

Income and Income Inequality as Social Determinants of Health: Do Social Comparisons Play a Role?

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Abstract: Two of the most prominent phenomena in the study of social determinants of health, the socio-economic gradient in health and the income inequality–health association, have both been suggested to be explainable by the mechanism of status comparisons. This, however, has rarely ever been tested in a direct fashion. In this article, we explicate and test this mechanism by assessing the role of social comparison orientation. Research has shown that individuals vary in their propensity to engage in social comparisons, and those with a higher propensity are also more likely to be affected by the outcomes of such comparisons. In our analysis, we check whether the tendency to compare one’s income to that of others can contribute to explaining socio-economic disparities in health. Using individual-level data ($N = 18,356$) from 23 European countries on self-rated overall health and psychological well-being, we show that a high-income comparison orientation neither moderates the negative effect of income inequality on health nor the health differences by relative income. Our findings cast doubt on the crucial role that researchers such as Wilkinson and Pickett (2010) have attributed to the mechanism of status differentiation as the link between social stratification and health outcomes.

The effects of social conditions on individual health have long been acknowledged. Earlier research has conclusively shown how both social relationships and socio-economic status (SES) have positive effects on a large variety of health outcomes. Individuals who are better socially integrated benefit from better health than those who are less socially integrated (Holt-Lunstad, Smith and Layton, 2010), and individuals with a higher SES exhibit better health than their low-SES counterparts (Elo, 2009). Research has further established that not only factors at the individual level affect health, but also contextual-level conditions can do so. The recent debate as to how greater income inequality in a society can diminish the health of individuals in it is an example for such contextual influences on health. How such social antecedents operate to affect health and disease, however, is still not fully understood (Elo, 2009; Thoits, 2011).

Prominent explanatory approaches for these relationships have focused on the material living conditions of individuals and societies on the one hand and psychosocial mechanisms on the other. Material living

conditions such as strenuous physical labour or less health care access have long been proposed as reasons for the poorer health of the lower social strata. With respect to the negative income inequality–health correlation, the so-called ‘neo-materialist’ approach blamed an underinvestment into human, physical, and cultural capital occurring in high-inequality societies (Davey Smith, 1996; Lynch *et al.*, 2004). Societies with greater income inequality have fewer collective resources to invest in the educational, medical, and cultural infrastructure, which in turn hurts health and stretches the social fabric.

Recently, researchers have turned to psychosocial factors to explain links between SES and health (Schnittker and McLeod, 2005). One of those factors, social comparisons, is assumed to be a key mechanism linking social conditions and health. For instance, comparing one’s own health or health behaviours can have important effects on one’s health assessments and future health behaviours (Thoits, 2011). Individuals receive guidance in terms of behaviour and norms when comparing their health and health behaviours to

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others' health and lifestyles. Comparing with others can aid in the interpretation of physical symptoms, help adapting to health threats, and provide social validation for personal health behaviours (Suls, 2003).

Conversely, a type of social comparison process that has been suggested to lead to negative health effects is the comparison of social status. Social status comparisons are assumed to underlie two of the most prominent phenomena in research on societal determinants of health, the socio-economic gradient in health (Marmot, 2004), and the negative inequality–health correlation (Wilkinson and Pickett, 2010). The socio-economic gradient in health refers to the oft-replicated finding that in developed countries health disparities arise between the different socio-economic strata, with those better off economically exhibiting better health than their counterparts from lower socio-economic strata. The negative income inequality–health correlation refers to the finding that population health in those developed societies is worse where income inequality is higher. Some researchers have attributed these phenomena to a common core, namely the existence of status hierarchies in societies and the status competition that takes place in these hierarchies (Marmot, 2004; Wilkinson and Pickett, 2010).

