2.68)	0.95 (0.47, 1.94)
Currently using alcohol	0.64 (0.40, 1.02)	0.61* (0.41, 0.90)	0.65 (0.22, 1.91)	0.67 (0.30, 1.53)
Soft drug use, ever	3.06*** (1.61, 5.82)	1.07 (0.59, 1.96)	0.28 (0.05, 1.43)	3.60 (0.74, 17.56)
Hard drug <sup>c</sup> use, ever	2.70 (0.96, 7.58)	1.19 (0.43, 3.29)	0.70 (0.07, 7.39)	... <sup>d</sup>

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

<sup>a</sup>After control for gender, age, education, and urbanicity.

<sup>b</sup>Reference group is heterosexual participants.

<sup>c</sup>Such as heroin, cocaine, amphetamines, or ecstasy.

<sup>d</sup>Could not be calculated.

\* $P = .05$ ; \*\* $P = .01$ ; \*\*\* $P = .001$ .

than heterosexual men but there was no such difference for women.

Only 1 type of drug use was significantly related to sexual orientation. Compared with heterosexual people, bisexual people were more likely to have used soft drugs (currently or ever). The use of hard drugs was not related to sexual orientation (Table 3). Sexual orientation was not significantly associated with BMI (Table 3); the proportion of overweight participants (BMI > 25) also did not differ by sexual orientation. (Because an interaction effect was expected for BMI specifically, we ran separate analyses for men and women; in both cases differences were not significant.)

## DISCUSSION

In this study, we found several differences in physical health in relation to sexual orientation, in addition to differences in mental health. The pattern of differences varied dependent upon the respondent's gender, his or her bisexual or gay/lesbian orientation, and the specific health aspect. In general, though, self-reported physical and mental health problems are systematically higher in the gay/lesbian group and, to somewhat lesser extent, the bisexual group. Gay and lesbian people reported more acute mental health symptoms than heterosexual people and their general

mental health also was worse. Gay/lesbian people also more frequently reported acute physical symptoms and chronic conditions than heterosexual people. Differences in physical health were partly explained by the higher prevalence of mental health problems among gay/lesbian people.

Differences in health behaviors were less systematic. Smoking behavior did not differ in relation to sexual orientation. Overall, gay and lesbian persons were less likely to currently use alcohol than heterosexual people. Among alcohol users, bisexual and gay/lesbian people were found to drink more than heterosexual people. Gay men, on average, started using alcohol at a later age than heterosexual men. There were no differences regarding substance use. Obesity was not related to sexual orientation, suggesting that gay/lesbian and bisexual people are not at greater risk than heterosexual people for obesity-related health problems.

Interpretation of the findings is limited by various factors. The samples of bisexual and gay/lesbian persons were relatively small, limiting power to detect group differences and especially interaction effects of sexual orientation and gender. Another limitation concerns the assessment of sexual orientation. The interpretation of the specific question might differ between age cohorts. It is unclear what

the report of a bisexual or homosexual preference actually means in the lives of these people; for instance, reporting a homosexual preference does not necessarily mean engaging in homosexual activity or self-identification as lesbian or gay. Future studies should include measures of attraction, behavior, and self-identification.<sup>68</sup> If time limitations don't allow this, a follow-up question should be asked to identify "false positives" among those categorized as a sexual minority. Finally, all findings are on the basis of self-report, and because there exist individual differences in self-assessed health,<sup>67</sup> we cannot exclude the possibility that these self-reports are to some extent affected by sexual orientation. Objective assessments of physical health could have resulted in a different and more accurate picture.

These limitations are counterbalanced by some strong characteristics of the study. First of all, instead of a convenience sample, this study employed a representative sample of the Dutch population. Second, the absolute numbers of gay/lesbian and bisexual people were high enough to treat them as separate groups in the analyses. Furthermore, not only mental health, but also physical health and health behaviors were addressed, and aspects of health behaviors, such as alcohol use, were assessed with multiple questions. Compared with others, this study found a relatively large proportion of bisexual people, which is a consequence of assessing sexual orientation in terms of attraction instead of behavior. People who, because of their behavior, are usually classified as gay or lesbian do not necessarily have exclusive or predominant same-sex attraction.

