2009

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## Original Publication Citation

Mansyur, C. L., Amick, B. C., Harrist, R. B., Franzini, L., & Roberts, R. E. (2009). The cultural production of health inequalities: A cross-sectional, multilevel examination of 52 Countries. *International Journal of Health Services, 39*(2), 301-319. doi: 10.2190/HS.39.2.e

*Political and Cultural Contexts of Health Inequalities: International Surveys*

# THE CULTURAL PRODUCTION OF HEALTH INEQUALITIES: A CROSS-SECTIONAL, MULTILEVEL EXAMINATION OF 52 COUNTRIES

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In a 2001 report, the U.S. National Institutes of Health called for more integration of the social sciences into health-related research, including research guided by theories and methods that take social and cultural systems into consideration. Based on a theoretical framework that integrates Hofstede's cultural dimensions with sociological theory, the authors used multilevel modeling to explore the association of culture with structural inequality and health disparities. Their results support the idea that cultural dimensions and social structure, along with economic development, may account for much of the cross-national variation in the distribution of health inequalities. Sensitivity tests also suggest that an interaction between culture and social structure may confound the relationship between income inequality and health. It is necessary to identify important cultural and social structural characteristics before we can achieve an understanding of the complex, dynamic systems that affect health, and develop culturally sensitive interventions and policies. This study takes a step toward identifying some of the relevant cultural and structural influences. More research is needed to explore the pathways leading from the sociocultural environment to health inequalities.

In a 2001 report, the U.S. National Institutes of Health called for more integration of the social sciences into health-related research. The report described a new perspective targeting "social and cultural systems as units of analysis" (1, p. 2) to better understand the social environments in which individuals are embedded and

International Journal of Health Services, Volume 39, Number 2, Pages 301–319, 2009

doi: 10.2190/HS.39.2.e
http://baywood.com

that influence their perceptions and behaviors. It is now becoming recognized that culture plays an essential role in shaping the social context of structural inequality and health disparities (1–3). Accordingly, some have suggested that cultural differences should be included in cross-national studies of health inequalities (1, 3–5), but as yet there has been no systematic attempt to do so.

Many empirical analyses of the relationship between inequality and health have relied on variables measuring the distribution of income within societies (6–8), without considering whether cultural differences could lead to different types of social institutions associated with both income inequality and health. This has led to a lack of consensus on whether social inequality is consistently associated with health inequality cross-nationally and suggests that any relationship found between income inequality and health may be indirect, or possibly spurious. If there was a systematic way to measure cultural variation across societies, it might be possible to assess whether or not specific cultural characteristics are associated with differences in the distribution of both social and health inequalities (5). There is, in fact, a large body of cultural psychology literature that measures cultural values cross-nationally (9–13). These measures of culture could be incorporated into cross-national epidemiological comparisons.

Cultural psychologists have used cross-national surveys to collect information about values and beliefs worldwide and to classify societies and communities according to cultural differences. Using this approach, Hofstede (11) presented empirical evidence that identifiable cultural dimensions exist at the national level (12–14). Hofstede defined cultural dimensions as distinct aspects "of societal norms consisting of the value systems (the mental software) shared by major groups in the population" (11, p. 11) that can be used to classify and compare societies. Hofstede identified four cultural dimensions cross-nationally:

- *Power distance:* The level of acceptance of interpersonal distinctions based on traditional norms of social status, rank, and power.
- *Uncertainty avoidance:* The intensity of intolerance for uncertainty about the future that is related to anxiety and the need for security.
- *Masculinity:* The degree to which achievement through aggression and competition is valued over enhancement of relationships through nurturance and cooperation.
- *Individualism:* The extent to which individual autonomy takes precedence over kinship and other group ties.

We should point out that cultural dimensions represent dominant value systems at the ecological level. They are not valid measures of cultural diversity at the individual level (11). Whether or not they share such values, individuals within societies do tend to be influenced by the cultural programming represented by these value systems. We have developed a theoretical framework that integrates

the cultural dimensions with sociological theory to explain the cultural, social, and economic processes affecting structural inequalities and health disparities at multiple levels (15). Our theoretical model includes hypothetical pathways leading from culture to health directly and indirectly through intervening economic and social processes. Because the model is complex, different components will be tested and refined in further studies carried out over time. The purpose of the study described in this article is to systematically investigate the overall utility of the cultural dimensions in accounting for variation in health inequalities cross-nationally. To start, we tested the hypothesis that health is a function of socioeconomic status (SES), economic development, and several cultural dimensions: uncertainty avoidance, individualism, power distance, and masculinity. We expected that some of the cultural dimensions would be associated with health inequalities, but made no a priori predictions about the nature of these relationships.