According to this explanation, individuals are assumed to compete for status and prestige in social hierarchies, and being unsuccessful in this status competition, i.e. receiving negative appraisals of one's status, has been shown to lead to stress (Dickerson and Kemeny, 2004). Chronic stress, in turn, is related to all sorts of negative health outcomes (Sapolsky, 2004). Thus, firstly, being on a lower or higher rung of the social ladder leads to more or less negative appraisals of one's status; this leads to more or less stress and illnesses, and a socio-economic gradient in health and illness emerges (Marmot, 2004). Secondly, living in a society with more income inequality, which equates to being on a social ladder where the rungs are farther apart, should result in more status competition and more negative appraisals of one's status for most people and a negative correlation between income inequality and average health emerges. This could either affect all members of a society to the same extent (as suggested by Wilkinson and Pickett, 2010) or predominately those at the bottom of the income distribution (Lancee and Van de Werfhorst, 2012).

If these presumed causal chains were true, individuals who would be more sensitive to status competition should exhibit greater health effects. Social psychological research has shown that individuals vary in their propensity to engage in social comparisons (Buunk and Gibbons, 2007). Furthermore, it has been shown that

those who are more prone towards comparisons are also more likely to be affected by the results of such comparisons (Buunk and Gibbons, 2007). In our study, we will focus on one form of status comparisons, namely income comparisons. We will proceed from the assumptions that income is an important status marker in contemporary societies (Marmot, 2004) and that the importance individuals attribute to income comparisons reflect their social comparison orientation and their sensitivity to status competition. We will use this income comparison orientation to test its moderating effect on the relationships between relative income, income inequality, and health.

Our study will extend existing research in three distinct ways. Firstly, we make use of a novel approach to test an assumption underlying a mechanism proposed to be responsible for both the negative health effects of low SES and income inequality, namely social comparisons of one's social status. According to our knowledge, this has never been tested before. We draw on social-psychological findings about differences in the propensity to engage in and the sensitivity towards social comparisons and this allows overcoming the practical problems associated with reliably and validly measuring social comparisons. Earlier research on status comparisons as a linking mechanism has relied on imposing the assumption that individuals compare their incomes to demographically similar groups. Secondly, by focusing on a potential common cause we contribute to linking the up to now largely separate debates on health effects of income inequality and health inequalities (Beckfield, Olafsdottir and Bakhtiari, 2013; Wilkinson and Pickett, 2008). Thirdly, we aim at giving a comprehensive view of health as a psychophysical entity by drawing on two distinct indicators of health, namely general health and psychological well-being, both measured via self-reports. By using these two indicators as our outcome variables, we are able to distinguish between general and mental health effects of income and income inequality.

Exploiting the third wave of the European Social Survey (ESS, 2006/07), our study analyses the relationship between income inequality, income comparisons, and health for 18,356 Europeans in paid work from 23 countries.

Background and Hypotheses

The Socio-Economic Gradient in Health

The finding of an SES gradient in health in the sense that those of higher SES enjoy better health than those in lower positions of the social ladder is a nearly universal

one: historical sources show that there has been a socio-economic gradient in health in ancient Greece, Egypt, and China (Krieger *et al.*, 1997). Comparative sources reveal that a socio-economic gradient in health can nowadays be found in all countries (Elo, 2009; Beckfield, Olafsdottir and Bakhtiari, 2013), irrespective of public health care provision and welfare regimes. Furthermore, the gradient has been documented not only for self-rated health and life expectancy, but also for a wide range of health outcomes.

