THE SOCIOECONOMIC GRADIENT IN HEALTH:

A CROSS-NATIONAL VARIABLE*

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ABSTRACT

The existence of social inequalities in health outcomes is well established in social science research. One strand of research focuses on inequalities in health within a single country. A separate and newer strand of research focuses on the relationship between aggregate inequality and population health across countries. Despite the theorization of (presumably variable) social conditions as "fundamental causes" of health (Link and Phelan 1995), the cross-national literature has focused on population health as the central outcome. Controversies currently surround macro-structural determinants of overall population health such as income inequality (Wilkinson 1996), the welfare state (Conley and Springer 2001), and economic development (Firebaugh and Beck 1994). We argue that these debates would be advanced by conceptualizing inequalities <u>in</u> health as cross-national variables that are sensitive to social conditions. Using data from the third wave of the World Values Survey, we examine cross-national variation in inequalities in health. The results reveal dramatic <u>variation in variations</u> in health according to income and education. We conclude by discussing the policy implications of significant cross-national variability in the socioeconomic gradient.

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INTRODUCTION

The inverse association between socioeconomic status (SES) and health is a central finding from much research on the social determinants of health (House 2002; Kitagawa and Hauser 1973; Mirowsky and Ross 2003; Schnittker and McLeod 2005; Williams 1990; Williams and Collins 1995). The "fundamental causes" approach takes this finding as a point of departure, and develops the argument that SES itself is a fundamental cause of disease (Link and Phelan 1995) that works through multiple mechanisms (Lutfey and Freese 2005). While the fundamental cause perspective has renewed interest in inequalities in health, a parallel movement highlights the relationship between inequality and health by shifting the focus to the macrosociological level of analysis and arguing that the level of income inequality within a society is inversely associated with the population health of that society (Wilkinson 1996).

What has gone largely missing as research has turned toward more sophisticated examination of individual-level inequalities in health (e.g., Schnittker 2004; Warren 2004) and debates over national-level income inequality and population health (cf. Beckfield 2004; Wilkinson and Pickett 2006) is attention to the "social conditions" (Link and Phelan 1995) that may shape the relationship between SES and health. Implicit in the fundamental causes perspective is the idea that the SES gradient in health should be sensitive to broader social conditions. This idea has critical policy implications, because public policy may be part of the complex of social conditions that can shift the gradient.

This idea also highlights the importance of a new direction for cross-national research at the intersection of medical sociology and comparative political economy. Too little empirical attention has been devoted to cross-national variation in individual-level health inequalities across societies. Equally important is to extend such research to understand how these inequalities interact with the local context. Relative inattention to these issues is not caused by lack of interest, especially given that the biggest health divide in the world today is between developed and developing nations (World Health Organization 1985). What has hampered researchers interested in health inequalities within nations in a comparative perspective has been the lack of suitable individual-level data (Lahelma 2001; Townsend and Davidson 1982). Consequently, with the prominent and laudable exception of the EU Working Group on Socioeconomic Inequalities in Health and others (Bobak et al. 2000; Kunst and Mackenbach 1994; Kunst et al. 1998; Mackenbach and Kunst 1997; Mackenbach et al. 1997; Marmot and Bobak 2000; Van Doorslaer et al. 1997), relatively few researchers have generated systematic and comparable cross-national information on the relative degree of inequality in health, especially for countries outside the advanced industrialized "first world" (Braveman and Tarimo 2002; Decker and Remler 2004).

In this paper, we take the next step toward understanding the macrostructural social conditions that shape the association between SES and health. Specifically, we use data from the World Values Survey (WVS) to examine the relationship between socioeconomic status and self-assessed health for a very diverse group of 38 countries that participated in the 1995 wave of the WVS.[1] The paper proceeds in three steps. First,

[1] The 3rd wave of the WVS is referred to as the 1995 data, although data collection in some countries extended into 1996 and 1997. In this paper, we refer to the dataset as the 1995 wave of the WVS.

we review the literature on the relationship between inequality and health, with specific attention to the two strands of research we extend. Second, we use ordinal logistic regression models to evaluate the effects of socioeconomic status (income and education) on self assessed health in the 38 societies. Based on that analysis, we then present four indices illustrating the relationship: the health disadvantage of low income, the health advantage of high income, the health disadvantage of low education, and finally the health advantage of high income. Finally, we discuss the implications of cross-national work on health inequalities for health research and health policy.

INEQUALITY IN HEALTH VS. INEQUALITY AND HEALTH

Much recent work in medical sociology grounded in social epidemiology aims to understand which risk factors lead to unequal health outcomes. This body of work convincingly establishes that disadvantaged individuals in the U.S. have worse health than those with more advantageous position (Adler et al. 1994; Mirowsky and Ross 2003; Ross and Bird 1994; Ross and Mirowsky 1995; Ross and Wu 1995, 1996; Schnittker 2004; Williams 1990; Williams and Collins 1995; Williams et al. 1997). Single-society studies in other nations, for example the United Kingdom and Finland, reach similar conclusions (Davey Smith et al. 1990; Lahelma, Rahkonen and Huuhka 1997; Macintyre 1997; Townsend and Davidson 1982). While much of this research focuses on individual risk-factors as proximate causes of disease, Link and Phelan (1995) call attention to how broader contextual factors contribute to continued inequalities in health. Other researchers concur, although the attention has mostly been on how inequalities created by capitalist systems lead to unequal health outcomes (McKeown 1979; Navarro 1976;

Ruggie 1996). Our research speaks to this concern, by exploring inequalities in health across national contexts, yet our research agenda broadens the notion of capitalist systems to include both the multiple varieties of capitalism (Hall and Soskice 2001), and non-capitalist countries (Lahelma 2001).

A related, but largely separate, body of work focuses on the relationship between inequality and health at the aggregate level. This research examines the relationship both across states in the U.S. (Kaplan et al. 1996; Kennedy, Kawachi, and Prothrow-Stith 1996) and across nations (Wilkinson 1996). While most of the research uses aggregate measures, such as life expectancy or infant mortality, more recent research within this tradition explores contextual effects of income inequality on subjective health outcomes in the U.S. Using data from all 50 U.S. states, Kennedy et al. (1999) show that income inequality affected self-rated health. Even more importantly, their results indicate that the effect of macro-level inequality depends on the micro-level context: the effect of income inequality is significant only for those in lower and middle income groups.

Drawing from the above insight and responding to the increased emphasis on research that simultaneously evaluates inequalities within and between countries (Beckfield 2004; Lahelma 2001), this paper takes the first step toward a new research agenda: contextualizing the effects of individual socioeconomic status on health in a comparative framework. Speaking to key issues in the comparative study of health inequalities, our research highlights the importance of considering inequalities in health across various national contexts in an effort to begin to understand how such inequalities are shaped by both the socioeconomic status of the individual and the broader context in which he or she lives.

