

Does village inequality in modern income harm the psyche? Anger, fear, sadness, and alcohol consumption in a pre-industrial society

Ricardo A. Godoy^{a,*}, Victoria Reyes-García^b, Thomas McDade^c, Tomás Huanca^b,
William R. Leonard^c, Susan Tanner^d, Vincent Vadez^b

^a*Heller School for Social Policy and Management Waltham, MA, USA*

^b*Heller, Brandeis University, USA*

^c*Department of Anthropology, Northwestern University, USA*

^d*Department of Anthropology, University of Michigan, USA*

Available online 7 March 2006

Abstract

Researchers have found a positive association between income inequality and poor individual health. To explain the link, researchers have hypothesized that income inequality erodes community social capital, which unleashes negative emotions, stress, and stress behaviors that hurt health. Few studies have tested the hypothesized path. Here we estimate the association between (a) village income inequality and social capital, and (b) three distinct negative emotions (anger, fear, sadness) and one stress behavior (alcohol consumption). We use four quarters of panel data (2002–2003) from 655 adults in 13 villages of a foraging–farming society in the Bolivian Amazon (Tsimane’). We found that: (1) village income inequality was associated with more negative emotions but with less alcohol consumption, (2) social capital always bore a negative association with outcomes, and (3) results held up after introducing many changes to the main model. We conclude that village income inequality probably affects negative emotions and stress behaviors through other paths besides social capital because we conditioned for social capital. One such path is an innate dislike of inequality, which might have pre-human origins. Our prior research with the Tsimane’ suggests that village income inequality bore an insignificant association with individual health. Therefore, village income inequality probably affects negative emotions and stress behaviors *before* undermining health.

© 2006 Elsevier Ltd. All rights reserved.

Keywords: Bolivia; Tsimane’; Health; Income inequality; Emotions; Social capital

Introduction

Since the early 1990s a raft of studies have found a positive association between income inequality and individual health (Lynch et al., 2004; Lynch, Davey Smith, Harper, & Hillemeier, 2004). Results have been sharper in the USA, in nations with large income inequality, in studies that draw on large

*Corresponding author.

E-mail addresses: rgodoy@brandeis.edu (R.A. Godoy),
vreyes@brandeis.edu (V. Reyes-García),
t-mcdade@northwestern.edu (T. McDade),
thlaura@hotmail.com (T. Huanca),
w-leonard1@northwestern.edu (W.R. Leonard),
stanner@umich.edu (S. Tanner), vvadez@brandeis.edu
(V. Vadez).

samples, and in studies that measured income inequality over large geographical areas (e.g., states) that shape public policies (Subramanian & Kawachi, 2004).

As one might expect in a young field, many topics remain unexplored, and one such topic relates to the paths linking community income inequality with individual health. Researchers have proposed at least three overlapping hypotheses (Lynch & Kaplan, 1997). First, income inequality makes it hard for groups to agree on public policies that improve health (Deaton, 2003; Diez-Roux, Link, & Northridge, 2000; Kaplan, Pamuch, Lynch, Cohen, & Balfour, 1996). Second, income inequality produces residential segregation along income, ethnic, and racial lines. Segregation spawns pockets of poverty without access to adequate public services, thus hurting individual health (Lobmayer & Wilkinson, 2002). Last, income inequality chafes community social capital — trust, safety nets, generosity, and reciprocity — which allows people to protect their health (Egolf, Lasker, Wolf, & Potvin, 1992; Kawachi, Kennedy, & Wilkinson, 1999). The rise of income inequality makes people compare themselves with the better off (Dressler, 2004; McDade, 2002; Watson, 1995). The comparison produces a sense of relative deprivation and unleashes negative emotions, such as envy, shame, guilty, anger, depression, hostility, cynicism, insecurity, social isolation, anxiety, and inadequacy (Kawachi & Kennedy, 2002; Macinko & Starfield, 2001; Marmot & Wilkinson, 2001; Matt, 2002; Wilkinson, 1997). Negative emotions, in turn, produce stress and stress behaviors, such as alcohol consumption and smoking that harm individual health (Kawachi & Kennedy, 2002; Kopp, Skrabski, & Szedmak, 2000; Subramanian, Delgado, Jadue, Vega, & Kawachi, 2003; Wilkinson, 1996; Williams, 1998).

The literature linking income inequality with negative emotions and stress behaviors has produced unclear results. Most studies show a positive association, but chiefly for sub-groups rather than for the pooled sample. Muramatsu (2003) studied people over 70 years of age in the USA by using multilevel analysis and by measuring income inequality at the county level and found a positive association between depression and income inequality. Diez-Roux et al. (2000) used the Behavioral Risk Factor Surveillance System survey of 1990 with 81,557 adults in the 50 states of the USA and found a positive association between state income inequality and smoking. For men, the positive

association was stronger at higher income levels, and for women the association was only present at higher income levels. Kahn, Wise, Kennedy, and Kawachi, (2000) used the 1991 National Maternal Infant Health Survey for 8060 women and their children from the 50 states of the USA and found a positive association between state income inequality and depression, but only among poor women. Weich, Lewis, and Jenkins (2001) studied common mental disorders among 8191 people 16–75 years of age in 18 regions of England, Wales, and Scotland and found a positive association between income inequality and mental disorders, but only among people with high income. Gunnell, Middleton, Whitley, Dorling, and Franker (2003) used data from the Office of National Statistics to examine time trends in suicide in England, Scotland, and Wales from 1950 to 1998 and found a positive association between country income inequality and suicide, but only among males 25–34 years of age.

Fewer studies have found weaker or no associations. Fiscella and Franks (2000) used the first National Health and Nutrition Examination Survey and Epidemiologic Follow-up Study and found a “modest” positive association between income inequality measured at the level of primary sampling units of the USA census and depressive symptoms. Henderson, Liu, Diez-Roux, Link, and Hasin (2004) used the 1992 National Longitudinal Alcohol Epidemiologic Survey for a sample of 42,862 people over 18 years of age in the USA and found no association between state income inequality and depression or alcohol dependence after controlling for state policies (e.g., alcohol taxes) affecting alcohol consumption. Sturm and Gresenz (2002) used the survey of Healthcare for Communities of 1997–1998 for 8235 adults in 60 metropolitan areas of the USA and found no association between income inequality measured at the level of metropolitan areas and mental health.

We found six gaps in the literature just reviewed. First, all studies focus on income inequality. We know little about the association between inequality in other economic resources (e.g., wealth) and negative emotions and stress behaviors (Eaton & Muntaner, 1999; Krieger, 1993; Weich et al., 2001). Second, most of the studies come from industrial nations, principally the USA (Larrea & Kawachi, 2005), so we do not know whether income inequality might also bear an association with negative emotions and stress behaviors in developing nations, which have lower income, but often also more

income inequality and stronger social capital. Third, researchers have paid scant attention to intra-household dynamics (e.g., spillovers within the household) that could mediate the links between income inequality and negative emotions and stress behavior (Fiscella & Franks, 2000; Kennedy, Kawachi, Glass, & Prothrow-Stith, 1998; Weich et al., 2001).