Differences in demographic characteristics between the gay/lesbian and the heterosexual groups, such as higher levels of education and fewer people in steady relationships among the gay/lesbian respondents, are in line with what other studies have reported.<sup>69,70</sup> Differences in health status do not seem to be the consequence of differential prevalences of HIV infection. In the total sample only 2 gay men and 1 heterosexual woman reported to be HIV-infected; these numbers are in line with what would be expected given the population prevalence.

Our study confirmed the finding that sexual orientation is related to mental health,

but also suggests that gay/lesbian orientation is a risk factor for poorer physical health.

The health of gay/lesbian people seems to be more at risk than the health of bisexual people, both in comparison to heterosexual people. Contrary to what other studies suggested,<sup>37,41-46</sup> there were no prominent differences in health behaviors on the basis of sexual orientation. We found no differences in rates of tobacco use, and alcohol use was even lower among gay/lesbian persons compared with heterosexual persons. The respondents' BMI, indicative of obesity-related health problems, did not differ on the basis of sexual orientation, unlike what is reported for studies using US samples.<sup>52</sup> It is quite possible that assessment of more specific problems, such as body image or eating disorders would have resulted in differences. The absence of differences in health behaviors might result from a social climate in the Netherlands that is comparatively more accepting of sexual minorities<sup>56,57</sup> or different social norms regarding use of tobacco, alcohol, or drugs within the Dutch gay community in comparison with gay communities in the United States.

Like in most other recent studies, it was not possible to test potential causes of the observed health disparities. Our findings suggest that health behaviors are an unlikely cause. Further studies should look at various potential causes, such as discrimination, lifestyle factors, and social integration, and health outcomes specifically linked to such causes. With cross-national studies, the consequences of general differences in acceptance of sexual minority status on health disparities could be explored. ■

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#### Contributors

T.G.M. Sandfort was primarily responsible for originating this study, analyzing the data, and writing this article. F. Bakker supported the data analysis and

collaborated with F.G. Schellevis and I. Vanwesenbeeck on interpreting the results and writing the article.

#### Human Participation Protection

Because no intervention was involved, Dutch law did not require informed consent from participants. However, a privacy regulation was established in accordance with Dutch privacy legislation and approved by the Dutch Data Protection Agency. Approval for the data analysis and report writing phases of the study was obtained from the institutional review board of the New York State Psychiatric Institute.

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#### References

- Sandfort TGM, de Graaf R, Bijl RV, Schnabel P. Same-sex sexual behavior and psychiatric disorders: findings from the Netherlands Mental Health Survey and Incidence Study (NEMESIS). *Arch Gen Psychiatry*. 2001;58:85-91.
- Cochran SD, Mays VM, Sullivan JG. Prevalence of mental disorders, psychological distress, and mental services use among lesbian, gay, and bisexual adults in the United States. *J Consult Clin Psychol*. 2003;71:53-61.
- Meyer IH. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: conceptual issues and research evidence. *Psychol Bull*. 2003;129:674-697.
- Mills TC, Paul J, Stall R, et al. Distress and depression in men who have sex with men: The Urban Men's Health Study. *Am J Psychiatry*. 2004;161:278-285.
- Jorm AF, Korten AE, Rodgers B, Jacomb PA, Christensen H. Sexual orientation and mental health: Results from a community survey of young and middle-aged adults. *Br J Psychiatry*. 2002;180:423-427.
- Diamant AL, Wold C. Sexual orientation and variation in physical and mental health status among women. *J Womens Health (Larchmt)*. 2003;12:41-49.
- Stall R, Mills TC, Williamson I, et al. Association of co-occurring psychosocial health problems and increased vulnerability to HIV/AIDS among urban men who have sex with men. *Am J Public Health*. 2003;93:939-942.
- Bailey JM. Homosexuality and mental illness. *Arch Gen Psychiatry*. 1999;56:883-884.
- Paul JP, Catania J, Pollack L, et al. Suicide attempts

among gay and bisexual men: lifetime prevalence and antecedents. *Am J Public Health*. 2002;92:1338-1345.