MEASURING SOCIAL STRATIFICATION ACROSS SOCIETIES

All comparative research faces the challenge of making measures comparable across national context. We follow others by viewing social stratification as a reflection of different positions of individuals in the social structure (Liberatos et al. 1988; Krieger, Williams, and Moss 1997). The key components of such stratification are traditionally measured by occupation, employment status, income, and education (Lahelma 2001; Krieger et al. 1997). While all research on stratification in health emphasizes some form of hierarchy, there is disagreement about the condition under which inequality matters. Some argue that each and every level matters, that is being one level above another is inherently beneficial for health. Others take a more absolute view, focusing on crucial poverty lines and diminishing returns (Najman 1993; Warr 1987).

Income and education are our main stratification measures of interest. Income indicates the material resources individuals possess, while education captures social status more broadly, reflecting both material and non-material resources (Lahelma 2001). Further, it has been suggested that education is more comparable across countries than occupation (Valkonen 1989). The huge variation in the economic development of the nations in our study, as well as other dimensions of cross-national variation, make it difficult to measure education and income in absolute terms. Instead we argue that the most meaningful measure is how individuals compare in terms of income and education to other individuals in their society. This measure allows for a cross-national comparison of the effects of relative position within the system of stratification. We argue that

relative measures of income and education best reflect national context and are most useful in making meaningful cross-national comparisons.

DATA, MEASURES, AND METHODS

Data

The World Values Survey (WVS) includes a wide range of societies, making it ideal for an exploration of cross-national variation in health inequalities. The original purpose of the WVS was to compare societies in terms of general attitudes and values (e.g., Inglehart and Baker 2000), but the dataset also offers researchers interested in multiple topics, including health, a unique opportunity to examine cross-national differences. Five waves of the WVS have been or are being conducted (1981, 1990, 1995, 1990-2001, and 2005-2006). The number of countries included in the survey has grown from 24 to 76 during those 25 years. Together, the WVS includes samples drawn from over 75% of the world's population. We use data from the third wave of the WVS (1995) instead of the more recent fourth wave because many of the European surveys in the fourth wave did not include our key variable of interest, self-assessment of health.

Measures

Self-assessed health is used as a dependent variable in our analysis. Self-assessed health has been established as a valid indicator of overall health that predicts mortality (Davies and Ware 1981; House 1981; Idler and Benyamini 1997; Idler, Hudson, and Leventhal 1999; Schnittker 2004). Further, this variable has been recommended as

suitable for comparative research by the World Health Organization (de Bruin 1996). Survey respondents were asked: "All in all, how would you describe your state of health these days? Would you say it is...." and the response categories were "very good," "good," "fair," "poor," and "very poor." We recoded the original variable so that higher values indicate better reported health.

Income is measured at the household level, since it more accurately captures available resources than individual income (Lahelma 2001). The original income measure in the WVS is a 10-category ordinal variable, but to enhance the cross-national comparability of income and avoid the scale differences in this measure across countries, we create three dummy variables. Specifically, we classify respondents as "relative low income" if their income falls into the bottom quartile of the income distribution, as "relative high income" if it falls into the top quartile of the distribution, and as "relative middle income" if it falls between these extremes. In the models, "relative middle income" is the reference category.

Education is also measured with three relative categories to ensure cross-national comparability and avoid scale differences. We construct the education measure in the same way as the income measure: respondents in the top quartile of the educational attainment distribution are coded as "relative high education," and respondents in the bottom quartile are coded as "relative low education," while others are coded as "relative middle education." The middle category is again the reference category in the regression models.

To maximize the sample size, we use a limited number of essential control variables for basic demographic characteristics. *Age* is measured in years, and is

expected to have a negative association with the dependent variable. *Sex* is an indicator variable, where 1=female and 0=male, and is also expected to have a negative association with self-assessed health. *Employment status* is also an indicator variable, where 1=full time employment and 0=else, and is expected to show a positive association with health.

After deleting missing cases, our data are 47,640 observations from 38 WVS countries: Armenia (1,723), Azerbaijan (1,683), Argentina (874), Australia (1,750), Bangladesh (1,423), Belarus (1,982), Bosnia (1,120), Brazil (1,101), Bulgaria (873), Chile (930), China (1,496), Croatia (1,171), Dominican Republic (329), East Germany (853), Estonia (987), Georgia (2,414), India (1,496), Finland (901), Latvia (1,159), Lithuania (921), Mexico (1,224), Nigeria (2,118), Norway (1,039), Pakistan (733), Peru (1,012), Poland (1,095), Russia (1,921), South Korea (1,230), Spain (876), Sweden (906), Switzerland (962), Taiwan (1,037), Turkey (1,798), Ukraine (2,253), Uruguay (926), Venezuela (1,137), West Germany (825), and USA (1,362).

Methods

We employ ordinal logistic regression for the analysis of self-assessed health. While we appreciate the ease of interpretation of OLS regression models, the added precision of ordinal logistic regression is essential in our case, because we are not merely interested in statistical significance.[2] In the analysis, we estimate regressions of self-assessed health on the covariates of interest, income and education, in addition to the controls, for each country separately. Because income and education are significantly

[2] OLS-models concur on statistical significance with our ordinal logistic regression results, making the results "substantively identical" across estimation type. However, we find that the ordinal logistic and OLS coefficients produce different rankings of countries on their levels of inequalities in health. Thus, we choose the more appropriate method of ordered logistic regression (Long 1997). The results for OLS models are available upon request.

correlated, and because it has been argued that access to higher incomes accounts for part of the education-health association (Mirowsky and Ross 2003), we enter income and education into the model separately. To ease cross-national comparison, we present our results – logistic coefficients for the effects of low income, high income, low education, and high education – in figures. Four tables in an appendix provide odds ratios and z-statistics corresponding to each logistic coefficient in each of the four figures. Reflecting our interest in both the relationship between stratification and health within countries and across countries, the figures group the countries in descending order according to the World Health Organization's national income classifications: high income, high middle income, low middle income, and low income. This gives an indication of one dimension of national context, the level of economic development. At the micro-level, countries are ordered by the level of health inequality on the relevant dimension.

RESULTS

Relative Income and Health in 38 Nations

Figure 1 shows large cross-national differences in the extent to which the relatively poor report worse health than middle-income people. Interestingly, the figures also show similar patterns across countries belonging to different income groups. This indicates that even within countries at similar levels of economic development, there is substantial variation in the effects of income on self-assessed health.