Fourth, none of the authors compute indices of inequality for sub-groups of their sample to assess the relevant reference group over which inequality might matter. In assessing their relative well-being, people might limit the comparison to people outside their community (Larrea & Kawachi, 2005), people of their same sex (Marmot, Kogevinas, & Elston, 1987), or people of their ethnic group (Martinez, 1996; Shihadeh & Steffensmeier, 1994). If so, then researchers should compute indices of inequality only for the relevant sub-groups within an area. Failure to identify the appropriate reference group will weaken results, as suggested by research on subjective social status and health (Singh-Manoux, Adler, & Marmot, 2003). For instance, the state income inequality might not correlate with women's health, but women's health might correlate with the inequality in income of women in the state. Fifth, most studies draw on cross-sectional information, making it hard to control for individual fixed effects and to examine the lag time between changes in income inequality and changes in negative emotions and stress behaviors. Last, issues remain unresolved about the usefulness of marginal versus multi-level models (Subramanian & Kawachi, 2004). Neither modeling approach gets at the endogeneity of income inequality and many pathway or mediating variables.

Drawing on four consecutive waves of quarterly panel data collected during August 2002–November 2003 from 655 people (319 women; 336 men) over 16 years of age in a foraging and farming society of the Bolivian Amazon, the Tsimane', we explore only the third hypothesis—the idea that income inequality hurts health by eroding social capital and unleashing negative emotions and stress behavior.

We have three aims. First, in the main analysis we want to estimate the association between (i) village income inequality and (ii) three distinct negative emotions (sadness, anger, and fear) and one stress behavior (alcohol consumption) while controlling for individual, household, and community variables that have become standard in studies of income inequality and health. Second, we want to test for

the robustness of the main results by estimating whether results hold (a) across income (Kahn et al., 2000), sex (Kopp et al., 2000), and age groups (Schieman, 2003) and (b) for different reference groups (village income inequality of women versus village income inequality of men), regression models (marginal versus hierarchical), individual resources (income versus wealth), outcomes (sadness, anger, fear, alcohol consumption), measures of income inequality (coefficient of variation, standard deviation of logarithm, Gini), and time lags.

Third, we want to test the following three hypotheses about the links between (a) village income inequality and village social capital and (b) negative emotions and stress behavior after conditioning for individual attributes that presumably protect individual health (LeClere & Soobader, 2000; Lynch et al., 2004; Mellor & Milyo, 2001; Wagstaff & van Doorslaer, 2000):

- H1. Without controlling for social capital, village income inequality will bear a positive association with negative emotions and stress behavior.
- H2. Without controlling for village income inequality, social capital will bear a negative association with negative emotions and stress behavior.
- H3. The positive association between village income inequality and negative emotions and stress behavior (H1) will weaken after we condition for social capital.

Sample

The Tsimane' number ~8000 people and live in ~100 villages of the Bolivian Amazon. Data comes from 13 Tsimane' villages along the river Maniqui, Department of Beni. Villages differed in their proximity to the town of San Borja (pop ~19,000) and degree of market exposure. The population of the 13 villages accounts for ~20% of all Tsimane'.

We collected repeated observations from *all* people in the 13 villages during five consecutive quarters, but we collected information on negative emotions and alcohol consumption only for adults (16+ years). The sample used in the analysis includes 319 adult women and 336 adult men from all 267 households in the 13 villages. Except for the variables for sex, age, and schooling, we dropped all information from quarter 1 because we used it to pilot test methods of data collection, train surveyors

and translators, and validate instruments. For the regression analysis we used information only from quarters 2–5. During quarters 2–5, 12.36% of the sample was absent at least on one survey, and 3.66% of the sample left permanently after the survey of quarter 2. Later we show that attrition did not bias results.

The information we use comes from a longer-term bio-cultural panel study that started in 1999 and continues (Godoy, Reyes-Garcia, Byron, et al., 2005). The goal of the longer study is to estimate the effect of market exposure on the well-being of a highly autarkic indigenous group as it gains a stronger foothold in the market economy. Four female and four male researchers who had participated in the longer study collected the information presented here. Researchers spoke Tsimane' but used Tsimane' translators.

Econometric model, variables, and estimation strategy

To estimate the association between (a) *sadness, anger, fear,* and *alcohol* consumption (dependent variables) and (b) village income *inequality*, village *social capital*, and individual resources (explanatory variables) we use the following model:

$$Y_{ihvq} = \alpha + \eta I_{ihvq} + \beta In_{vq} + \delta SC_{vq} + \theta P_{ihv} + \zeta H_{hvq} + \pi V_{vq} + \lambda C_{ihvq=1} + \varepsilon_{ihvq}. \quad (1)$$

Table 1 contains definition and summary statistics of the variables in (1). The subscripts i, h, v, and q stand for individual, household, village, and quarters. We next discuss how we define and measured the variables in (1). For clarity, we italicize the name of variables from tables and regressions when we use them in the text. In the sub-headings below the expressions in parenthesis refer to the name of the variable in (1).

Dependent variables (*Y*)

We asked participants how often they had felt *sadness, anger, or fear* during the 7 days before the day of the interview, and coded answers as follow: 1 = never, 2 = sometimes, 3 = always. The Tsimane' recognize and have distinctive terms for these emotions (Ellis, 2002). We also asked participants how often they had consumed commercial *alcohol* during the 7 days before the day of the interview. The outcomes did not reflect one underlying

dimension, so we treat them as separate dependent variables; Chronbach's alphas for the three negative emotions and for the three negative emotions plus alcohol consumption were 0.53 and 0.42.

Explanatory variables

Modern income for person (*I*)

We asked participants to list all sources of monetary income and all good received in barter for the past 14 days, and for each source we asked them to specify the monetary value. We added all values to arrive at total income; we call the variable *modern income* to distinguish it from income from the consumption of own production, which we did not measure. Since we measured *modern income* during four consecutive quarters, our measure captures seasonal variations, but contains random measurement error from faulty recall. Furthermore, our measure provides an incomplete reading of quarterly income because we only measured income for the 2 weeks before the day of the interview.

Village inequality in modern income (*In*)

We used individual quarterly *modern income* to estimate the Gini coefficient of *modern income/quarter* in the village. We call the variable *inequality*, but add an adjective when there might be ambiguity about the type of inequality.