Our theoretical framework followed House's recommendation (16) to distinguish between culture and social structure, emphasizing the importance of both to the social context of health inequalities. According to House (16, p. 542):

> A *culture* is a set of cognitive and evaluative beliefs—beliefs about what is or what ought to be—that are shared by the members of a social system and transmitted to new members. A social structure is a *persisting* and bounded *pattern* of social relationships (or pattern of behavioral interaction) among the units (that is, persons or positions) in a social system. Culture and social structure are closely related—shared values and beliefs shape the definition of social positions and the relations between them (that is, the social structure), whereas the nature of actual social relationships, even if these are primarily responses to physical or biological imperatives, influences our values and beliefs.

It would be informative to compare health in different subgroups of countries based on key cultural and social structural characteristics. Prior research has suggested that the *individualist* versus *collectivist* dichotomy is the most important cultural division cross-nationally (10, 12, 13). The dichotomy is created by splitting the individualism dimension into opposite poles: "individualist" for high individualism, "collectivist" for low individualism. Individualist societies are those in which individual autonomy is highly valued and self-actualization is perceived as the principal source of well-being; collectivist societies are characterized by an emphasis on group goals, and group ties are perceived to give life meaning. Although most of the countries of the world are collectivist, many northern European countries and their offshoots (e.g., United States, Canada, and Australia) tend to be individualist (11). Much of the cultural psychology literature has compared societal differences in terms of the different types of cognitions associated with each that can lead to cross-cultural misunderstandings (11, 13). For example, in individualist societies, social processes and behaviors

are typically framed in terms of self-sufficiency and personal choices, while in collectivist societies they are typically framed in terms of social relations and obligations.

Our framework discussed a second dichotomy, *vertical* and *horizontal*, which, according to the literature, may be important in differentiating societies' overall social structures (15). This dichotomy represents a major divergence in social structure, or pattern of social stratification, that links culture to society-specific social institutions, such as type of political system. Vertical social structures are associated with institutionalized inequality and horizontal social structures are associated with egalitarianism. Elsewhere (15) we have suggested that there may be differences in the way vertical social structures manifest themselves in individualist or collectivist societies. Vertical-collectivist societies tend to have entrenched hierarchies based on traditions of ascribed status and rank (17). Conversely, in vertical-individualist societies, inequality is believed to result from differences in personal achievement and there is an "acceptance of unequal distributions of rewards" based on merit (18, p. 11). Combining these dichotomies is one way to represent the intersection between social structure and cultural features of societies and to partition them into subgroups. The Appendix (p. 317) lists subgroups of countries belonging to each of the four combinations: vertical-individualist, horizontal-individualist, horizontal-collectivist, and vertical-collectivist. We tested the sensitivity of our model to changes in subgroup in order to explore the relative importance of culture and social structure to the production of health inequalities. We expected that there would be variation in results among the subgroups, indicating that both culture and social structure should be considered in future models.

## METHODS

### *Data Sources*

We used cross-sectional data from three sources: the World Development Indicators Online database (WDI) (19), Hofstede's cultural dimension indices (11), and the World Values Surveys (WVS) (20, 21). Detailed information on data collection methods and quality from these sources is provided elsewhere (11, 19, 21, 22).

Both country- and individual-level data were used. Hofstede's indices and the WDI are publicly available in aggregated form and were combined for the country-level data. The WVS was used for individual-level variables. The WVS uses survey responses collected from adult citizens, 18 and older, cross-nationally to compare values on several different topics. Four waves have been collected to date. We combined the most recent three waves (1990–2000) because some of the items to be used in the analysis were not included in all country samples in all waves.

The World Bank's economic indicators are routinely collected from government sources in the participating countries (23). Recent data are generally of better quality than older published indicators, so we used the online database (19) to obtain 1990 gross national product (GNP) per capita in international dollars (PPP; purchasing power parity).

The sample Hofstede used to create his cultural dimension indices included IBM employees in 64 countries from 1967 to 1973. Sixteen additional countries were included in his 2001 book (11), classified from data collected in the 1980s. The time lag between Hofstede's data and the other data we are using is consistent with the assumption that the cultural dimensions should precede all other variables. All IBM employees were included, thus the sample was comparable across countries. The survey was repeatedly administered during the time period, allowing reliability testing. Although it is possible that this type of sample may be unrepresentative of country populations, Hofstede and others later validated the findings in other types of samples (11).

*Sample*

The sample included 108,966 respondents from 52 countries for which none of the relevant data were missing.