FIGURE 1 ABOUT HERE.

Among the high-income countries, the largest health disadvantage of low income is in the United States. Substantively, this means that Americans living in relative poverty have 48.1% lower odds of reporting better health than those with middle income. Somewhat surprisingly, the second largest health disadvantage of low income is in Norway, where those living in relative poverty have 42% lower odds of reporting better health than those with medium income. In descending order of low-income disadvantage follow Taiwan, West Germany, and Switzerland. The relationship is, not surprisingly, weakest in Sweden and Finland. In Sweden, those living in relative poverty have 24.3% lower odds of reporting better health than those with middle income. In Finland, the relationship is not statistically significant.

The relationship is significant in all countries belonging to the middle-high income group. The effect of relative poverty is strongest in Poland and Estonia, where those living in relative poverty have 49.3% and 47.7% lower odds of reporting better health than those with middle income, respectively. The effects are weakest in Mexico and Venezuela, where those living in relative poverty have approximately 25% lower odds of reporting better health than those with middle income. The strongest relationship is found in a country belonging to the middle-low income group. In Bosnia, those with relatively low income have 58.9% lower odds of reporting better health than those with middle income. The second strongest effects are found in Dominican Republic, followed by Bulgaria, China, and Russia. Within the low middle income category of nations, there is not a significant relationship between living in relative poverty and self-assessed health in Peru or Belarus. Among the poorest countries, the relationship is strongest in India,

where those living in relative poverty have 57.4% lower odds of reporting better health than those with middle income. Other nations in this category with strong relationships are Bangladesh, Pakistan, and Nigeria. In general, the relationship appears to be somewhat weaker in the former Soviet nations, and is weakest in Ukraine and Azerbaijan. Specifically, in Ukraine those living in relative poverty have about 25% lower odds of reporting better health than those with middle income. The relationship between relative low income and self-assessed health is not significant in Azerbaijan.

Overall, our results show that relative poverty harms health even in poor countries and not just in the advanced industrial countries. Indeed, low income is associated with significantly worse self-reported health in nearly every country (34 out of 38 countries). Yet, importantly, there is substantial variation in the magnitude of the association. The effects of relative poverty appear to be sensitive to varying social conditions that do not merely reflect economic development.

While figure 1 shows the health disadvantage of relative low income, figure 2 displays the health advantage of high relative income. What again stands out is the substantial variation among these 38 countries in the extent to which high relative income translates into better self-reported health. Somewhat surprisingly, the effect of high income are strongest in Sweden, even surpassing the effect in the U.S. In Sweden, those with relative high income have 82.8% higher odds of reporting better health than those with middle income. In the U.S., they have 54.1% higher odds of reporting better health. The relationship is not significant in four of the high income countries: Taiwan, East Germany, Spain, and Switzerland.

FIGURE 2 ABOUT HERE.

It appears that the health advantage of high income may be the largest in middle income countries, both in terms of the number of countries where the relationship is significant and the strength of the effects. Those with relatively high income in Chile have 91.3% higher odds of reporting better health than those with middle income, followed by the relatively affluent in Poland and Mexico, who have about 73% higher odds of reporting better health than those with middle income. The health advantage of high income is not significant in Brazil or Venezuela. In countries belonging to the low-middle income group, the effects of relative affluence are strongest in Dominican Republic, where those living in relative affluence have 106.8% higher odds of reporting better health than those with middle income. In China, those living in relative affluence have 99.1% higher odds of reporting better health than those with middle income. The relationship is not significant in Lithuania, Turkey or Russia.

The relationship appears to be weaker in the poorest countries. In Armenia, those living in relative affluence have 61.3% higher odds of reporting better health, and in South Korea those living in relative affluence have 50% higher odds of reporting better health than those with middle income. The relationship is not significant in Bangladesh, India or Azerbaijan.

Overall, the relationship between relative affluence and good health is less consistent across nations than the relationship between relative poverty and good health. Yet, there is a significant association in 26 out of 38 countries, indicating that living in relative affluence is an important predictor of good health outcomes cross-nationally.

Further, there is some evidence that affluence might be most important in countries with middle-level income. It appears that those living in countries at a moderate level of development are most capable of transferring personal resources into good health. The advantage of high income might matter less in countries that have reached the highest level of economic development, or in countries that are simply too poor to have the resources that could be taken advantage of by relatively affluent individuals.

Relative Education and Health in 38 Nations

Figure 3 turns to a different dimension of SES: education. Again, there is substantial cross-national variation in inequality in health, and substantial variation even within countries at similar levels of economic development. In the richest nations, the negative health effects of relative low education are strongest in Taiwan, the U.S., and China. In Taiwan, those with low levels of education have 52.8% lower odds of reporting better health than those with medium levels of education. In the U.S., they have 49.6% lower odds, and in Norway they have 46.1% lower odds than those with middle levels of education. The relationship between low levels of education and better health is not significant in East Germany or Finland.

FIGURE 3 ABOUT HERE.

Among countries in the middle-high income group, the effects are strongest in Croatia and Poland. In Croatia, those with low levels of education have 48% lower odds of reporting better health than those with middle levels of education. In Poland, their

odds are 44.6% lower. The relationship between low education and self-assessed health is not significant in Brazil or Uruguay. The strongest relationships among the middle-low income group are found in Bulgaria, Dominican Republic and Peru. In Bulgaria, those with relatively low levels of education have 44.4% lower odds of reporting better health than those with middle levels of education. In the Dominican Republic and Peru, the odds are 43.7% and 40.5% lower, respectively. The relationship is not significant in Bosnia, Turkey, or Latvia.

The relationship appears to be weakest in the poorest countries. We find significant relationships in just four of the low-income countries: Pakistan, India, Bangladesh, and South Korea. In Pakistan, those with relatively low levels of education have 58.7% lower odds of reporting good health than those with middle levels of education. In India, Bangladesh, and South Korea, the odds are 43.6%, 40.2%, and 39.7% lower, respectively. The relationship fails to reach significance in Azerbaijan, Nigeria, Ukraine, Armenia, and Georgia.

Overall, the relationship between low educational attainment and self-assessed health appears to be weaker and more inconsistent than the relationship between relative poverty and self-assessed health. The relationship is more likely to be found in wealthier nations. Yet, we find a significant relationship in 26 out of 38 countries, suggesting that educational attainment clearly is a cross-nationally important predictor of health.

Finally, figure 4 shows the health advantage of relatively high education. As with the relatively larger effect of poverty than affluence, it appears that the effect of low education tends to outweigh the effect of high education. Still, the effect of high

education on health varies by national context – even within groups of countries at similar levels of economic development.