Village social capital (*SC*)

Researchers routinely equate social capital with norms and behaviors that enable people to act collectively (Durlauf & Fafchamps, 2005). Common proxies for social capital include trust, safety nets, social networks, membership in local organizations, and political engagement. To measure social capital, we asked participants about the following behaviors for the 7 days before the day of the interview: (a) number of gifts given to other households, (b) number of times participants had offered labor help to other households, and (c) number of times participants had done communal work. We added answers to arrive at the total number of acts of generosity/quarter for the participant. From individual measures of social capital/quarter we estimated village measures of social capital/quarter. Village *social capital* is the mean of individual expressions of social capital in the village each quarter excluding measures of social capital from the participant's household for that quarter. We did not collect information on gifts or labor help received, so our

Table 1
Definition and summary statistics of variables used in regressions and Eq. (1)

Name	Definition	<i>N</i>	Mean	Std. Dev.
<i>Dependent variables (last 7 days)</i>				
Sadness (<i>Y</i>)	How often did you feel sad? (%)			
	Never (1)	575	28.47	
	Sometimes (2)	1083	53.61	
Anger (<i>Y</i>)	How often did you feel angry? (%)			
	Never (1)	1236	61.16	
	Sometimes (2)	702	34.74	
Fear (<i>Y</i>)	How often did you feel fear? (%)			
	Never (1)	1028	50.87	
	Sometimes (2)	775	38.35	
Alcohol (<i>Y</i>)	Always (3)	83	4.11	
	# times participant consumed commercial alcohol	2090	0.239	0.555
	<i>Explanatory variables (individual)</i>			
Modern income (<i>I</i>)	Earnings from wage labor and sale of goods plus value of goods received in barter for 14 days before day of the interview/quarter. In 1000s bolivianos. 1 US dollar = 7.45 bolivianos	2290	0.078	0.242
BMI (<i>P</i>)	Body-mass index (kg/m ²)/quarter; in regression entered in logarithms	1930	23.277	2.548
Male (<i>P</i>)	Sex of participant (1 = male; 0 = female)	655	0.512	0.500
Schooling (<i>P</i>)	Maximum school grade of participant in first quarter	655	1.926	2.252
Age (<i>C</i>)	Age of participant in years in first quarter	655	34.189	15.651
<i>Explanatory variables (household)</i>				
Household size (<i>H</i>)	Number of people in the household/ quarter	980	5.880	2.730
Social capital (<i>SC</i>)	Village average frequency of labor help and gifts given to other households and communal work done by households in last seven days; excludes participant's household. Measured quarterly	980	1.866	.812
<i>Explanatory variables (village)</i>				
Gini (<i>In</i>)	Gini of village modern income inequality/ quarter	52	0.711	0.078
Distance (<i>V</i>)	Hours walking from village to town of San Borja during current quarter	52	3.141	2.284

Note: Under column 'Name', expression in parenthesis is name of variable in (1).

measure of village *social capital* captures the gross, not the net, displays of generosity in the village excluding the participant's household.

Individual resources besides modern income (P)

In the main analysis, *P* stands for two individual resources — *schooling* and body-mass index, *BMI* (kg/mt²) — that might protect against negative emotions and stress behavior (Lynch, Harper, & Davey Smith, 2003). To measure *schooling* we asked about the maximum school grade attained by the participant. In the analysis of robustness, *P* also includes measures of individual *traditional wealth*,

modern wealth, and their sum or *total wealth*. *Traditional wealth* includes physical assets (e.g. bows) and *modern wealth* includes assets bought in the market (e.g., bicycles) owned by the participant. We multiplied the quantities owned by the person times the village price for the goods to arrive at a total value for *modern wealth*, *traditional wealth*, and *total wealth* for the person.

Household attributes (H)

H stands for two household variables measured quarterly. The variable *other* stands for the average of the outcome, *Y*, for the household excluding the

participant. We use *other* to assess spillover associations inside the household. *Household size* stands for the total number of people living in the household at the time of the interview.

Village attribute (V)

Traveling time varies by season, so each quarter we asked about the number of hours it took to walk from the village to the closest market town. We call the variable *distance*.

Controls (C)

Control variables included the participant's sex (*male* = 1; *female* = 0) and *age* during the first quarter, which we measured in years.

Estimation strategy

Since the variables for negative emotions were ordered and categorical, we used an ordered logit regression. The variable for alcohol consumption was censored at zero (79.5% of the sample did not consume alcohol), so we use a Tobit regression. We do the main analysis with clustering by participant across quarters, but we later show results of analysis with other types of clustering (i.e., people within households; households within villages); we also use a hierarchical linear model in the sensitivity analysis. We did not have instrumental variables to correct for the endogeneity of village *inequality in modern income* or village *social capital*, so one should read results as associations.

The people

In a recent publication in this journal (Godoy, Byron, et al., 2005) we provide historical and ethnographic background on the Tsimane', so we limit the discussion of this section to information that complements the earlier analysis.

The Tsimane' have been in continuous contact with the market economy since the 1940s. Contact has not deracinated them nor transmogrified their society. For example, we found no secular change in adult physical stature for people born during 1920–1980 (Godoy, Leonard, et al., 2005). Most Tsimane' still have access to farmlands. They continue to live in small villages of ~20 households closely linked by ties of blood and marriage. Most follow their traditional social organization (e.g., cross-cousin marriage). Protestant missionaries introduced schooling and academic and modern

practical skills (e.g., hygiene) as far back as the 1950s, and continue to play a role in today's schooling. All textbooks are in the Tsimane' language and Tsimane' do all the teaching. In an earlier study done in 2000 in 58 villages, we documented high indices of village income inequality, but we also showed that measures of village income inequality bore weak associations with market exposure. We found that Tsimane' select to take part in the market economy to supplement their diet rather than to acquire kitsch (Godoy, Reyes-García, Huanca, et al., 2005). Despite more than five decades of continuous exposure to the market economy, Tsimane' remain highly autarkic. During quarters 2–5, 35.57% of the sample had made no sales, 59.24% had not worked for wages, and 22.14% had earned no money, either from sales or from wage labor.

Tsimane' society and economy have changed during the last half century. For example, since the 1970s Tsimane' have faced encroachment from loggers, cattle ranchers, and migrant farmers. Traders ply the upper reaches of rivers swapping commercial goods, including alcohol (ethanol, 96% concentration), for forest and farm goods (Byron, 2003). Traders use alcohol as an advance for future deliveries of local goods, a practice that indebts Tsimane'. The practice prevails in villages without easy access to market towns. Those villages also have a greater abundance of forest products coveted by traders. The consumption of commercial alcohol occurs in secular settings, accompanied by radio music or done in the privacy of homes; it has none of the ritual aura that accompanies the consumption of traditional beverages fermented at home. Males consumed more commercial alcohol than females. In all, 38.04% of males consumed alcohol, but only 3.48% of females did ($\chi^2 = 382$; $p = 0.001$); males consumed alcohol 0.44 times/week (SD = 0.70) compared with females who consumed alcohol only 0.03 times/week (SD = 0.22) ($p = 0.001$). Since women produce and distribute the traditional beverages fermented at home, they control the amount of traditional alcoholic beverages men consume, but they have no control over the consumption of commercial alcohol.