*Dependent Variable*

The dependent variable, self-rated health (SRH), is based on the response to the WVS question: "All in all, how would you describe your state of health these days?" The response categories form a 5-point Likert scale, with values: 1 = very good; 2 = good; 3 = fair; 4 = poor; and 5 = very poor. We reversed the coding of the responses so that the higher the value, the better the subjective rating of health. SRH has been commonly used as a measure of health in the literature. An instrument's validity can be established by determining the extent to which its results are consistent with other relevant evidence. Numerous longitudinal studies have validated SRH as a surrogate for more objective health measures (24, 25) and in predicting mortality (26, 27).

*Independent Variables*

Independent variables and descriptive statistics are shown in Table 1.

*Individual-Level Variables*

Socioeconomic status was the predictor variable at the individual level. We measured SES by income group (INC), because this was the only SES-related variable available in the WVS data for all countries that was comparable

Table 1

Descriptive statistics for variables used in the model

| | N | Range | Mean | S.D. |
|---|---|---|---|---|
| *Individual level*[a] | | | | |
| Self-rated health | 108,966 | 1–5 | 3.8 | 0.9 |
| Income group | 108,966 | 1–10 | 4.7 | 2.4 |
| Age | 108,966 | 15–97 | 40.6 | 15.8 |
| Gender | | | | |
| 1 = male | 54,735 | N.A. | N.A. | N.A. |
| 0 = female | 54,231 | N.A. | N.A. | N.A. |
| *Country level* | | | | |
| GNP per capita 1990 in $PPP[b] | 52 | $620–$25,580 | $9,818.46 | $7,152.40 |
| Power distance (PDI)[c] | 52 | 11–104 | 58.8 | 21.2 |
| Uncertainty avoidance (UAI)[c] | 52 | 23–104 | 67.1 | 21.4 |
| Masculinity (MAS)[c] | 52 | 5–110 | 50.2 | 20.7 |
| Individualism (IND)[c] | 52 | 12–91 | 47.5 | 23.8 |
| Life expectancy at birth 1990[b] | 52 | 47.5–78.8 | 70.3 | 6.7 |
| Infant mortality rate 1990[b] | 52 | 4.6–120 | 29.1 | 29.4 |
| Under-5 mortality rate 1990[b] | 52 | 6.4–230 | 39.9 | 46.6 |

*Sources*: [a]European and World Values Survey Waves II through IV combined (20, 21). [b]World Development Indicators Online (19), 1990. [c]Hofstede's cultural dimension indices (11).

cross-nationally. Measures of education were available, but these were inconsistent across countries and could not be used. Income group was measured by responses to the WVS question: "Here is a scale of incomes. We would like to know in what group your household is, counting all wages, salaries, pensions and other incomes that come in. Just give the letter of the group your household falls into, before taxes and other deductions." Responses formed a 10-point Likert scale with scale items ranging from 1 (lowest) to 10 (highest). Age and gender were both significantly correlated with self-rated health ($p < .01$) and could potentially confound any observed relationships if they were not included.

*Country-Level Variables*

Gross national income per capita (GNP) in 1990, converted to international dollars (PPP) by the World Bank, ranged in the sample from $620 to $25,580 PPP dollar equivalents. We divided the GNP by 1,000 so that it would be measured in units

closer to the other variables used in the model. Hofstede's cultural dimensions: individualism (IND), power distance (PDI), uncertainty avoidance (UAI), and masculinity (MAS) are index scores; the methods Hofstede used for their calculation are described elsewhere (11). GNP and the cultural dimension indices were retained as continuous variables.

Implicit in the meaning of self-rated health is comparison to a reference group, raising questions about whether respondents might be using different reference groups, especially cross-nationally. For example, respondents might rate their health in comparison to others of their age group or gender. At the societal level, health might be compared to overall life expectancy or mortality rates. We obtained life expectancy, infant mortality, and under-5 mortality data from the World Bank online indicators (19) for 1990 in order to test this. Life expectancy was measured by life expectancy at birth in total number of years. Infant mortality was measured by the infant mortality rate per 1,000 live births, and under-5 mortality by the mortality rate for children under the age of 5 (per 1,000).

As discussed earlier, the literature suggests that the most important cultural and structural distinctions are between the individualist/collectivist and vertical/horizontal dichotomies, respectively. Both dichotomies are derived from specific cultural dimensions (3, 10, 13, 15, 17). The individualist/collectivist dichotomy was created from Hofstede's individualism (IND) dimension following Gudykunst, Ting-Toomey, and Chua (10). Countries scoring above 51 were classified as individualist, and those scoring 51 or below as collectivist.