FIGURE 4 ABOUT HERE.

Among countries belonging to the highest income groups, the effect is strongest in the U.S. Americans with high levels of education, as compared to middle levels, have 61.7% higher odds of reporting better health. In descending order, the U.S. is followed by Norway and Finland, where those with high levels of education have 54.4% and 50.6% higher odds of reporting better health, respectively. The health advantage of high levels of education is not significant in five rich countries: Taiwan, East Germany, Australia, West Germany, and Switzerland.

As with relative affluence, there is some evidence that relatively high education has the strongest effect in nations belonging to the middle-high income group. The effect is strongest in Uruguay, where those with high levels of education have 79.2% higher odds of reporting better health than those with middle levels. In Mexico, they have 61.6% higher odds; in Estonia, 52.4% higher odds. The relationship is not significant in Argentina, Chile, or Venezuela. With the exception of Uruguay and Mexico at the top, the relationship appears to be weak or non-existent for Latin-American nations in this income group and stronger for former Eastern European and Soviet nations. In countries with middle-low income, the relationship is strongest in Lithuania, where those with higher levels of education have 50.2% higher odds of reporting better health. In Peru,

their odds are 44.2% higher. The relationship is insignificant in number of countries, including the Dominican Republic, Latvia, Bosnia, and China.

Again, we find that the advantage of high education might be weakest in the poorest countries. The effects are strongest in South Korea, where those with high education have 38.5% higher odds of reporting better health than those with middle levels of education. The relationship is not significant in Bangladesh, Pakistan, Georgia, Armenia, or Azerbaijan.

In sum, cross-nationally the health advantage of high educational attainment appears to be weaker than both the advantage of high income, and the disadvantages of low income and low education. Yet, its impact should not be neglected, given that the relationship reaches significance in the majority of countries in this sample (20 of 38). It appears that the effects are strongest and most consistent in middle income countries, indicating that the effect of stratification, especially stratification advantage, depends on the level of economic development.

SUMMARY

In this paper, we extend and integrate previous work on the relationship between social stratification and health, by exploring cross-national similarities and differences in four dimensions of the socioeconomic gradient in health. Our results indicate that the socioeconomic gradient is present in nearly all 38 World Values Survey nations, but that its strength varies considerably. In fact, Azerbaijan is the only nation in our sample that has nonsignificant associations for all four of our SES indicators. However, the relationship is clearly much more complex than a conclusion that the gradient is simply

universal would imply. Specifically, we demonstrate that the SES gradient in health is sensitive to social conditions (Link and Phelan 1995), in that it varies substantially according to national social context. For instance, Sweden ranks low on the health disadvantage of low income, but ranks high on the health advantage of high income. This suggests that social conditions in Sweden insulate the poor against the negative health effects of low income, but allow high-income people to translate those resources into better health. The USA is also an interesting case: here, social conditions neither insulate the poor from poor health, nor prevent the rich from translating high income into better health. With respect to the Chilean case, one might speculate that it is the unique pattern of stratification in Chile (viz., a distinct elite coupled with a very high level of total income inequality) that produces such a large health advantage of high income (see Torche [2004] for a discussion of Chilean stratification). For the lowest-income grouping of countries, it appears that the disadvantage of low income outweighs the advantage of high income, perhaps owing to the absence of some of the mechanisms through which higher income brings better health in wealthier countries (viz., potentially, advanced medical technology and a professional health care system).

Our results also address concerns regarding different components of stratification and disadvantage in both relative and absolute terms. Overall, it appears that the effect of relative poverty has the strongest relationship with poor health, highlighting that it is inherently bad for health to be relatively poor. However, it is clear that those with relative high income, as compared with those in the middle, are capable of transferring this material advantage into a health advantage, across multiple national contexts. And while income appears to have more general impact on health, the effects of education are

intriguing and imply important cross-national differences. It appears that education, especially having low education, matters more in richer nations. This suggests that educational attainment might be overridden by overall poverty in some nations, that is that nations have to reach certain level of economic development for education to generally benefit individual health.[3] Additionally, the finding that low education harms health in more countries than high education benefits health has important implications for our understanding of the relationship between inequality and health and speaks directly to the fundamental cause argument. As levels of technology increase and information becomes more available and more critical to health, the differences between those with medium education and high education might lessen, while those with low levels of education are left behind. This supports the notion of diminishing returns and is somewhat contradictory to the fundamental cause argument, as those with higher education are not necessarily able to use their higher levels of education to advance their health, but those with the lowest levels of education suffer.

Although these results shed light on cross-national variation in health inequalities, it is important to reiterate that this paper represents a first step in a broader research agenda. It is crucial to continue to examine the meaning of these variations and how they might be conditioned by social context. Below, we outline our agenda in more detail.

DIRECTIONS FOR FUTURE RESEARCH

Based on our findings, the next objective for social research on health is to investigate which aspects of national context, or, which dimensions of social conditions, explain this

[3] There are notable exceptions, but the general pattern holds. For example, low education is significant in 8 out of 10 rich countries, but only 4 out of 9 poor countries.

variation. We think that understanding cross-national variation in inequalities in health opens up a number of exciting new avenues for research. One line of inquiry might test the hypothesis that the level of national income inequality affects the level of income-based inequality in health. Such research could build on Wilkinson's argument that income inequality affects population health: "it may simply be that larger class differences lead to a steeper social gradient in health, but it could also be that a more unequal society becomes more dominated by status competition and class differentiation and suffers a more widespread health disadvantage as a result" (Wilkinson and Pickett 2006). This implies a potentially fruitful comparison of the effect of income inequality on the SES gradient to the effect of income inequality on population health. In high-inequality societies, it could be that the relatively poor suffer a larger health disadvantage than in low-inequality societies because the strain of social comparison is greater in high-inequality societies.

A second line of inquiry might examine the role of economic development and economic dependency in health inequality (cf. Firebaugh and Beck 1994; Kentor and Boswell 2005). Although the evidence certainly implies that SES affects health even in poor countries, more systematic work is needed to determine what role economic development and dependency play in setting the social conditions for the SES gradient. For instance, the health advantage of high income appears to be greatest in middle-income countries, which suggests that rapid economic growth like that China is currently experiencing may disproportionately benefit high-income groups and widen health inequality. This again points to a possible role for income inequality as an important

predictor of health inequality, but one that is itself driven by other social forces such as development, globalization, and deindustrialization (Alderson 1999).