Mean quarterly Gini coefficients for village *modern wealth* (0.56) were significantly higher than mean quarterly Gini coefficients for village *traditional wealth* (0.45) ($p = 0.001$). A regression of quarterly Gini coefficients for village economic outcomes against quarters suggests that Gini

coefficients for village *traditional wealth* and Gini coefficients for village *inequality in modern income* remained stable (Gini *traditional wealth* = 0.0003; $p = 0.96$; Gini *modern income* = 0.002; $p = 0.76$), whereas quarterly Gini coefficients for village *modern wealth* declined by 0.017/quarter ($p = 0.009$).

We end with a short discussion of the role of different economic resources in daily life. Tsimane' show more tolerance of inequality in *traditional wealth* because they borrow traditional assets with greater ease than modern assets. Tsimane' borrow each other's assets constantly, often without asking the owner, but some assets are easier to borrow than others. For instance, people cannot borrow with the same ease an outboard motor, as they can borrow a mortar lying in an open courtyard. Traditional assets, and even some modern assets (e.g., metal plates), often lie in open courtyards. When high indices of wealth inequality co-exist with norms of sharing and reciprocity then one might find higher indices of inequality associated with fewer negative emotions. For instance, we have seen poor people in villages with a prosperous villager draw on the generosity of the prosperous villager and ask that villager to take them in their motorized canoe to a health facility. Traditional assets are more readily available to everyone, so their distribution within the village might not bear as clear an association with negative emotions and stress behaviors as the distribution of modern assets.

Main results

Correlation coefficients within subject for outcomes between quarters ranged between 0.20 and 0.40. For women, correlation coefficients increased from quarter 2 to quarter 5 across outcomes, but for men they showed no clear time trend. The low correlation coefficients and their unclear time trend points to the role of the environment in shaping outcomes and to errors in the measurement of outcomes.

Table 2 contains the main regression results. In columns [a] we leave out village *social capital*, in columns [b] we leave out village *income inequality*, and in columns [c] we include village *social capital* and *income inequality*. Five results stand out.

First, we find partial confirmation for hypothesis 1. Village *inequality in modern income* bore the hypothesized positive association with individual *sadness*, *anger*, and *fear*, but it bore a negative association with individual *alcohol* consumption.

Village *inequality in modern income* had a stronger positive association with *anger* than with *sadness* or *fear*. The coefficient of village *income inequality* with *anger* as a dependent variable (column [2c]) was 4.18 ($p < 0.0001$), twice as high as the coefficient of village *income inequality* with *sadness* (coefficient = 2.30, $p < 0.001$) (column [1c]) or *fear* (coefficient = 2.30, $p < 0.003$) (column [3c]) as dependent variables. A one-point increase in the Gini coefficient of village *inequality in modern income* was associated with 2.39–2.59 fewer times/week a participant consumed *alcohol*. The counter-intuitive finding that village *inequality in modern income* bore a negative association with *alcohol* consumption probably has to do with peripatetic traders who contact more remote (egalitarian) villages; there, they advance alcohol, repayable in forest and farm goods. We did not collect information on the presence of traders, so we cannot test the idea. Once we control for village fixed effects (row 12, Table 3) the negative association between *alcohol* consumption and *income inequality* weakens, lending indirect support to our interpretation.

Second, as the information in columns [b] suggest, we find confirmation for hypothesis 2; village *social capital* bore a negative association with negative emotions and alcohol consumption even after conditioning for village *inequality in modern income* (columns [c]). The negative association was more pronounced with *anger* than with *sadness* or *fear*. The coefficient for the variable for village *social capital* in the regression with *anger* as an outcome was -0.34 ($p < 0.0001$) (column [2c]), and -0.24 to -0.28 in the regressions with *sadness* (-0.28 , $p < 0.0001$) (column [1c]) or *fear* (-0.24 , $p < 0.002$) (column [3c]) as outcomes. An increase of one episode/week in village *social capital* was associated with 0.22–0.24 fewer times drinking *alcohol* ($p < 0.009$).

Third, we reject hypothesis 3 because including village *social capital* (columns [c]) did not attenuate the negative coefficient of village *income inequality*. If village *social capital* bore a negative association with outcomes and if village *income inequality* undermined village *social capital*, then failure to control for village *social capital* in columns [1] should have overstated the significance of village *income inequality* owing to the role of a positive indirect effect between village *income inequality* and the outcomes. Since the positive association between village *income inequality* and outcomes increased after conditioning for village *social capital*, the indirect effect must be negative. We tested the

Table 2

Main multivariate regression results: relation between (a) income inequality and social capital and (b) negative emotions and alcohol consumption among Tsimane' adults (16+ years of age), Bolivia during four quarters, 2002 – 2003

Explanatory variables	Dependent variables					
	[1] Sadness (<i>n</i> = 1697)			[2] Anger (<i>n</i> = 1698)		
	[a]	[b]	[c]	[a]	[b]	[c]
Gini	1.83 (0.68)***	^	2.30 (0.69)***	3.47 (0.71)***	^	4.18 (0.73)***
Social capital	^	−0.24 (0.07)***	−0.28 (0.07)***	^	−26 (0.01)***	−0.34 (0.08)***
Modern income	−0.05 (0.21)	0.02 (0.22)	0.04 (0.20)	−0.15 (0.35)	−0.20 (0.36)	−0.15 (0.35)
Schooling	−0.06 (0.02)**	−0.05 (0.02)**	−0.05 (0.02)**	0.01 (0.02)	0.02 (0.02)	0.02 (0.02)
BMI	1.16 (0.56)**	1.37 (0.54)**	1.29 (0.54)**	0.80 (0.58)	1.07 (0.59)*	0.92 (0.58)
Others	1.06 (0.09)***	1.05 (0.09)***	1.02 (0.09)***	1.10 (0.11)***	1.14 (0.12)***	1.05 (0.12)***
Male	−0.31 (0.12)***	−0.33 (0.11)***	−0.33 (0.11)***	−0.48 (0.13)***	−0.50 (0.13)***	−0.50 (0.13)***
Age	0.01 (0.01)*	0.01 (0.01)**	0.01 (0.01)*	−0.01 (0.01)	−0.01 (0.01)	−0.01 (0.00)
Household size	−0.01 (0.01)	−0.01 (0.01)	−0.01 (0.01)	−0.01 (0.02)	−0.01 (0.02)	−0.01 (0.02)
Distance	0.05 (0.02)**	0.11 (0.02)***	0.09 (0.02)***	0.01 (0.02)	0.09 (0.02)***	0.054 (0.02)*
<i>Wald test of joint significance (χ^2 and <i>p</i> value in parenthesis)</i>						
Schooling + BMI + modern income	9.37 (0.02)	10.54 (0.01)	9.88 (0.01)	2.53 (0.47)	4.65 (0.19)	3.87 (0.27)
Social capital + Gini	^	^	22.99 (0.01)	^	^	40.51 (0.0001)
	[3] Fear (<i>n</i> = 1698)			[4] Alcohol (<i>n</i> = 1782)		
Gini	1.87 (0.74)**	^	2.30 (0.76)***	−2.59 (0.77)***	^	−2.39 (0.77)***
Social capital	^	−0.20 (0.07)***	−0.24 (0.07)***	^	−0.24 (0.1)***	−0.22 (0.07)***
Modern income	−0.02 (0.28)	−0.05 (0.30)	−0.01 (0.28)	−0.06 (0.19)	−0.09 (0.19)	0.06 (0.19)
Schooling	−0.03 (0.03)	−0.03 (0.03)	−0.03 (0.03)	−0.07 (0.02)***	−0.06 (0.02)**	−0.06 (0.02)**
BMI	0.13 (0.53)	0.32 (0.53)	0.21 (0.53)	0.16 (0.57)	0.22 (0.57)	0.35 (0.57)
Others	1.10 (0.10)***	1.09 (0.10)***	1.07 (0.10)***	0.69 (0.17)***	0.69 (0.17)***	0.67 (0.17)***
Male	−0.99 (0.13)***	−1.0 (0.13)***	−1.01 (0.13)***	2.52 (0.18)***	2.5 (0.18)***	2.51 (0.18)***
Age	0.01 (0.01)	0.01 (0.01)*	0.01 (0.01)*	0.01 (0.01)*	0.01 (0.01)*	0.01 (0.01)*
Household size	−0.01 (0.02)	−0.01 (0.03)	−0.01 (0.02)	−0.02 (0.02)	−0.02 (0.02)	−0.02 (0.02)
Distance	0.03 (0.02)	0.09 (0.02)***	0.06 (0.02)**	0.01 (0.02)	0.01 (0.02)	0.04 (0.02)
<i>Wald test of joint significance (χ^2 and <i>p</i> value in parenthesis)</i>						
Schooling + BMI + modern income	1.38 (0.71)	1.18(0.75)	0.99 (0.80)	7.18 (0.06)	6.32 (0.09)	6.50 (0.08)
Social capital + Gini	^	^	15.33 (0.0005)	^	^	18.58 (0.0001)