- Wichstrom L, Hegna K. Sexual orientation and suicide attempt: a longitudinal study of the general Norwegian adolescent population. *J Abnorm Psychol*. 2003;112:144-151.
- French SA, Story M, Remafedi G, Resnick MD, Blum RW. Sexual orientation and prevalence of body dissatisfaction and eating disordered behaviors: a population-based study of adolescents. *Int J Eat Disord*. 1996;19:119-126.
- Russell CJ, Keel PK. Homosexuality as a specific risk factor for eating disorders in men. *Int J Eat Disord*. 2002;31:300-306.
- Brooks V. *Minority Stress and Lesbian Women*. Lexington, Mass: Lexington Books; 1981.
- Frable DE, Wortman C, Joseph J. Predicting self-esteem, well-being, and distress in a cohort of gay men: the importance of cultural stigma, personal visibility, community networks, and positive identity. *J Pers*. 1997;65:599-624.
- Meyer IH. Minority stress and mental health in gay men. *J Health Soc Behav*. 1995;36:38-56.
- Herek GM, Gillis JR, Cogan JC. Psychological sequelae of hate-crime victimization among lesbian, gay, and bisexual adults. *J Consult Clin Psychol*. 1999;67:945-951.
- Bradford J, Ryan C, Rothblum ED. National Lesbian Health Care Survey: implications for mental health care. *J Consult Clin Psychol*. 1994;62:228-242.
- Ross MW. The relationship between life events and mental health in homosexual men. *J Clin Psychol*. 1990;46:402-411.
- Meyer IH, Dean L. Internalized homophobia, intimacy, and sexual behavior among gay and bisexual men. In: Herek GM, ed. *Stigma and Sexual Orientation: Understanding Prejudice Against Lesbians, Gay Men, and Bisexuals. Psychological Perspectives on Lesbian and Gay Issues*. Vol 4. Thousand Oaks, Calif: Sage Publications; 1998:160-186.
- Waldo CR, Hesson-McInnis MS, D'Augelli AR. Antecedents and consequences of victimization of lesbian, gay, and bisexual young people: A structural model comparing rural university and urban samples. *Am J Community Psychol*. 1998;26:307-334.
- Salovey P, Rothman AJ, Detweiler JB, Steward WT. Emotional states and physical health. *Am Psychol*. 2000;55:110-121.
- Goodkin K, Visser AP. *Psychoneuroimmunology: Stress, Mental Disorders, and Health*. Vol 59. Washington, DC: American Psychiatric Publishing; 2000.
- Pennebaker JW. Emotion, disclosure, and health: An overview. In: Pennebaker JW, ed. *Emotion, Disclosure, & Health*. Washington, DC: American Psychological Association; 1995:3-10.
- Kubzansky LD, Kawachi I. Affective states and health. In: Berkman LF, Kawachi I, eds. *Social Epidemiology*. New York, NY: Oxford University Press; 2000:213-241.
- Carney RM, Freedland KE. Depression and medical illness. In: Berkman LF, Kawachi I, eds. *Social Epidemiology*. New York, NY: Oxford University Press; 2000:191-212.
- Wyatt SB, Williams DR, Calvin R, Henderson FC,