Social structure is closely related to culture, and the vertical/horizontal dichotomy was constructed from two of Hofstede's cultural dimensions, as we proposed elsewhere (15). We theorized that in collectivist countries verticality was associated with power distance (PDI), but that in individualist countries it was associated with masculinity (MAS). This is because PDI tends to be lower in individualist societies, and those with higher levels of inequality seem to be higher in MAS characteristics such as aggression and competition. Therefore, in collectivist countries, those scoring above the median for PDI were classified as vertical, and those at or below the median as horizontal. Individualist countries scoring above the median for MAS were classified as vertical, and those below as horizontal. Table 2 illustrates the relationships.

In this way, four subgroups—vertical-collectivist, horizontal-collectivist, vertical-individualist, and horizontal-individualist—were created based on cross-classification of collectivism with power distance and individualism with masculinity. Countries and sample size in each subgroup are shown in the Appendix.

*Statistical Methods*

Due to the hierarchical structure of the data, multilevel statistical models were used to test the hypothesis that health is a function of SES, GNP, and the cultural dimensions: uncertainty avoidance, individualism, power distance, and

Table 2

Cross-classification of the cultural dimensions used to construct the four subgroups of countries: vertical-individualist, horizontal-individualist, vertical-collectivist, and horizontal-collectivist

| | High individualism | Low individualism |
|---|---|---|
| High masculinity | Vertical-individualist | |
| Low masculinity | Horizontal-individualist | |
| High power distance | | Vertical-collectivist |
| Low power distance | | Horizontal-collectivist |

masculinity. Level 1 of the data structure was the individual respondent and level 2 was the country, and this structure was reflected in the statistical models. All multilevel analyses were carried out using MLwiN 2.02 (28). Non-dummy independent variables were grand mean centered. Because the distribution of responses to SRH approached normality in many countries and there was no sign of heteroskedasticity in the residuals (29), we followed the method we used elsewhere (3) of treating health as a continuous variable in order to retain all the information available from the five ordered categories (30). This was not possible to do in an ordered category response model because the computer resources required in this large sample were prohibitive. We also fitted a logistic model, but the results were less meaningful and not substantially different.

We fitted a series of six increasingly complex multilevel models. In each model, the intercepts for the different countries were assumed to be random at level 2. Model 1 was an intercept-only model and was used to calculate the intraclass correlation coefficient (ICC) to determine how much of the variance in self-rated health was due to differences between countries. Model 2 was a covariates-only model used to establish a comparison basis with the subsequent models. Model 3 included the level-1 variables only. Model 4 was the full model with random intercept and fixed slopes originally used to test the hypothesis. Model 5 and Model 6 were extensions to the original model. Model 5 was the same as Model 4, except that the income slopes were allowed to be random at level 2. Model 6 added cross-level interactions between income and the level-2 predictors.

In comparing Model 3 (level-1 variables only) to the full model, Model 4, the null hypothesis of "no effect" was rejected if a likelihood ratio chi-square test showed a significant decrease in deviance. The fitted models were examined by conducting Wald tests of the estimated parameters. Sensitivity tests were carried out by fitting the sequence of models in the following subgroups: vertical-individualist, vertical-collectivist, horizontal-individualist, and horizontal-collectivist. The results were then compared with those in the full sample.

## RESULTS

Table 3 presents the results of fitting the models. The intraclass correlation coefficient (ICC) of 0.114 indicated that about 11 percent of the variance in self-rated health (SRH) was due to differences between countries. The deviance (–2*loglikelihood) decreased significantly ($p < .01$) from Model 3 to Model 4, allowing us to reject the null hypothesis that income, GNP, and the cultural dimensions had no effect on SRH. Model 5 demonstrated that introducing income slopes as a random effect significantly improved the fit ($p < .01$). Higher income (INC) was associated with better SRH ($p < .01$). Only two level-2 predictor variables, uncertainty avoidance (UAI) and power distance (PDI), were significant ($p < .01$) in predicting SRH in Model 5. Both had negative coefficients, indicating that as each increased, SRH decreased. The remaining predictors were not significantly related to SRH.

Model 6 describes cross-level interaction effects and improved the fit over Model 5 ($p < .05$). Because Model 6 represents a more complete depiction of the complex pathways involved in the cultural production of health inequalities, we emphasized this model when examining all effects. Three cross-level interactions, those between income and uncertainty avoidance (UAI*Income), power distance (PDI*Income), and GNP (GNP*Income), were found to have small but significant effects when fitting Model 6. The UAI*Income interaction causes average predicted SRH to decrease at a steeper rate for lower-income individuals as UAI increases. The PDI*Income interaction causes average predicted SRH to decrease at a steeper rate for higher-income individuals as PDI increases. The GNP*Income interaction causes average predicted SRH to increase at a steeper rate for lower-income individuals as GNP increases.