A third line of inquiry could investigate the role of the welfare state (and national policy more broadly) in ameliorating or exacerbating health inequality. Such research could make connections between theories of the welfare state (Janoski and Hicks 1994) and the social determinants of health, and in doing so advance debates surrounding the effects of the welfare state on social outcomes (Brady 2005; Kenworthy 1999; Pampel 2001). For instance, indicators of welfare-state investments in education and income redistribution could be employed to determine domain-specific effects of the welfare state on income- and education-based health inequality.

IMPLICATIONS FOR HEALTH POLICY

The problem of health inequality has gained a place on the social policy agenda of many countries, including the United States. The evidence we present here suggests that far from being an intractable permanent problem, health inequality varies a great deal across national contexts, and seems rather sensitive to social conditions. Thus, the first policy implication of this research is that there may indeed be policy changes that could be made to reduce the overall levels of income- and education-based health inequality. We think the pessimistic view that nothing can be done to reduce health inequality is inconsistent with the immense cross-national variation in health inequality.

The indicators of health inequality we have generated could be used to understand which policies are associated with lower health inequality. For instance, national level data on characteristics of the health care system (drawn, for instance, from the World

Health Organization) could be incorporated into a statistical model that would show which aspects of the health care system are related to health inequality. More broadly, other indicators of social policy, such as unemployment benefit replacement rates, national spending on income redistribution, and social investments in health infrastructure, could be used to determine which policy domains of the welfare state might bring reductions in health inequality. Evidence like this could also be used to demonstrate how much of a difference in health inequality certain policy innovations might make. That is, our data could be used to show precisely how sensitive the gradient might be to various policy changes.

If employed as dependent variables, our four indicators of health inequality could also reveal differences in the effects of various social conditions across the dimensions of health inequality. For instance, if the policy objective were to ameliorate the health disadvantage of low income while leaving the health advantage of high income unaffected, models of these two dependent variables could be contrasted to reveal the social conditions that are associated with the low income disadvantage but not the high income advantage.

Finally, understanding which social conditions exacerbate health inequality would help to identify indirect paths from policy to heath inequality. For instance, if certain patterns of economic growth exacerbate health inequalities, policy could be directed toward altering the pattern (not necessarily the pace) of economic growth. Or, if the recent increase in income inequality across many advanced industrial countries were associated with higher levels of health inequality, then a case could be made for efforts at income redistribution (cf. Deaton 2002). Finally, policy could also be targeted more

effectively if other macrostructural changes such as (de)unionization or (de)industrialization were key aspects of the social conditions that are associated with cross-nation variation in health inequality. Likewise, such an approach could also identify the social conditions that are not associated with health inequality and therefore not likely targets for health policy intervention.

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Figure 1. Low Income Disadvantage in Self-Assessed Health, Countries Grouped by Economic Development

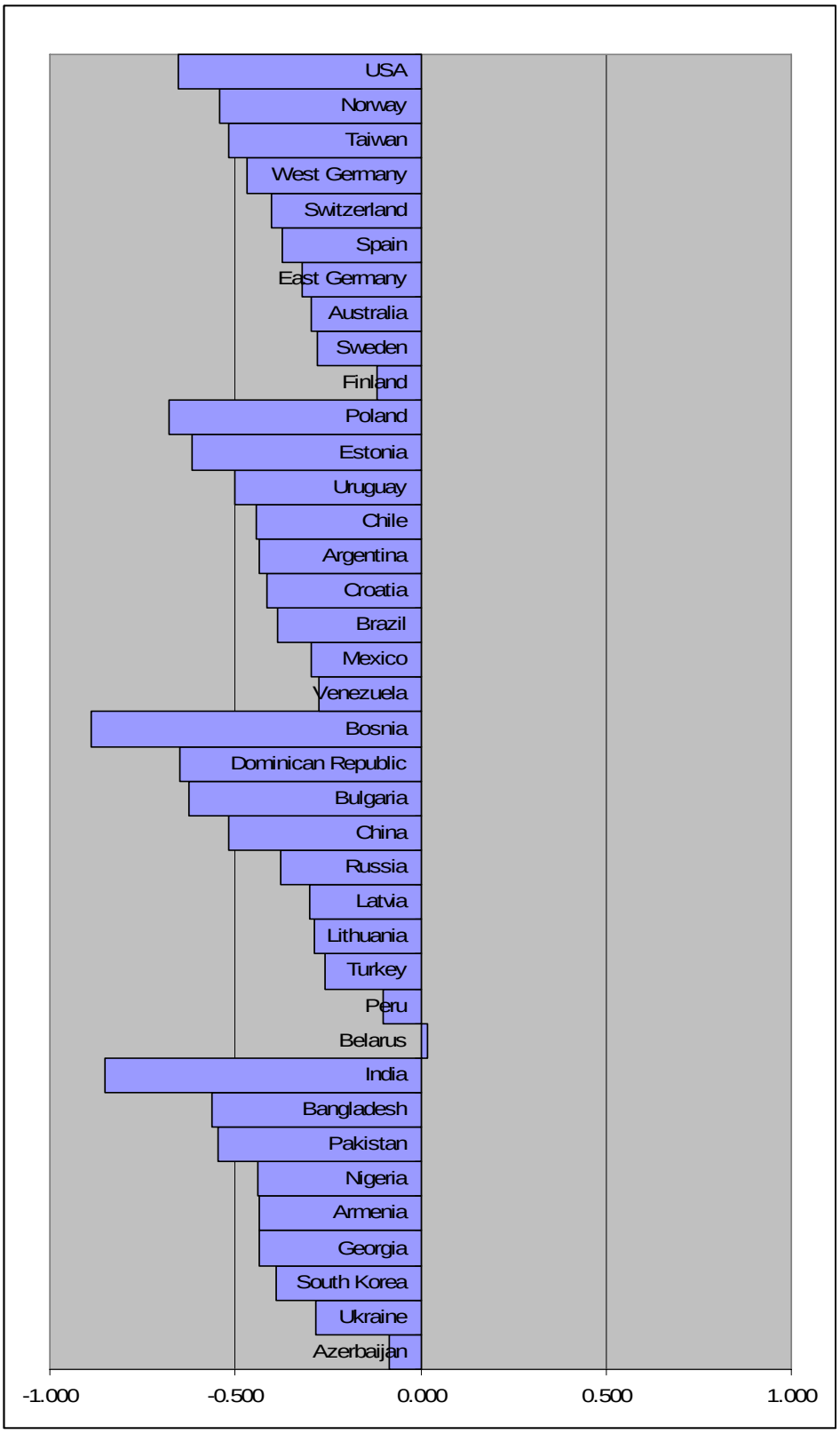


Figure 2. High Income Advantage in Self-Assessed Health, Countries Grouped by Economic Development