- Walker ER, Winters K. Racism and cardiovascular disease in African Americans. *Am J Med Sci*. 2003;325:315–331.
27. Williams DR, Neighbors H. Racism, discrimination and hypertension: evidence and needed research. *Ethn Dis*. 2001;11:800–816.
28. Karlsen S, Nazroo JY. Relation between racial discrimination, social class, and health among ethnic minority groups. *Am J Public Health*. 2002;92:624–631.
29. Krieger N, Sidney S. Prevalence and health implications of anti-gay discrimination: a study of black and white women and men in the CARDIA cohort. Coronary Artery Risk Development in Young Adults. *Int J Health Serv*. 1997;27:157–176.
30. Krieger N. Discrimination and health. In: Berkman LF, Kawachi I, eds. *Social Epidemiology*. New York, NY: Oxford University Press; 2000:36–75.
31. Stevens PE. Lesbian health care research: a review of the literature from 1970 to 1990. *Health Care Women Int*. 1992;13:91–120.
32. Sandfort TGM, Bos H, Vet R. Lesbians and gay men at work: consequences of being out. In: Omoto AM, Kurtzman HS, eds. *Sexual Orientation and Mental Health: Examining Identity and Development in Lesbian, Gay, and Bisexual People*. Washington, DC: American Psychological Association; 2006:225–244.
33. Boehmer U. Twenty years of public health research: inclusion of lesbian, gay, bisexual, and transgender populations. *Am J Public Health*. 2002;92:1125–1130.
34. Daling JR, Weiss NS, Hislop TG, et al. Sexual practices, sexually transmitted diseases, and the incidence of anal cancer. *N Engl J Med*. 1987;317:973–977.
35. Daling JR, Weiss NS, Klopfenstein LL, Cochran LE, Chow WH, Daifuku R. Correlates of homosexual behavior and the incidence of anal cancer. *JAMA*. 1982;247:1988–1990.
36. Frisch M, Smith E, Grulich A, Johansen C. Cancer in a population-based cohort of men and women in registered homosexual partnerships. *Am J Epidemiol*. 2003;157:966–972.
37. Diamant AL, Wold C, Spritzer K, Gelberg L. Health behaviors, health status, and access to and use of health care: a population-based study of lesbian, bisexual, and heterosexual women. *Arch Fam Med*. 2000;9:1043–1051.
38. Kavanaugh-Lynch MHE, White E, Daling JR, Bowen DJ. Correlates of lesbian sexual orientation and the risk of breast cancer. *J Gay Lesbian Med Assoc*. 2002;6:91–95.
39. Hughes TL, Jacobson KM. Sexual orientation and women's smoking. *Curr Womens Health Rep*. 2003;3:254–261.
40. Ryan H, Wortley PM, Easton A, Pederson L, Greenwood G. Smoking among lesbians, gays, and bisexuals: a review of the literature. *Am J Prev Med*. 2001;21:142–149.
41. Valanis BG, Bowen DJ, Bassford T, Whitlock E, Charney P, Carter RA. Sexual orientation and health: comparisons in the women's health initiative sample. *Arch Fam Med*. 2000;9:843–853.
42. Greenwood GL, Paul JP, Pollack LM, et al. Tobacco use and cessation among a household-based sample of US urban men who have sex with men. *Am J Public Health*. 2005;95:145–151.
43. Tang H, Greenwood GL, Cowling DW, Lloyd JC, Roeseler AG, Bal DG. Cigarette smoking among lesbians, gays, and bisexuals: how serious a problem? (United States). *Cancer Causes Control*. 2004;15:797–803.
44. Cochran SD, Keenan C, Schober C, Mays VM. Estimates of alcohol use and clinical treatment needs among homosexually active men and women in the US population. *J Consult Clin Psychol*. 2000;68:1062–1071.
45. Hughes TL, Eliason M. Substance use and abuse in lesbian, gay, bisexual and transgender populations. *J Primary Prev*. 2002;22:263–298.
46. Stall R, Paul JP, Greenwood G, et al. Alcohol use, drug use and alcohol-related problems among men who have sex with men: the Urban Men's Health Study. *Addiction*. 2001;96:1589–1601.
47. Clutterbuck DJ, Gorman D, McMillan A, Lewis R, Macintyre CC. Substance use and unsafe sex amongst homosexual men in Edinburgh. *AIDS Care*. 2001;13:527–535.
48. Halkitis PN, Parsons JT. Recreational drug use and HIV-risk sexual behavior among men frequenting gay social venues. *J Gay Lesbian Soc Serv*. 2002;14(4):19–38.