Standard error are in parenthesis. [1]–[3] = ordered logit regressions; [4] = Tobit. ^ = variable or tests intentionally left out. Constant and dummies for quarters not shown.

*, **, ***. Statistically significant at the 10%, 5%, and 1% level.

intuition by regressing village *social capital* against village *income inequality* and found a positive but statistically insignificant association. A one-point increase in the Gini coefficient of village *income inequality* was associated with an average increase of 2.37 pro-social events in the village ($p = 0.14$). In sum, the positive association between village *income inequality* and village *social capital*, and the negative association between village *social capital* and outcomes helps to explain why including village *social capital* would raise the coefficients of village *income inequality*.

Fourth, we found positive associations between the negative emotions and alcohol consumption of the rest of the household and the participant's

negative emotions and alcohol consumption. The coefficients were close to +1 for the three negative emotions and +0.67 – +0.79 for alcohol consumption; all relations were statistically significant at the 1% level. Since the estimates could contain biases from omitted variables, such as role models in the household, we re-estimated regressions using fixed effects for households. Those results (not shown) suggest that, except for *sadness*, the household average of the outcome excluding the participant related strongly but negatively to a participant's negative emotions and alcohol consumption. The coefficients and *p* values were as follow: −0.10 ($p < 0.001$) for *anger*, −0.05 ($p < 0.071$) for *fear*, and −0.18 ($p < 0.001$) for *alcohol* consumption.

Fifth, individual resources bore no strong, consistent association with negative emotions or alcohol consumption. *Modern income* bore no statistically significant relation with any of the outcomes, perhaps because of an attenuation bias. *Schooling* bore a negative association only with *sadness* (coefficient -0.05 , $p < 0.02$; column [1c]) and *alcohol* consumption (coefficient -0.06 , $p < 0.005$; column [4c]). *BMI* did not bear a statistically significant association with most outcomes, except for *sadness*, and then it had the wrong, positive, sign (coefficient $+1.29$, $p < 0.01$). We tested whether the three individual resources — *modern income*, *schooling*, and *BMI* — bore a statistically significant joint association to the outcome, and found ambiguous results. The three variables together bore a statistically significant association only with *sadness* ($\chi^2 = 9.88$, $p > \chi^2 = 0.01$; column [1c]) and *alcohol* consumption ($\chi^2 = 6.50$, $p > \chi^2 = 0.08$), but not with *anger* ($\chi^2 = 3.87$, $p > \chi^2 = 0.27$) or *fear* ($\chi^2 = 0.99$, $p > \chi^2 = 0.80$).

Robustness

For brevity, in Table 3 we report only the coefficient and standard errors for village *inequality* in *modern income* and for village *social capital* for variants of the main regressions in columns [c] of Table 2. The last column of Table 3 contains a summary of the changes made to the regressions of columns [c] of Table 2 to produce Table 3, and the notes to Table 3 contain details of the changes made.

Three findings stand out. First, the main results hold up virtually unchanged after controlling for the number of children under 13 years of age, temporary and permanent attriters, personal wealth (row 7), mean or median village incomes (rows 14–15), *age* and *household size* squared (row 17), religious affiliation (row 16), fixed effect of villages (row 12), and individual social capital and the interaction of individual and village social capital (row 20). Row 20 suggests that the coefficients of village *social capital* and *village inequality* in *modern income* remained virtually unchanged relative to the core regressions after adding individual and village social capital. In contrast to findings from industrial nations (Kawachi, Kim, Coutts, & Subramanian, 2004; Subramanian, Kim, & Kawachi, 2002), we found that neither the direct effect of individual social capital nor the interaction effect of individual and village social capital bore a statistically

significant association with the outcomes; village social capital protects against negative emotions independent of people's own expression of social capital or pro-social behavior.

The main results of the core regression did not change when we clustered data by village (row 18) or household (row 19) each quarter instead of individual, when using an ordered probit instead of using an ordered logit (row 8), or when using other indices of income inequality beside the Gini coefficient (rows 1–2).

Second, the main results held up better when using *sadness* and *anger* than when using *fear* or *alcohol* consumption as outcome variables.

Third, the coefficients for village *social capital* were more robust than the coefficients for village *inequality* in *modern income*. The following changes attenuated the coefficient of village *inequality* in *modern income*: (a) changes in the economic resource (e.g., using *traditional* or *modern wealth* to measure *inequality* instead of using *modern income*) (rows 3–5) and (b) the use of reference groups within the total sample to estimate indices of village *inequality* in *modern income* (e.g., using the village *income inequality* for each sex). The signs for the coefficients for village *wealth inequality* were negative rather than positive, as was the case with the sign for the coefficient for village *inequality* in *modern income*, but results were statistically significant only when using village inequality in *modern wealth*, not when using village *inequality* in *traditional wealth*. As mentioned, Tsimane' take a cavalier attitude toward their assets, rarely hiding them, often leaving them in the open for others to use. This contrasts with income, which is easier to guard. Thus, greater village *inequality* in either *modern* or *traditional wealth* would be associated with fewer negative emotions since people at the bottom of the income hierarchy can share the assets. But why would associations be stronger with *modern wealth* than with *traditional wealth*? We suspect that the answer probably has to do with errors in the measure of the value of traditional assets. Because modern assets come from the market, they have a market price, which makes easier their valuation. In contrast, traditional assets often do not have a market price, so one must impute a value, a procedure that introduces random measurement error.