Research on the SES–health gradient has proposed a whole range of causal pathways linking one’s economic conditions to health, such as health behaviours, poverty, access to and quality of health care, but these are seen as incomplete (Elo, 2009). Status differences are one of the many explanatory factors proposed and have received a substantial amount of attention in the debate. Status in this context refers to distinction in valued aspects, and does not necessarily entail a high SES (Frank, 1985; Brennan and Pettit, 2004). After an income threshold beyond material hardships has been passed, additional income does not buy better health—it becomes a marker of status (Marmot, 2004). In line with the gains in happiness that are brought about by a higher relative income (Clark, Frijters and Shields, 2008), individuals are concerned about their position in the hierarchy. This corresponds to an evolutionary account of the emergence of status seeking (Marmot, 2004) and to links between hierarchies and stress and illness encountered in non-human primates (Shively, 2000; Sapolsky, 2005). Furthermore, the status competition explanation is in line with recent findings about subjective SES: subjective SES—the subjective assessment of one’s own SES in a society—has been shown to be crucially related to health outcomes (Schnittker and McLeod, 2005). Believing that one has a high socio-economic position is beneficial for health irrespective of one’s actual SES measured in an objective way. Subjective SES inherently involves social comparisons: one has to size up peers to gain an impression of one’s own ranking in the social hierarchy. Evidence for the effect of subjective SES is strong: in an experimental prospective study, Cohen *et al.* (2008) were able to show that it was the subjective assessment of SES and not the objective indicators that predicted whether participants developed a common cold when exposed to a common cold virus.

In line with existing evidence (Lorant *et al.*, 2003; Beckfield, Olafsdottir and Bakhtiari, 2013), we suggest that there is a socio-economic gradient in self-rated health and psychological well-being.

H1. *Relative income is positively related to self-rated health and psychological well-being.*

The Negative Income Inequality–Health Correlation

Evidence of a zero-order correlation between income inequality and population health outcomes in developed societies has been presented since the late 1970s (Rodgers, 1979), but it was not until Wilkinson’s (1992) contribution that the debate gained momentum. Wilkinson (1992) suggested that there was a -0.86 country-level correlation between income inequality and life expectancy. Numerous replications followed, and probably the most extensive narrative review by Wilkinson and Pickett (2006) counted 139 studies until then. Studies, however, vary strongly in their methodological quality; especially early studies largely relied on aggregate-level data with only few data points. Narrative reviews like Wilkinson and Pickett’s (2006) and the one by Lynch *et al.* (2004) thus vary in their conclusions: whereas Lynch *et al.* refute the idea of any meaningful correlation between income inequality and health and argue for the neo-materialist account of a spurious association between inequality and health, Wilkinson and Pickett insist on a causal relationship. Also, recent high-quality studies only provide mixed evidence. Kondo and colleagues’ (2009) meta-analysis of earlier multilevel studies showed a correlation between income inequality and health. This correlation, however, was substantially attenuated when unmeasured characteristics of areas with high income inequality were accounted for. In a similar vein, fixed-effects analyses of macro-level data sets attributed the correlation between income inequality and health fully to unobserved heterogeneity (Beckfield, 2004) or could find such a correlation in low- and middle-income countries only (Pop, van Ingen and van Oorschot, 2013).

Based on theoretical reasoning and the bulk of the existing evidence, we suggest that there is a negative correlation between income inequality in a country and health.

H2. *Income inequality is negatively correlated with self-rated health and psychological well-being.*

Social Comparisons and Psychobiological Reactions to Hierarchies

Social comparisons are assumed to be an innate human activity that evolved over evolutionary time. To match with potential competitors is an ability of high adaptive value that has been recognized in many species (Gilbert, Price and Allan, 1995). Social comparisons form the foundations of self-knowledge (Fiske, 2011) and can

satisfy the basic human need to feel competent by letting people know whether their opinions are correct and what their abilities allow them to do (Festinger, 1954). Social comparisons have also long been a focal interest of classical sociology, for instance, Veblen's (1899) notion of conspicuous consumption, which suggested that social status is communicated to strangers via wasteful ways of spending money.

Social comparison theory has had sizable impact on research on health and health behaviours (Buunk and Gibbons, 1997; Suls, 2003). Individuals use the attitudes, beliefs, and behaviours of others as benchmarks for evaluating their own attitudes, beliefs, and behaviours, and usually shift their own to match those of the group. Furthermore, norms about health behaviours are acquired via social comparison processes, for instance, through the use of alcohol and cigarettes, seeking health care and counseling, adherence to treatment regimes, and to attend to diet (Thoits, 2011).