We refitted Model 6 three times, once for each of the life expectancy and mortality controls. None of the three substantially changed the beta coefficients from the predictors in the original model. Only infant mortality significantly improved the model fit ($p < .05$).

A preliminary analysis indicated that there were differences in mean SRH and its distribution among the subgroups based on individualist/collectivist and vertical/horizontal cross-classifications. Mean SRH had the largest range in vertical-individualist societies, overlapping with all three of the other subgroups. Mean SRH in the horizontal-individualist subgroup was at the highest end of the range, while mean SRH in horizontal-collectivist and vertical-collectivist subgroups overlapped with the middle of the vertical-individualist range. Because Estonia and Russia were outliers in their respective subgroups, we excluded these two countries from the sensitivity tests.

The results for the subgroups did seem to indicate that the effects of the cultural dimensions on SRH varied by subgroup. For the most part, the effects of the fitted model in the vertical-individualist subgroup were similar to the effects found in the full sample. The difference between this subgroup and the

Table 3

Parameter coefficients (standard errors in parentheses) of fitted multilevel models examining income, gross national product (GNP), and cultural dimensions—individualism (IND), uncertainty avoidance (UAI), masculinity (MAS), and power distance (PDI)—as predictors of self-rated health for 108,966 respondents in 52 countries

| Variable | Model 1[a] (intercept only) | Model 2 (covariates only) | Model 3 (level 1 only) | Model 4 (full model: random intercept, fixed slopes) | Model 5 (full model: random intercept, random income slopes) | Model 6 (cross-level interactions) |
|---|---|---|---|---|---|---|
| Intercept | 3.7791 (0.0430)** | 3.7318 (0.0422)** | 3.7258 (0.0396)** | 3.7111 (0.0307)** | 3.7168 (0.0311)** | 3.7158 (0.0306)** |
| Age | | –0.0155 (0.0002)** | –0.0143 (0.0002)** | –0.0143 (0.0002)** | –0.0142 (0.0002)** | –0.0142 (0.0002)** |
| Male | | 0.1189 (0.0050)** | 0.1057 (0.0050)** | 0.1058 (0.0050)** | 0.1053 (0.0050)** | 0.1053 (0.0050)** |
| Income | | | 0.0524 (0.0011)** | 0.0523 (0.0011)** | 0.0562 (0.0036)** | 0.0563 (0.0033)** |
| GNP[b] | | | | 0.0113 (0.0081) | 0.0054 (0.0077) | 0.0118 (0.0080) |
| IND | | | | –0.0027 (0.0025) | –0.0022 (0.0023) | –0.0027 (0.0024) |
| UAI | | | | –0.0058 (0.0016)** | –0.0047 (0.0015)** | –0.0058 (0.0016)** |
| MAS | | | | –0.0009 (0.0016) | –0.0012 (0.0015) | –0.0008 (0.0016) |
| PDI | | | | –0.0042 (0.0022) | –0.0057 (0.0021)** | –0.0040 (0.0022) |
| IND*Income | | | | | | 0.0002 (0.0003) |
| UAI*Income | | | | | | 0.0004 (0.0002)* |
| MAS*Income | | | | | | –0.0002 (0.0002) |
| PDI*Income | | | | | | –0.0006 (0.0002)* |
| GNP[b]*Income | | | | | | –0.0021 (0.0009)* |
| –2*loglikelihood | 277,028.9 | 268,109.0 | 265,818.3 | 265,791.3 | 265,581.3 | 265,569.8 |
| Chi-square | | 8919.9** (*df* = 2) | 2290.7** (*df* = 1) | 27** (*df* = 5) | 210** (*df* = 1) | 11.5* (*df* = 5) |

[a] Intraclass correlation coefficient = 0.114

*b* 1990 GNP per capita in thousands of international dollars (PPP).

*$p < .05$ (2-tail); **$p < .01$ (2-tail).

full sample was that MAS had a significant negative coefficient. This indicates that SRH tends to be higher in vertical-individualist countries scoring lower in masculinity.

In the horizontal-individualist subgroup, there was no additional level-2 variance once level-2 variables were included in the fitted models. However, the level-2 sample size was small (6 countries), and a preliminary analysis had indicated that there might be some multi-collinearity among the level-2 predictors in this particular group.