The attenuation in the coefficients for village *income inequality* when estimated separately for women and men (row 6) suggests that the positive

Table 3
Analysis of robustness: Changes to columns [c] of Table 2

Explanatory Variables	Dependent variables				Changes
	Sadness	Anger	Fear	Alcohol	
0. Inequality	2.30 (0.69)***	4.18 (0.73)***	2.30 (0.76)***	-2.39 (0.77)***	Core model, columns [c] Table 2
Social capital	-0.28 (0.07)***	-0.34 (0.08)***	-0.24 (0.07)***	-0.22 (0.07)***	
1. Inequality	0.97 (0.26)***	1.57 (0.28)***	0.55 (0.30)*	-0.36 (0.28)	Std. dev. of log income
Social capital	-0.26 (0.07)***	-0.31 (0.08)***	-0.21 (0.07)***	-0.24 (0.07)***	
2. Inequality	0.24 (0.067)***	0.44 (0.07)***	0.31 (0.07)***	-0.07 (0.08)	Income coefficient of variation
Social capital	-0.30 (0.07)***	-0.39 (0.08)***	-0.28 (0.08)***	-0.22(0.08)***	
3. Inequality	-0.71 (0.91)	-0.84 (1.02)	-2.32 (0.99)**	-0.20 (0.93)	Village wealth inequality:(a) Total
Social capital	-0.24 (0.07)***	-0.25 (0.08)***	-0.19 (0.07)***	-0.24 (0.07)***	
4. Inequality	-4.17 (1.02)***	-5.19 (1.22)***	-5.92 (1.17)***	2.13 (1.08)**	(b) Modern
Social capital	-0.24 (0.071)***	-0.23 (0.07)***	-0.18 (0.075)**	-0.25 (0.08)**	
5. Inequality	-0.41 (1.12)	-0.81 (1.31)	-2.14 (1.19)*	-1.55 (1.23)	(c) Traditional
Social capital	-0.24 (0.07)***	-0.25 (0.08)***	-0.17 (0.07)**	-0.22 (0.08)***	
6. Inequality	0.68 (0.07)***	0.35 (0.22)	0.13 (0.22)	-0.06 (0.21)	Sex-specific village income inequality
Social capital	-0.24 (0.07)***	-0.26 (0.08)	-0.19 (0.07)***	-0.24 (0.07)***	
7. Inequality	2.82 (0.86)***	4.74 (0.90)***	3.19 (1.02)***	-2.63 (0.93)***	Add children, attriters, wealth
Social capital	-0.33 (0.09)***	-0.48 (0.11)***	-0.29 (0.09)***	-0.33 (0.09)***	
8. Inequality	1.31 (0.40)***	2.26 (0.44)***	1.27 (0.45)***	Not applicable	Ordered probit
Social capital	-0.157 (0.04)***	-0.19 (0.05)***	-0.13 (0.04)***		
9. Inequality	-1.62 (0.98)	1.37 (1.00)	-0.01 (0.92)	-3.02 (0.92)***	Lagged X's
Social capital	-0.48 (0.09)***	-0.53 (0.100)***	-0.49 (0.10)***	-0.17 (0.09)**	
10. Inequality	0.57 (0.28)**	0.43 (0.23)*	0.34 (0.26)	-0.16 (0.14)	Individual fixed effect
Social capital	0.03 (0.03)	-0.01 (0.03)	0.03 (0.03)	-0.01 (0.02)	
11. Inequality	0.79 (0.28)***	0.42 (0.24)*	0.53 (0.27)*	-0.26 (0.15)*	Household fixed effect
Social capital	0.05 (0.04)	-0.05 (0.03)*	0.05 (0.03)	-0.01 (0.02)	

12. Inequality	1.77 (0.81)**	2.57 (0.86)***	1.54 (0.83)*	-0.84 (0.86)	Village fixed effect
Social capital	0.14 (0.09)	-0.03 (0.12)	0.14 (0.10)	0.06 (0.11)	
13. Inequality	0.80 (0.19)***	0.79 (0.16)***	0.78 (0.19)***	-0.27 (0.14)*	Hierarchical linear model
Social capital	0.01 (0.02)	-0.02 (0.01)	0.01 (0.01)	-0.04 (0.01)***	
14. Inequality	3.20 (0.68)***	4.51 (0.75)***	2.78 (0.78)***	-2.56 (0.73)***	Add mean village income
Social capital	-0.17 (0.06)***	-0.28 (0.07)***	-0.16 (0.07)**	-0.21 (.007)***	
15. Inequality	2.60 (0.91)***	4.67 (0.97)***	3.31 (0.98)***	0.72 (1.00)	Add median village income
Social capital	-0.16 (0.06)***	-0.28 (0.07)***	-0.17 (0.07)**	-0.24 (0.07)***	
16. Inequality	2.31 (0.68)***	4.18 (0.74)***	2.25 (0.76)***	-2.56 (0.78)***	Add religion dummy
Social capital	-0.22 (0.07)***	-0.35 (0.09)***	-0.19 (0.08)**	-0.07 (0.08)	
17. Inequality	2.37 (0.69)***	4.18 (0.73)***	2.35 (0.76)***	-2.27 (0.77)***	Add age ² and household size ²
Social capital	-0.27 (0.07)***	-0.35 (0.08)***	-0.24 (0.07)***	-0.18 (0.07)**	
18. Inequality	2.30 (1.01)**	4.18 (1.22)***	2.30 (1.11)**	-2.39 (0.77)***	Cluster by village-quarter
Social capital	-0.28 (0.09)***	-0.34 (0.12)***	-0.24 (0.11)**	-0.22 (0.07)***	
19. Inequality	2.30 (0.59)***	4.18 (0.62)***	2.30 (0.63)***	-2.39 (0.77)***	Cluster by household-quarter
Social capital	-0.28 (0.05)***	-0.34 (0.07)***	-0.24 (0.06)***	-0.22 (0.07)***	
20. Inequality	2.28 (0.68)***	4.14 (0.73)***	2.30 (0.76)***	-2.32 (0.77)***	Add individual social capital
Social capital	-0.34 (0.08)***	-0.41 (0.09)***	-0.24 (0.08)***	-0.14 (0.09)	

Multivariate regressions are the same as those in columns [c], Table 2, except for changes noted in last column of Table 3.

[3–5] = Gini coefficients of various measures of wealth estimated for villages each quarter.

[6] = The measure of village inequality includes the standard deviation of the logarithm of *modern income* in the village/quarter only of women or only of men.

[7] = Regression includes the logarithm of total wealth, the number of children < 13 years, and a dummy variable for temporary or permanent attriters. Permanent attriters never returned; temporary attriters were absent in one round but returned in subsequent rounds.