In the case of status hierarchies, social comparisons of status positions can have different effects. Perceiving oneself to be better than others is beneficial for self-esteem, positive affect, and it reduces anxiety. Negative results of comparisons diminish self-esteem, produce negative affect, and can cause stress (Buunk and Gibbons, 1997). In the case of an individual with low status, for instance, a person with little income, income comparisons will most likely lead to stress (Marmot, 2004). In the case of income inequality, people living in areas with high, rather than low, income inequality are more concerned about how they compare with others (status anxiety) and feel deprived, marginalized, and angry as a result (relative deprivation) (Wilkinson and Pickett, 2010). Threats to one's social esteem, value, and status have been shown to be salient for creating stress (Dickerson and Kemeny, 2004).

Stress, in turn, is linked to negative health effects in two ways. Firstly, there is a direct connection via physiological pathways. Stressed individuals react with a fight-or-flight response: energy is mobilized via putting out glucocorticoids to exercise muscles, and other non-essential processes for fighting or fleeing are deferred, such as digestion, growth, inflammation, and tissue repair, and immune function is inhibited (Sapolsky, 2005). While this is functional in the case of immediate danger, studies have shown that these physiological processes taking place in stressful situations are dangerous when experienced chronically. Secondly, there is an indirect connection between stress and bad health in the sense that individuals might engage in unhealthy behaviours such as smoking or overeating. These are forms of relaxation and pleasure that can serve to

regulate the mood of the disadvantaged (Pampel, Krueger and Denney, 2010).

Whereas early research assumed that social comparisons largely depend on situational factors (Mussweiler, 2003) and not on personality, recent research was able to show, however, that individuals vary in their propensity to engage in social comparisons (Buunk and Gibbons, 2007). Social comparisons can be functional in many situations. For instance, a strong social comparison orientation has been shown to serve an adaptive function that enhances subjective well-being among the elderly (Frieswijk *et al.*, 2007); social comparisons provided the elderly with information that allowed them to make adjusted assessments of their own situation. Research has also shown that results of such comparisons have a stronger impact on those who have a stronger social comparison orientation (Buunk and Gibbons, 2007). In our study, we will focus on an important and easily measurable aspect of social comparison orientation, namely, income comparison orientation. An earlier study was able to show that income comparisons were less likely to be important the higher one's household income, although the effect was small and contradicted by a non-linear effect of education on income comparisons (Clark and Senik, 2010), providing support to the notion that income comparison orientation is a personality trait.

In sum, distressing comparison processes have been suggested to be at the core of the socio-economic gradient in health and the negative effects of income inequality on health. Previous research on the SES–health link did not consider that there are considerable personality differences in social comparison orientation, as shown by recent advances in psychological research on personality and social comparisons. We posit that individuals with a greater propensity to compare their incomes should suffer more in countries with greater income inequality and when their relative income is lower. To test whether comparison processes really are key in explaining the socio-economic gradient in health and the inequality–health association, we hypothesize that those individuals who are more sensitive towards comparison processes due to a greater income comparison orientation should experience greater health effects of relative income and of income inequality.

H3. *Income comparison orientation moderates the effect of relative income on self-rated health and psychological well-being in the sense that those respondents with a stronger income comparison orientation will experience stronger relative income effects.*

H4. *Income comparison orientation moderates the effect of income inequality on self-rated health and psychological well-being in the sense that those respondents with a stronger income comparison orientation will experience stronger income inequality effects.*

Methods and Data

Data

This study uses the third round of the ESS, a large-scale survey conducted in 25 European countries in 2006/07, namely, Austria, Belgium, Bulgaria, Switzerland, Cyprus, Germany, Denmark, Estonia, Spain, Finland, France, the United Kingdom, Hungary, Ireland, Latvia, the Netherlands, Norway, Poland, Portugal, Romania, Russia, Sweden, Slovenia, Slovakia, and Ukraine. Cyprus and Latvia had to be excluded from our study owing to differences in the measurement of the income comparison variable. Thus, our analyses are based on 23 countries.