49. Boyd CJ, McCabe SE, d'Arcy H. Ecstasy use among college undergraduates: gender, race and sexual identity. *J Subst Abuse Treat*. 2003;24:209–215.
50. Noell JW, Ochs LM. Relationship of sexual orientation to substance use, suicidal ideation, suicide attempts, and other factors in a population of homeless adolescents. *J Adolesc Health*. 2001;29:31–36.
51. Orenstein A. Substance use among gay and lesbian adolescents. *J Homosex*. 2001;41:1–15.
52. Carpenter C. Sexual orientation and body weight: Evidence from multiple surveys. *Gender Issues*. 2003;21(3):60–74.
53. Soltz AL, ed. *Lesbian Health. Current Assessment and Direction for the Future*. Washington, DC: National Academy Press; 1999.
54. Udry JR, Chantala K. Risk assessment of adolescents with same-sex relationships. *J Adolesc Health*. 2002;31:84–92.
55. Dodge B, Sandfort TGM. Mental health among bisexual individuals when compared to homosexual and heterosexual individuals: an introductory review. In: Firestein BA, ed. *The Handbook of Counseling and Psychotherapy With Bisexual Clients*. New York, NY: Columbia University Press; In press.
56. Van den Akker P, Halman L, De Moor R. Primary relations in Western societies. In: Ester P, Halman L, De Moor R, eds. *The Individualizing Society: Value Change in Europe and North America*. Tilburg, Netherlands: Tilburg University Press; 1994:97–127.
57. Widmer ED, Treas J, Newcomb R. Attitudes toward nonmarital sex in 24 countries. *J Sex Res*. 1998;35:349–358.
58. De Graaf H, Sandfort TGM. *De Maatschappelijke Positie van Homoseksuele Mannen en Lesbische Vrouwen [The Societal Position of Gay Men and Lesbian Women]*. Delft, Netherlands: Eburon; 2000.
59. Joint United Nations Programme on HIV/AIDS. *2004 Report on the Global HIV/AIDS Epidemic: 4th Global Report*. Geneva, Switzerland: Joint United Nations Programme on HIV/AIDS; 2004.
60. Westert GP, Schellevis FG, de Bakker DH, Groenewegen PP, Bensing JM, van der Zee J. Monitoring health inequalities through general practice: The Second Dutch National Survey of General Practice. *Eur J Public Health*. 2005;15:59–65.
61. Goldberg DP, Hillier VF. A scaled version of the General Health Questionnaire. *Psychol Med*. 1979;9:139–145.
62. Adlaf EM, Gliksman L, Demers A, Newton-Taylor B. The prevalence of elevated psychological distress among Canadian undergraduates: findings from the 1998 Canadian Campus Survey. *J Am Coll Health*. 2001;50:67–72.
63. Ware JE Jr, Sherbourne CD. The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. *Med Care*. 1992;30:473–483.
64. McDowell I, Newell C. *Measuring Health: A Guide to Rating Scales and Questionnaires*. 2nd ed, rev ed. New York, NY: Oxford University Press; 1996.
65. Ware JE Jr, Kosinski M, Bayliss MS, McHorney CA, Rogers WH, Raczek A. Comparison of methods for the scoring and statistical analysis of SF-36 health profile and summary measures: summary of results from the Medical Outcomes Study. *Med Care*. 1995;33(4 suppl):AS264–AS279.
66. Jenkinson C, Layte R, Lawrence K. Development and testing of the Medical Outcomes Study 36-Item Short Form Health Survey summary scale scores in the United Kingdom. Results from a large-scale survey and a clinical trial. *Med Care*. 1997;35:410–416.
67. William PG, Wiebe DJ. Individual differences in self-assessed health: gender, neuroticism and physical symptom reports. *Pers Individual Differences*. 2000;28:823–832.
68. Sell RL. Defining and measuring sexual orientation: a review. *Arch Sex Behav*. 1997;26:643–658.
69. Laumann EO, Gagnon JH, Michael RT, Michaels S. *The Social Organization of Sexuality: Sexual Practices in the United States*. Chicago, Ill: University of Chicago Press; 1994.
70. Sandfort TGM. Homosexual and bisexual behavior in European countries. In: Hubert MC, Bajos N, Sandfort TGM, eds. *Sexual Behaviour and HIV/AIDS in Europe*. London, England: University College London Press; 1998:68–105.

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