[13] = Three-level nested panel linear mixed model with random intercepts at individual, individuals within households, and households within villages.

[16] = Dummy variable added if participant identified as Protestant; excluded category includes Catholics and people without a religious affiliation.

associations between income inequality and negative emotions probably stems from a comparison with all adults in the village rather than with a comparison limited to people of one's own sex. The chief reasons why the coefficients for *social capital* lose significance have to do with the use of individual and household fixed effects, and hierarchical linear models; the changes did not attenuate the coefficient of village *inequality* in *modern income*. We have no explanation why fixed-effect or hierarchical linear models attenuate the coefficient of village *social capital* but not the coefficient of village *income inequality*.

We did other analysis not shown. We found no evidence that results varied by levels of income, age, or sex. During the surveys, we also asked about smoking and found similar results to alcohol consumption. Last, we expressed *BMI* in raw levels rather than in logarithms, and found that results did not change significantly.

Conclusion

The study has contributed to our understanding of how income inequality might affect health by presenting information from a highly autarkic, small-scale, pre-industrial society in the early stages of continual exposure to the market economy. Results confirm some findings from industrial nations, fail to confirm others, and raise questions for future research.

The positive association between income inequality and negative emotions and stress behaviors so often found in industrial nations is not unique to industrial nations. We also found a positive association between income inequality and negative emotions (but not alcohol consumption). Results held up after introducing a wide range of changes in the types of controls, regressions, definition of variables, and clustering. Since we found a positive association between income inequality and negative emotions after controlling for social capital, we doubt social capital could explain the link between income inequality and health.

Some of our results differ from those of industrial nations. For example, in contrast to findings from industrial nations where the associations between income inequality and negative emotions and stress behaviors hold chiefly for sub-samples rather than for the pooled sample, here we found the opposite. Results held up only for the pooled sample, not for groups broken down by age, sex, or income. The

village inequality in income of people of the same sex as the participant bore a much weaker association with individual outcomes as the village inequality in income of all adults in the village. In contrast to industrial nations where individual resources protect health, here we found spotty evidence that income, schooling, or short-run nutritional status protected against negative emotions or stress behavior. The results could reflect a combination of measurement error, low level of resources, and lack of variance in resources.

The analysis points to the usefulness of examining intra-household spillovers and using other individual economic resources besides income. We found preliminary evidence of spillovers within the household even after controlling for household-fixed effects, and we found that wealth and income inequality bore a different association with the outcomes. Whereas income inequality bore the expected positive association with negative emotions, wealth inequality (particularly inequality in *modern wealth*) was associated with fewer negative emotions. Unlike industrial nations, *wealth inequality* in pre-industrial societies might be associated with fewer negative emotions if social norms allow people to borrow each other's assets. When this happens, more *wealth inequality* might go with better health.

Why might *inequality* in *modern income* bear a negative association with negative emotions after conditioning for *social capital*? We doubt the other two hypotheses commonly cited in industrial nations — residential segregation and public policies — would explain the finding because daily interactions take place in small villages and villages have no revenues to spend on public health. In recent studies (Godoy, Reyes-García, vadez, et al., 2005; Godoy, Byron, et al., 2005) we show that village income inequality among Tsimane' does not bear any significant association with anthropometric indices of short-term nutritional status nor with self-perceived health. The results presented here complement those findings because they suggest that village income inequality might increase negative emotions and stress behaviors *before* harming health, though income inequality could affect blood pressure or immune function.

A hypothesis worth exploring in the future has to do with people's innate dislike for inequality — dislikes that likely have roots in our pre-human past. A recent experimental study with non-human primates shows that inequities produced by researchers who

arbitrarily manipulated rewards increased sullenness, grievance, and angry behavior among primates (Brosnan & de Waal, 2003). If partially hard wired, the dislike for inequality would naturally operate independent of individual resources, household attributes, or community social capital.

Acknowledgements

Grants from the programs of Biological and Cultural Anthropology of the National Science Foundation (0078801, 0134225, 0200767, 9731240, 9904318, and 0322380) and the Wenner-Gren Foundation (GR-7250) covered the expenses of the research. Thanks to L. Apaza, E. Conde, J. Dávila, H. Rivas, Y. Lobo, L. Parada, B. Nate, P. Pache, E. Tayo, S. Cari, J. Cari, M. Roca, D. Pache, J. Pache, and V. Cuata for help collecting data and logistical support, to the Gran Consejo Tsimane' for their continuous support, and to three anonymous reviewers and Ichiro Kawachi for helpful comments.