Owing to the fact that our focal independent variable, the subjective importance of income comparisons, was collected only for respondents who are active on the labour market (employed, self-employed, and family workers), our analyses are restricted to respondents currently in paid work. To ensure that outliers in terms of age do not affect our results, we removed respondents >70 years of age. Furthermore, we removed respondents with missing values on one of our study variables. This results in a sample size of 18,356 complete cases.

Outcome Variables

Our analysis makes use of two dependent variables. *Psychological well-being* is based on a short version of the Centre for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977). Despite being a scoring rather than diagnostic measure, the CES-D is a strong predictor for depression without covering all potential symptoms of depression. Of the original 20 CES-D items, 8 items are included in the questionnaire, probing whether respondents felt, for instance, lonely, sad, or depressed in the past week. Four response options were provided, ranging from 'None or almost none of the time,' (0) to 'All or almost all of the time' (3). Responses were reverse coded, summed, and divided by eight, resulting in a composite variable ranging from 0 to 3, so that higher values indicate a higher degree of psychological well-being. The scale exhibits a high degree of internal consistency (Cronbach's $\alpha = 0.80$) and an earlier multi-group confirmatory factor analysis showed the validity of the

scale for cross-national comparison (Van de Velde *et al.*, 2010). Furthermore, it has already been successfully applied in cross-nationally comparative studies (Huijts, Kraaykamp and Subramanian, 2013). The intraclass correlation coefficient (*ICC*) of psychological well-being is 0.08, which is modest by conventional standards.

Self-rated overall health is measured with a single item: 'How is your health in general?' Response options ranged from 'very bad' (0) to 'very good' (4). Self-rated health is a general assessment of one's health status, not connected to any specific illness, but covering largely physical and functional aspects of health (Idler, Hudson and Leventhal, 1999). It has been shown to predict mortality and morbidity and has high test-retest reliability in a number of studies (Idler and Benyamini, 1997). Furthermore, this variable has been recommended by the World Health Organization for comparative research (De Bruin, Picavet and Nossikov, 1996) and a large number of researchers have followed this advice (Hildebrand and Van Kerm, 2009; Huijts, Monden and Kraaykamp, 2010), especially in the comparative study of health disparities (Mackenbach *et al.*, 2008; Gesthuizen, Huijts and Kraaykamp, 2012). Research has also shown that different socio-economic groups evaluate their health in comparable ways (Burström and Fredlund, 2001) and that the associations between objective health indicators and self-perceived health are largely similar across countries (Bardage *et al.*, 2005). Clustering of self-rated health within countries is moderate by conventional standards: self-rated health has an *ICC* of 0.13.

Means and standard deviations of the variables are reported in Table 1, along with descriptive statistics for all other individual-level variables. The correlation between the two outcome variables is $r = 0.35$, reflecting that they are two interrelated, yet distinct, aspects of health.

Key Predictor Variables

Importance of income comparisons was measured by the question 'How important is it for you to compare your income with other people's incomes?' Original response options ranged from 'Not at all important' (0) to 'Very important' (6), with no labels for the response options in between. Despite being a measure that has not yet been used in research on health inequities, Clark and Senik (2010) were able to demonstrate construct validity by showing its negative correlations to a wide range of well-being measures, something we would expect from theory (Kasser and Ryan, 1993). The left panel of Figure 1 shows the average income comparison orientation by income quintiles, and a slight negative relationship to income appears: those at the bottom of the income

distribution are more likely to engage in income comparisons than those at the top. The left panel of Figure 1 presents country averages in income comparison orientation. It shows that Eastern European countries (and Spain) exhibit the greatest average income comparison orientation, whereas the wealthier countries show lower values.