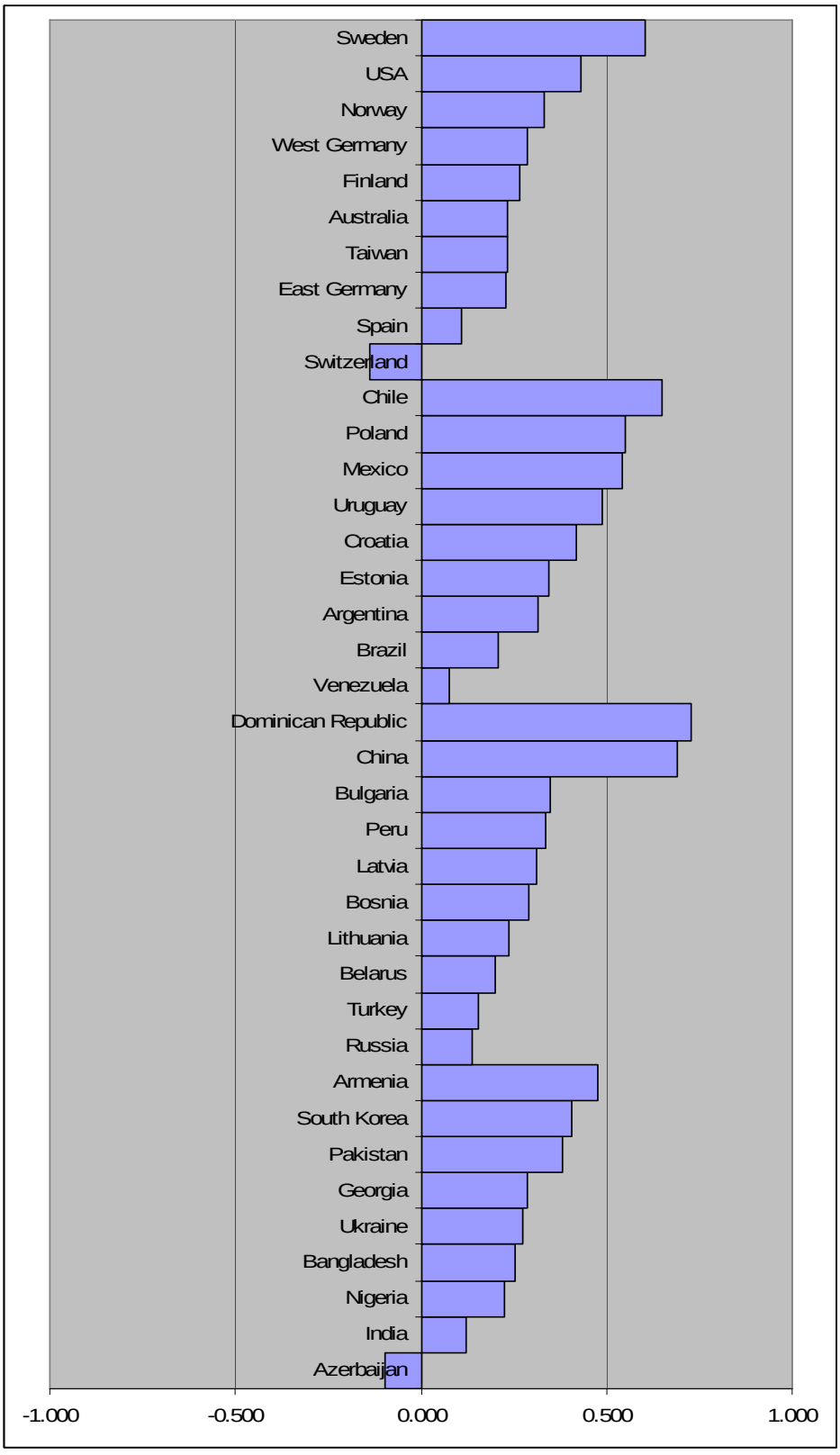


Figure 3. Low Education Disadvantage in Self-Assessed Health, Countries Grouped by Economic Development