References

- Brosnan, S. F., & de Waal, F. B. M. (2003). Monkeys reject unequal pay. *Nature*, *425*, 297–299.
- Byron, E. (2003). *Markets and health: The impact of markets on the nutritional status, morbidity, and diet of the Tsimane' Amerindians of Lowland Bolivia*. Ph.D. dissertation, Department of Anthropology, University of Florida.
- Deaton, A. (2003). Health, inequality, and economic development. *Journal of Economic Literature*, *41*, 113–158.
- Diez-Roux, A. V., Link, B. G., & Northridge, M. E. (2000). A multilevel analysis of income inequality and cardiovascular disease risk factors. *Social Science & Medicine*, *50*, 673–687.
- Dressler, W. W. (2004). Cognitive anthropology. In M. Lewis-Beck, A. Bryman, & T. Futing Liao (Eds.), *Encyclopedia of social science research methods*. London: Sage Publication.
- Durlauf, S. N., & Fafchamps, M. (2005). Social capital. In P. Aghion, & S. N. Durlauf (Eds.), *Handbook of economic growth*. Amsterdam: North-Holland, (In press).
- Eaton, W. W., & Muntaner, C. (1999). Socioeconomic stratification and mental disorder. In A. V. Horwitz, & T. L. Scheid (Eds.), *Handbook for the study of mental health* (pp. 259–283). New York: Cambridge University Press.
- Egolf, B., Lasker, J., Wolf, S., & Potvin, L. (1992). The Roseto effect. *American Journal of Public Health*, *82*, 1089–1092.
- Ellis, R. (2002). Brujería y enojo entre Tsimanes y carayanas: Una aproximación al estudio antropológico de las emociones. Unpublished manuscript. La Paz: Museo Etnográfico.
- Fiscella, K., & Franks, P. (2000). Individual income, income inequality, health, and mortality: What are the relationships? *Health Services Research*, *35*, 307–318.
- Godoy, R., Reyes-García, V., Vadez, V., Leonard, W. R., Huanca, T. L., & Bauchet, J. (2005). Human capital, wealth, and nutrition in the Bolivian Amazon. *Economics and Human Biology*, *3*, 139–162.
- Godoy, R. A., Byron, E., Reyes-García, V., Vadez, V., Leonard, W. R., Apaza, L., et al. (2005). Income inequality and adult nutritional status: Anthropometric evidence from a pre-industrial society in the Bolivian Amazon. *Social Science & Medicine*, *61*, 907–919.
- Godoy, R. A., Leonard, W. R., Reyes-García, V., Goodman, E., Huanca, T., McDade, T. W., et al. (2005). Physical stature of adult Tsimane' Amerindians, Bolivian Amazon in the 20th century. *Economics and Human Biology*, in press.
- Godoy, R. A., Reyes-García, V., Huanca, T., Leonard, W. R., Vadez, V., Valdes-Galicia, C., et al. (2005). Why do subsistence-level people join the market economy? *Journal of Anthropological Research*, *61*, 157–178.
- Gunnell, D., Middleton, N., Whitley, E., Dorling, D., & Franker, S. (2003). Why are suicide rates rising in young men but falling in the elderly? *Social Science & Medicine*, *57*, 595–611.
- Henderson, C., Liu, X., Diez-Roux, A. V., Link, B. G., & Hasin, D. (2004). The effects of US state income inequality and alcohol policies on symptoms of depression and alcohol dependence. *Social Science & Medicine*, *58*, 565–575.
- Kahn, R. S., Wise, P. H., Kennedy, B. P., & Kawachi, I. (2000). State income inequality, household income, and maternal mental and physical health. *British Medical Journal*, *321*, 1311–1315.
- Kaplan, G. A., Pamuch, E. R., Lynch, R. D., Cohen, R. D., & Balfour, J. L. (1996). Income inequality and mortality in the United States. *British Medical Journal*, *312*, 999–1003.
- Kawachi, I., & Kennedy, B. P. (2002). *The health of nations. Why inequality is harmful to your health*. New York: The Free Press.
- Kawachi, I., Kennedy, B. P., & Wilkinson, R. G. (1999). Introduction. In I. Kawachi, B. P. Kennedy, & R. G. Wilkinson (Eds.), *The society and population health reader: Income inequality and health* (pp. 1–19). New York: The New Press.
- Kawachi, I., Kim, D., Coutts, A., & Subramanian, S. V. (2004). Reconciling the three accounts of social capital. *International Journal of Epidemiology*, *33*, 682–690.
- Kennedy, B. P., Kawachi, I., Glass, R., & Prothrow-Stith, D. (1998). Income distribution, socioeconomic status, and self rated health in the United States. *British Medical Journal*, *317*, 917–921.
- Kopp, M. S., Skrabski, A., & Szedmak, S. (2000). Psychosocial risk factors, inequality and self-rated morbidity in a changing society. *Social Science & Medicine*, *51*, 1351–1361.
- Krieger, N. (1993). Racism, sexism, and social class. *American Journal of Preventive Medicine*, *9*, 82–122.
- Larrea, C., & Kawachi, I. (2005). Does economic inequality affect child malnutrition? The case of Ecuador. *Social Science & Medicine*, *60*, 165–178.
- LeClere, F. B., & Soobader, M.-J. (2000). The effect of income inequality on the health of selected US demographic groups. *American Journal of Public Health*, *90*, 1892–1897.
- Lobmayer, P., & Wilkinson, R. G. (2002). Inequality, residential segregation by income, and mortality in US cities. *Journal of Epidemiology and Community Health*, 183–187.
- Lynch, J., Davey Smith, G., Harper, S., & Hillemeier, M. (2004). Is income inequality a determinant of population health? Part 2. *The Milbank Quarterly*, *82*, 355–400.

- Lynch, J., Davey Smith, G., Harper, S., Hillemeir, M., Ross, N., Kaplan, G. A., et al. (2004). Is income inequality a determinant of population health? Part 1. *The Milbank Quarterly*, 82, 5–99.
- Lynch, J., Harper, S., & Davey Smith, G. (2003). Commentary. *International Journal of Epidemiology*, 32, 1029–1036.
- Lynch, J., & Kaplan, G. A. (1997). Understanding how inequality in the distribution of income affects health. *Journal of Health Psychology*, 2, 297–304.
- Macinko, J., & Starfield, B. (2001). The utility of social capital in research on health determinants. *The Milbank Quarterly*, 79, 387–427.
- Marmot, M., Kogevinas, M., & Elston, M. A. (1987). Social/economic status and disease. *Annual Review of Public Health*, 8, 111–135.
- Marmot, M., & Wilkinson, R. G. (2001). Psychosocial and material pathways in the relation between income and health. *British Medical Journal*, 322, 1233–1236.
- Martinez, R. (1996). Latinos and lethal violence. *Social Problems*, 43, 131–146.
- Matt, S. J. (2002). Children's envy and the emergence of the modern consumer ethic, 1890–1930. *Journal of Social History*, 36, 283–302.
- McDade, T. W. (2002). Status incongruity in Samoan youth. *Medical Anthropology Quarterly*, 16, 123–150.
- Mellor, J. M., & Milyo, J. D. (2001). Income inequality and health. *Journal of Policy Analysis and Management*, 20, 151–159.
- Muramatsu, N. (2003). County-level income inequality and depression among older Americans. *Health Services Research*, 38, 1863–1883.
- Schieman, S. (2003). Socioeconomic status and the frequency of anger across the life course. *Sociological Perspectives*, 46, 207–222.
- Shihadeh, E. S., & Steffensmeier, D. J. (1994). Economic inequality, family disruption, and urban Black violence. *Social Forces*, 73, 729–751.
- Singh-Manoux, A., Adler, N. E., & Marmot, M. G. (2003). Subjective social status. *Social Science & Medicine*, 56, 1321–1333.
- Sturm, R., & Gresenz, C. R. (2002). Relations of income inequality and family income to chronic medical conditions and mental health disorders. *British Medical Journal*, 324, 20–23.
- Subramanian, S. V., Delgado, I., Jadue, L., Vega, J., & Kawachi, I. (2003). Income inequality and health. *Journal of Epidemiology and Community Health*, 57, 844–848.
- Subramanian, S. V., & Kawachi, I. (2004). Income inequality and health. *Epidemiologic Review*, 26, 78–91.
- Subramanian, S. V., Kim, D. J., & Kawachi, I. (2002). Social trust and self-rated health in US communities. *Journal of Urban Health*, 79, S21–S34.
- Wagstaff, A., & van Doorslaer, E. (2000). Income inequality and health: What does the literature tell us? *Annual Review of Public Health*, 21, 543–567.
- Watson, P. (1995). Explaining rising mortality among men in Eastern Europe. *Social Science & Medicine*, 41, 923–934.
- Weich, S., Lewis, G., & Jenkins, S. P. (2001). Income inequality and the prevalence of common mental disorders in Britain. *British Journal of Psychiatry*, 178, 222–227.
- Wilkinson, R. G. (1996). *Unhealthy societies: The affliction of inequality*. London: Routledge.
- Wilkinson, R. G. (1997). Commentary. *British Medical Journal*, 314, 1727–1728.
- Williams, R. B. (1998). Lower socioeconomic status and increased mortality. *Journal of American Medical Association*, 279, 1745–1746.