The effects in the collectivist subgroups were direct only, but they varied in the two groups. In the vertical-collectivist group, higher MAS and lower PDI were associated with better SRH. In the horizontal-collectivist group, the relationship between GNP and SRH was reversed: higher GNP was associated with poorer SRH.

## DISCUSSION

This study supports the idea that cultural dimensions and social structure, along with economic development, may account for much of the cross-national variation in the distribution of health inequalities. Our findings confirm that self-rated health tends to be worse for lower-income individuals, but also suggest that a cultural context of higher uncertainty avoidance or higher power distance may be associated with lower SRH, regardless of income. In addition, UAI, PDI, and GNP all seem to moderate the relationship between individual income and health, raising important questions about the role of cultural context in shaping health inequalities. We introduce these questions in the next few paragraphs as we discuss specific findings.

It seems that, in most countries, GNP per capita is not associated with SRH directly when the cultural dimensions are included in the model, but retains an indirect effect by interacting with income. The interaction indicates that there is more of an improvement in average predicted SRH for lower-income individuals than for higher-income individuals as country wealth increases. This raises the questions of whether culture confounds the association of GNP with health or mediates it and which cultural dimensions are important. A preliminary analysis had indicated that PDI and IND were both associated with GNP; PDI had a negative correlation with GNP and IND a positive one, which is consistent with the literature (11, 13). Future research should examine the nature of the interrelationships among these cultural dimensions, economic development, and health.

Of the cultural dimensions, two, UAI and PDI, interacted with income. Higher UAI is associated with more of a decrease in average SRH for lower-income respondents than for higher-income respondents. In this way, higher UAI seems to exaggerate health disparities. This was an unexpected finding, raising the question of why UAI would moderate the relationship between income and health.

Hofstede (11) characterized high-UAI societies as those that are more authoritarian. In such societies there tend to be higher overall levels of stress and anxiety about the future. Because of this, rules and rituals are strongly enforced in order to achieve a sense of control. Many of the formerly communist countries have high UAI, and the average SRH in these countries also tends to be lower. Hofstede found a strong negative correlation between UAI and health (rho = –.75), attributing this relationship to the anxiety component in uncertainty avoidance (31). The relationships we found between UAI and SRH would seem to support his findings, especially for lower-income respondents. It stands to reason that, because they have less control over their lives, members of lower income groups would consistently be more anxious or stressed than those of higher income groups, especially in higher UAI societies where a sense of control is more valued. This finding reveals an additional line of research that should be pursued to refine the model.

By way of contrast, the interaction found between PDI and income indicates that a cultural context of higher PDI is associated with more of a decrease in SRH for higher income groups. In this way, higher PDI seems to lessen health disparities. As stated before, higher PDI is more often found in collectivist societies and is typically associated with inequality in these societies. Most individualist countries have a much lower score for this particular cultural dimension (11). Even horizontal-collectivist societies tend to have higher PDI than most individualist countries. This may be an indication that the interaction is associated with larger health disparities in individualist countries. Sensitivity tests indicated that this does seem to be the case in vertical-individualist countries. This raises a question of why lower PDI would be associated with health disparities in vertical-individualist societies—a matter that should be pursued in future research.

Our results suggest that culture can produce health inequalities. The cultural production of health inequality can operate both directly and indirectly, in interactions with income, for uncertainty avoidance and power distance. Thus, both UAI and PDI moderate the effect of income on health. GNP also moderates the effect of income on health, even though there was no direct effect when all countries were included in the sample. The implication is that in most countries, economic development may not affect health directly when controlling for cultural factors.

There was no evidence to support a direct effect of IND, PDI, or MAS on health when all countries were included in the sample. However, different direct and indirect relationships with SRH could be identified when both culture and social structure were taken into consideration by dividing societies into the four subgroups of vertical-individualist, horizontal-individualist, vertical-collectivist, and horizontal-collectivist. GNP is significantly associated with SRH in the expected direction in vertical-individualist societies only. Interestingly enough, the direct effect of income on SRH loses its significance in this subgroup. It is

possible that these results could be due to the fact that the poorer countries in this subgroup have a history of communism. The WVS data were collected during the 1990s, a transitional period in which other studies found average SRH to be lower in communist countries (32, 33). As mentioned above, countries with a history of communism also tend to be higher in UAI, which seems to be the cultural dimension that is most consistently related to poorer SRH in individualist countries.