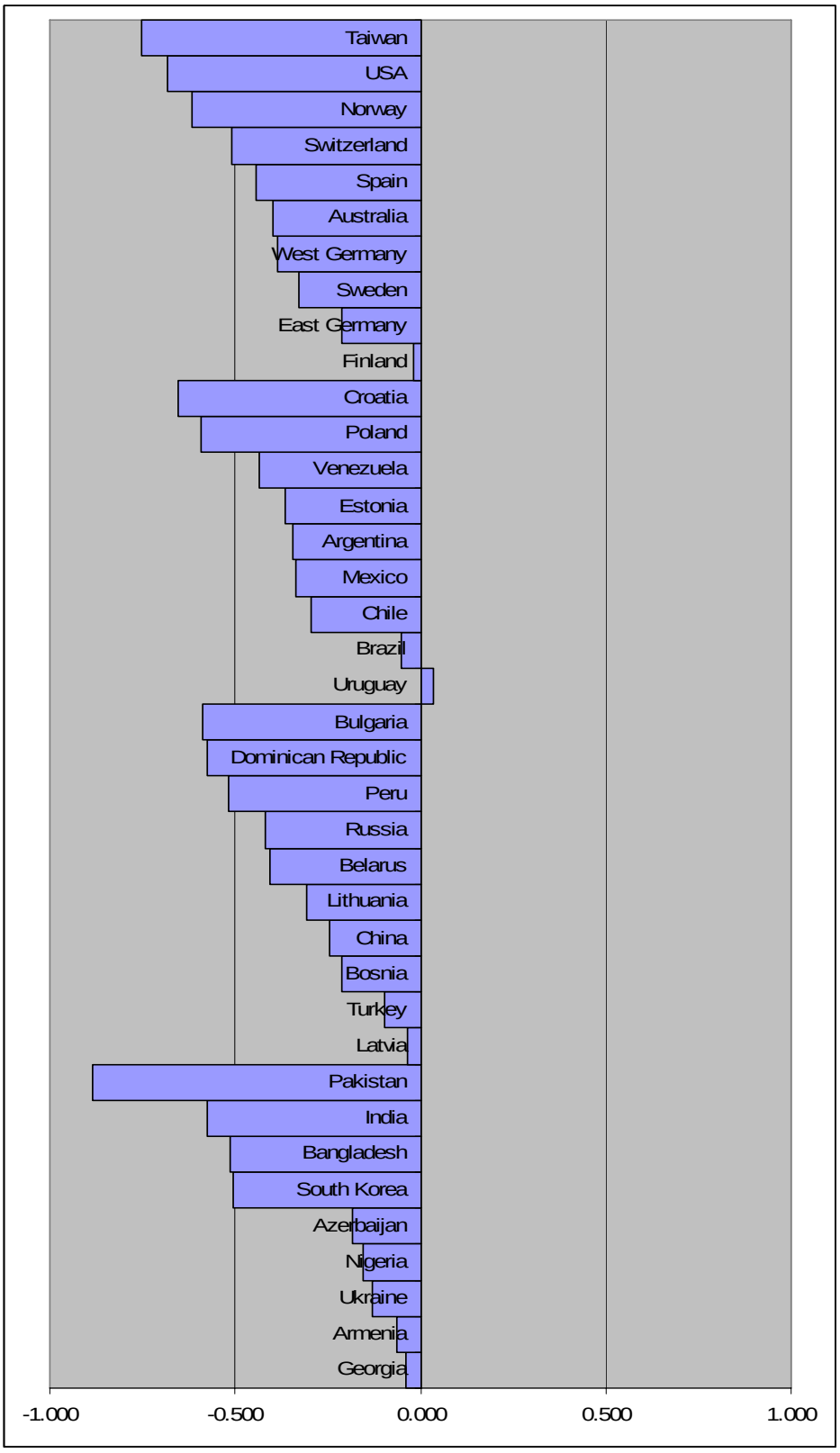
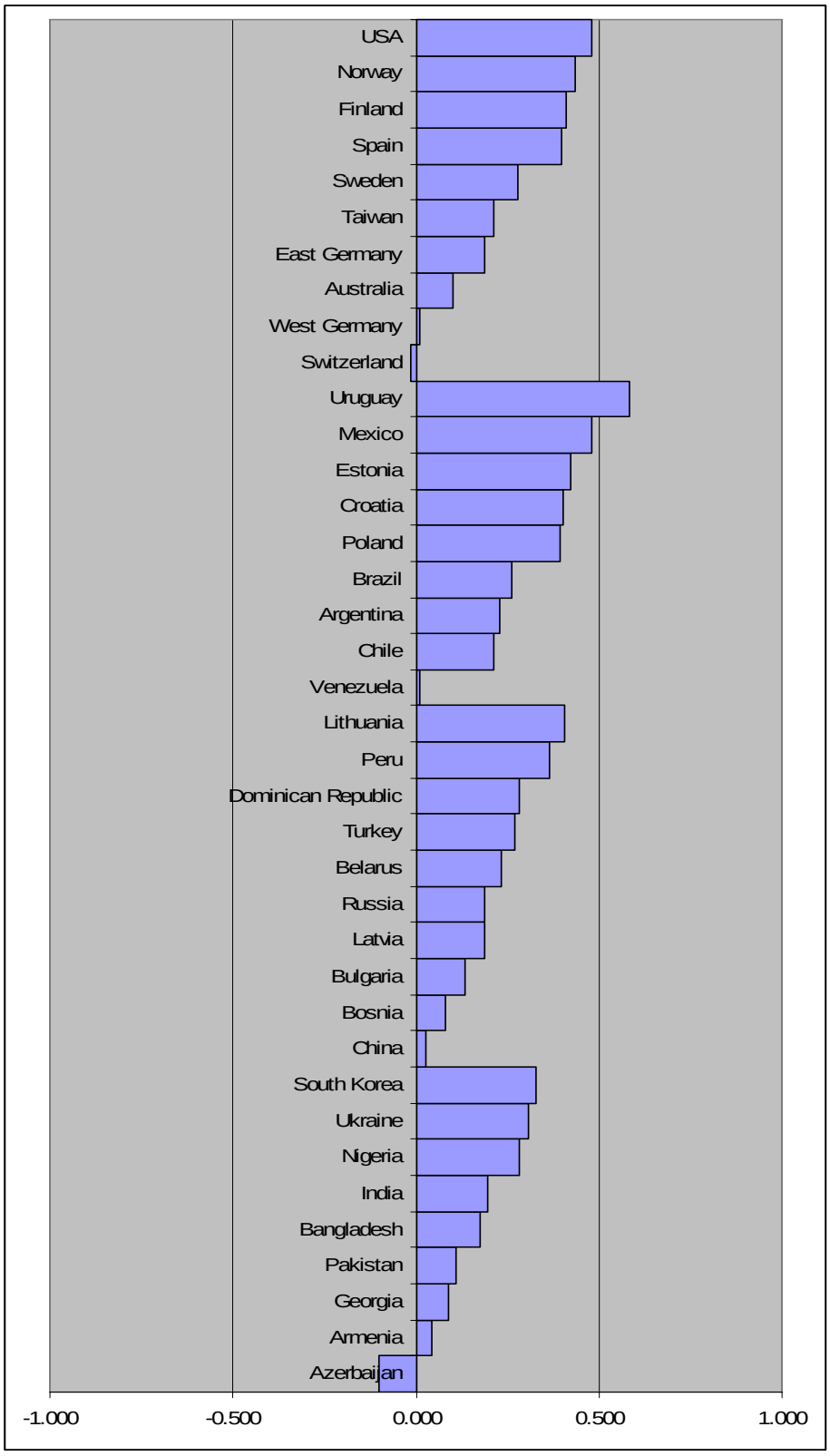


Figure 4. High Education Advantage in Self-Assessed Health, Countries Grouped by Economic Development



Appendix Table 1. Low Relative Income Effect on Self-Assessed Health, 38 World Values Survey Countries, 1996

Country	Log-Odds	Odds Ratio	Z-Statistic
USA	-0.655	0.519	-5.035*
Norway	-0.544	0.580	-3.344*
Taiwan	-0.517	0.596	-3.556*
West Germany	-0.468	0.626	-2.999*
Switzerland	-0.403	0.668	-2.679*
Spain	-0.374	0.688	-2.216*
East Germany	-0.318	0.728	-1.930*
Australia	-0.297	0.743	-2.454*
Sweden	-0.278	0.757	-1.764*
Finland	-0.116	0.891	-0.669
Poland	-0.679	0.507	-4.514*
Estonia	-0.615	0.540	-3.710*
Uruguay	-0.500	0.606	-3.301*
Chile	-0.444	0.642	-2.952*
Argentina	-0.435	0.647	-2.884*
Croatia	-0.413	0.662	-2.671*
Brazil	-0.384	0.681	-2.963*
Mexico	-0.297	0.743	-2.377*
Venezuela	-0.276	0.759	-2.228*
Bosnia	-0.888	0.411	-5.464*
Dominican Republic	-0.649	0.523	-2.529*
Bulgaria	-0.625	0.535	-3.517*
China	-0.517	0.596	-4.339*
Russia	-0.376	0.687	-3.212*
Latvia	-0.300	0.741	-1.996*
Lithuania	-0.288	0.750	-1.738*
Turkey	-0.259	0.772	-2.435*
Peru	-0.100	0.905	-0.577
Belarus	0.017	1.017	0.153
India	-0.853	0.426	-6.839*
Bangladesh	-0.564	0.569	-4.286*
Pakistan	-0.546	0.579	-3.435*
Nigeria	-0.440	0.644	-4.353*
Armenia	-0.436	0.646	-3.849*
Georgia	-0.434	0.648	-3.691*
South Korea	-0.389	0.678	-2.806*
Ukraine	-0.283	0.753	-2.659*
Azerbaijan	-0.085	0.919	-0.760