One of the more interesting direct effects found in the subgroups is that of MAS on SRH. In vertical-individualist countries, the higher the MAS the worse the average SRH; in vertical-collectivist countries, the higher the MAS the better the average SRH. This suggests that an interaction between culture and social structure may confound the relationship between income inequality and health. Perhaps this is one reason that studies have not generally found a strong relationship at the societal level between income inequality and mortality in the horizontal-individualist Scandinavian countries, but have found such a relationship in the vertical-individualist United States and United Kingdom (34, 35). Future research should examine the possible interrelationships among culture, social structure, and standard measures of societal-level income inequality.

It is paradoxical that higher MAS is associated with better SRH in vertical-collectivist societies. Apparently, there may be some health benefit to a society that values aggression and competition, if it also places more importance on group ties and cooperation than on individual autonomy and self-reliance. In collectivist societies, life is organized around "in-groups," which are usually kin-based, but can be based on other criteria such as ethnic group, community, or organization (11, 13). When they are kin-based, in-groups are based on large, extended family networks. "Relationships with in-groups are intensive and interdependence is high in collectivist cultures, whereas there is more detachment, distance, and self-reliance in individualist cultures" (36, p. 325). Perhaps the support of the group enhances overall well-being, leading to a spirit of solidarity or camaraderie when competition for survival and advantage is between groups rather than between individuals. With the correspondingly high levels of inequality found in vertical-collectivist societies, this could be the effect of a form of "team spirit" as a social norm.

Triandis (13, 36) proposed that health should be better in collectivist societies, all other things (such as societal wealth) being equal, despite higher levels of inequality. He theorized that this would be due to the emphasis on "collective coping" found in collectivist societies, causing higher levels of social cohesion and "making it easier for the individual to cope with unpleasant life events" (36, p. 327). Our results suggest that higher levels of inequality are associated with poorer health in vertical-collectivist societies as well as in vertical-individualist societies, regardless of GNP. This might initially seem to refute Triandis. However, given the previously described association of MAS with SRH in vertical-collectivist societies, perhaps the social cohesion Triandis associates with collectivist

societies manifests itself in vertical-collectivist societies through group-based "team spirit" at lower levels of analysis.

In horizontal-collectivist societies, the only level-2 variable associated with health is GNP, and in a direction opposite to that expected. The three wealthiest countries in this subgroup have lower average SRH than the other horizontal-collectivist countries. Of these, two (Spain and Portugal) are among those that Navarro and Shi (37) classified as ex-fascist. It is possible that lower average SRH in these two countries could be due to historical factors related to political instability, just as in the former communist countries. Indeed, Triandis (13) implied that political instability could lead to poorer health in collectivist societies despite higher levels of social cohesion, while Hofstede (11) noted that countries in the middle of the range for PDI tended to have more unstable governments. However, the third country in this subgroup, Japan, not only has a stable government, but has the lowest mortality rates and highest life expectancy of the 52 countries in our sample. While it is possible that the lower average SRH in this country was due to random error, it is more likely to be an example of a response bias that is language or culturally based. This is one of the reasons that the results should be interpreted with caution.

As exemplified by the example of Japan, a potential limitation of this study is the use of self-rated health as the primary outcome. We used SRH because it was the only health-related variable available at the individual level in the data. Although it has been validated in many studies (25, 27), some authors (38–40) have cautioned that systematic cross-cultural differences in meaning may be attached to the different response items for SRH or there may be response biases that are culturally based. The studies uncovering these issues, however, have typically been of minority ethnic populations within single countries, and acculturation may have been a confounder. Few studies have been carried out in non-Western or developing societies that examined its validity, but those that did also found SRH to be a good predictor of morbidity or mortality (24, 27, 41). Nevertheless, the potential limitation remains that there may be systematic differences in meaning attributed to SRH response items in different languages or reporting biases that are culturally based. These same issues of differences in meaning or culture-related reporting biases could apply to the subjective income scale as well. For example, there might be a cultural tendency for individuals in some countries to either understate or exaggerate their status relative to others, and their responses would reflect this.

Another possibility is that respondents in different countries were using different reference groups when rating health. However, we controlled for age and gender, and none of the three health controls—life expectancy, infant mortality, and under-5 mortality—substantially changed the results of the fitted multilevel model. It seems likely that these types of reference groups, at least, are unlikely to cause systematic bias in the results. Among the remaining limitations of this study is its cross-sectional nature; only a longitudinal study can determine cause and effect.

Among the strengths of our study are the large number of countries included in the sample and the use of theory to categorize these countries into different subgroups based on important cultural and social structural characteristics. Social institutions associated with population health, such as Navarro's political system classifications (37), seem to correspond with these subgroups. For example, most of the social democratic countries are horizontal-individualist, all of the liberal countries are vertical-individualist, all of the conservative or ex-fascist countries are horizontal-collectivist, and the Christian democratic countries are a mixture of vertical- and horizontal-individualist. Politicians typically "translate the values dominant in their countries into political priorities" (11, p. 317). Political systems and other social institutions thus reflect both culture and social structure. Social institutions, in turn, act as mediators on the pathways leading to material conditions, which themselves are intermediary between distal and more proximal determinants of health, such as SES, psychosocial, and behavioral factors (15).

## CONCLUSION

Regardless of the limitations, this study has demonstrated the importance of taking culture into consideration when studying the social environment in which health is embedded. Despite the importance of identifying the relevant cultural and structural factors, little is known about the cultural determinants of health. Furthermore, it is often difficult to identify the distinctive aspects of one's own cultural biases that may not be shared in other societies. For example, epidemiological research has typically been carried out from a Western, individualist perspective that, because of the strong Western belief in the importance of individuals being able to control their own destiny, assumes that risk factors are controllable at the individual level (42, 43). These types of assumptions seem to presuppose that risk factors operate in a vacuum. Not only can such assumptions lead to misleading findings that interfere with the long-term success of interventions, but they can also perpetuate health disparities (42, 43). Globalization and increasing diversity within societies can also cause unrecognized cultural differences, leading to ineffective interventions or unanticipated problems resulting from policy decisions. Moreover, certain cultural characteristics in various types of communities may provide some resilience to adversity and stress. If these could be identified, it might be possible to design more effective policies and interventions that build on community strengths.

In short, it is necessary to identify important cultural and structural variables before we can achieve an understanding of the complex, dynamic systems that affect health and develop culturally sensitive interventions and policies. Together, culture and social structures form systems of collective values and institutionalized norms that may interact with material conditions, SES, adversity, and social identity, either to aggravate or to mitigate the subjective experience of stress

(15, 42) and ensuing biological responses. A recent World Health Organization report on the social determinants of health noted that social context "encompasses a broad set of structural, cultural and functional aspects of a social system whose impact on individuals tends to elude quantification but which exert a powerful formative influence on patterns of social stratification and thus on people's health opportunities" (44, p. 21). Our study has taken a step toward identifying some of the relevant cultural and structural influences. More research is needed to explore the pathways leading from the sociocultural environment to health inequalities.

*Acknowledgments* — This research was supported in part by the 2006–2007 Ronald J. Lorimor Memorial Scholarship in Behavioral Sciences at the University of Texas Health Science Center at Houston School of Public Health, received by Mansyur. An earlier version of this manuscript was submitted to the University of Texas Health Science Center at Houston School of Public Health as part of Mansyur's doctoral dissertation.

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*References continue on p. 318*

APPENDIX
Country subgroup classifications and sample size of each

| *Horizontal-Individualist* | | *Horizontal-Collectivist* | |
|---|---|---|---|
| Denmark | 896 | Argentina | 2,900 |
| Estonia | 1,938 | Chile | 3,549 |
| Finland | 1,483 | Iran | 2,209 |
| France | 823 | Japan | 2,968 |
| Netherlands | 789 | Korea, Rep. | 2,430 |
| Norway | 2,076 | Pakistan | 2,603 |
| Sweden | 1,767 | Portugal | 1,121 |
| Total | 9,772 | Spain | 5,151 |
| | | Uruguay | 927 |
| | | Total | 23,858 |
| *Vertical-Individualist* | | *Vertical-Collectivist* | |
| Australia | 1,775 | Bangladesh | 2,995 |
| Austria | 1,395 | Brazil | 2,777 |
| Belgium | 1,695 | Bulgaria | 942 |
| Canada | 3,164 | China | 3,427 |
| Czech Republic | 925 | Croatia | 1,172 |
| Germany | 2,745 | Egypt | 2,676 |
| Hungary | 981 | El Salvador | 1,048 |
| Ireland | 892 | Ghana | 45 |
| Italy | 1,411 | India | 5,860 |
| New Zealand | 1,076 | Indonesia | 886 |
| Poland | 1,977 | Mexico | 3,867 |
| Slovak Republic | 462 | Morocco | 1,385 |
| Switzerland | 2,064 | Nigeria | 4,936 |
| United Kingdom | 1,099 | Peru | 2,514 |
| United States | 4,127 | Philippines | 1,192 |
| Total | 25,788 | Romania | 1,100 |
| | | Russia | 3,583 |
| | | Slovenia | 1,019 |
| | | Turkey | 6,009 |
| | | Venezuela | 1,144 |
| | | Vietnam | 971 |
| | | Total | 49,548 |

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