* $p < .05$ (one-tailed tests)

Appendix Table 2. High Relative Income Effect on Self-Assessed Health, 38 World Values Survey Countries, 1996

Country	Log-Odds	Odds Ratio	Z-Statistic
Sweden	0.603	1.828	3.943*
USA	0.432	1.541	3.456*
Norway	0.332	1.394	2.158*
West Germany	0.288	1.334	1.747*
Finland	0.266	1.305	1.655*
Australia	0.234	1.263	2.121*
Taiwan	0.231	1.260	1.566
East Germany	0.230	1.259	1.325
Spain	0.111	1.118	0.715
Switzerland	-0.138	0.871	-0.896
Chile	0.649	1.913	3.964*
Poland	0.550	1.733	3.816*
Mexico	0.543	1.722	3.989*
Uruguay	0.487	1.627	2.909*
Croatia	0.419	1.520	3.096*
Estonia	0.346	1.414	2.255*
Argentina	0.317	1.372	1.970*
Brazil	0.208	1.231	1.389
Venezuela	0.076	1.079	0.483
Dominican Republic	0.727	2.068	2.792*
China	0.689	1.991	5.220*
Bulgaria	0.349	1.418	2.230*
Peru	0.338	1.401	2.363*
Latvia	0.313	1.367	2.187*
Bosnia	0.290	1.337	2.140*
Lithuania	0.237	1.267	1.534
Belarus	0.199	1.221	1.846*
Turkey	0.155	1.167	1.424
Russia	0.136	1.146	1.283
Armenia	0.478	1.613	3.929*
South Korea	0.406	1.500	2.673*
Pakistan	0.381	1.463	2.029*
Georgia	0.288	1.334	2.909*
Ukraine	0.276	1.317	2.607*
Bangladesh	0.252	1.286	1.205
Nigeria	0.225	1.253	2.178*
India	0.120	1.127	1.027
Azerbaijan	-0.095	0.909	-0.833

* $p < .05$ (one-tailed tests)

Appendix Table 3. Low Relative Education Effect on Self-Assessed Health, 38 World Values Survey Countries, 1996

Country	Log-Odds	Odds Ratio	Z-Statistic
Taiwan	-0.751	0.472	-4.718*
USA	-0.684	0.504	-5.196*
Norway	-0.617	0.539	-3.719*
Switzerland	-0.511	0.600	-3.026*
Spain	-0.445	0.641	-2.637*
Australia	-0.399	0.671	-3.278*
West Germany	-0.387	0.679	-2.360*
Sweden	-0.326	0.722	-2.090*
East Germany	-0.213	0.808	-1.105
Finland	-0.018	0.982	-0.115
Croatia	-0.654	0.520	-4.388*
Poland	-0.591	0.554	-3.998*
Venezuela	-0.437	0.646	-2.997*
Estonia	-0.366	0.693	-2.043*
Argentina	-0.342	0.710	-2.296*
Mexico	-0.334	0.716	-2.300*
Chile	-0.297	0.743	-1.990*
Brazil	-0.052	0.949	-0.329
Uruguay	0.034	1.034	0.209
Bulgaria	-0.588	0.556	-3.309*
Dominican Republic	-0.575	0.563	-2.047*
Peru	-0.520	0.595	-3.391*
Russia	-0.418	0.658	-2.892*
Belarus	-0.407	0.665	-3.114*
Lithuania	-0.309	0.734	-1.746*
China	-0.247	0.781	-1.880*
Bosnia	-0.212	0.809	-1.384
Turkey	-0.096	0.909	-0.946
Latvia	-0.035	0.965	-0.261
Pakistan	-0.885	0.413	-5.235*
India	-0.573	0.564	-4.619*
Bangladesh	-0.515	0.598	-4.158*
South Korea	-0.506	0.603	-2.973*
Azerbaijan	-0.183	0.833	-1.616
Nigeria	-0.155	0.856	-1.377
Ukraine	-0.128	0.880	-1.044
Armenia	-0.062	0.940	-0.586
Georgia	-0.041	0.960	-0.481

* $p < .05$ (one-tailed tests)

Appendix Table 4. High Relative Education Effect on Self-Assessed Health, 38 World Values Survey Countries, 1996

Country	Log-Odds	Odds Ratio	Z-Statistic
USA	0.481	1.617	3.837*
Norway	0.434	1.544	3.211*
Finland	0.409	1.506	2.697*
Spain	0.396	1.486	2.410*
Sweden	0.280	1.323	1.697*
Taiwan	0.212	1.236	1.308
East Germany	0.187	1.206	1.166
Australia	0.103	1.108	0.983
West Germany	0.011	1.011	0.066
Switzerland	-0.015	0.986	-0.100
Uruguay	0.583	1.792	3.481*
Mexico	0.480	1.616	3.630*
Estonia	0.421	1.524	2.688*
Croatia	0.403	1.496	3.078*
Poland	0.394	1.483	2.637*
Brazil	0.264	1.302	2.008*
Argentina	0.230	1.259	1.188
Chile	0.212	1.236	1.351
Venezuela	0.009	1.009	0.061
Lithuania	0.407	1.502	2.490*
Peru	0.366	1.442	2.471*
Dominican Republic	0.283	1.327	1.133
Turkey	0.269	1.309	1.959*
Belarus	0.234	1.263	2.133*
Russia	0.190	1.209	1.696*
Latvia	0.189	1.208	1.178
Bulgaria	0.136	1.145	0.816
Bosnia	0.082	1.085	0.612
China	0.028	1.029	0.245
South Korea	0.326	1.385	2.244*
Ukraine	0.307	1.360	2.992*
Nigeria	0.281	1.324	2.937*
India	0.196	1.217	1.685*
Bangladesh	0.174	1.190	1.366
Pakistan	0.110	1.117	0.598
Georgia	0.090	1.094	0.849
Armenia	0.042	1.042	0.349
Azerbaijan	-0.100	0.905	-0.816

* $p < .05$ (one-tailed tests)