Relative household income was included as a set of dummy variables representing country-specific income quintiles, with the highest (fifth) quintile serving as the reference category. Specifically, the questionnaire asked all respondents for total household net income from all

sources. Response options were sets of income ranges, which slightly varied over countries. Owing to the fact that income information enters the models in the form of country-specific quintile dummy indicators, this does not have a substantial effect on our results. By using the mid-points of income categories, a metric household income variable was created, which in turn was equalized by dividing it by the square root of the number of household members. This brings household income to the individual level and adjusts household income for the economies of scale that arise when individuals live together. Controlling for individual income when assessing the inequality–health relationship is crucial, as the non-linear relationship between income and health on the individual level (every additional Euro will improve health only to a diminishing extent) can create a macro-level correlation between income inequality and health (Gravelle, 1998): with total income being constant, a more equal income distribution should yield better average health.

Income inequality was measured on the country-level via the Gini coefficient of net household income. The Gini coefficient ranges between 0 and 100, with 0 indicating an income distribution where every household has exactly the same income and 100 denoting that there is perfect inequality in the distribution (one household receives all income, while all other households receive

Table 1 Descriptive statistics individual-level variables, *N* = 18,356

Variable	Mean	SD	Min	Max
Psychological well-being	2.33	0.46	0	3
Self-rated general health	2.95	0.78	0	4
Female	0.49	0	0	1
Married/cohabiting	0.56	0	0	1
Age (centred)	0.00	12.10	-26.7	28.3
Income comparison orientation (centred)	0.00	1.85	-2.3	3.7
Education in years (centred)	0.00	3.63	-13.6	9.4

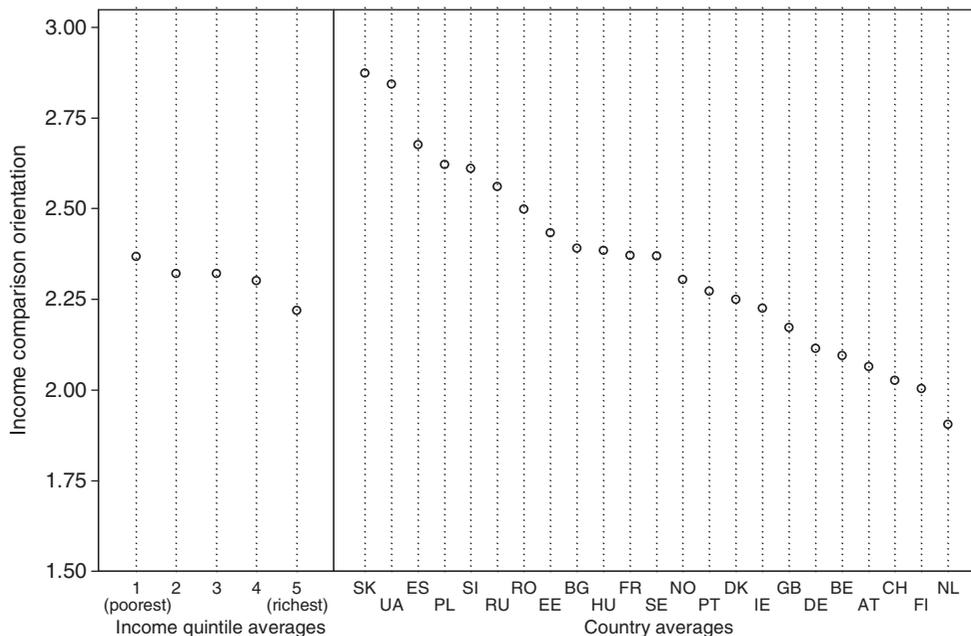


Figure 1 Average income comparison orientation by income quintile (left panel) and by country (right panel)

nothing). For sources and descriptive statistics, please consult the Supplementary Material. Earlier research demonstrated that the income inequality–health association is largely independent of the choice of income inequality measure used (Judge, Mulligan and Benzeval, 1998), and recent research has largely relied on the Gini coefficient (Wilkinson and Pickett, 2010; Layte, 2012; Ellwardt *et al.*, forthcoming; Whelan and Maitre, 2013).

Control variables included in our models are marital status/cohabitation (0 = not married or cohabiting with a partner, 1 = married/cohabiting with a partner), sex (0 = male, 1 = female), age, and education as measured in years. Furthermore, the log of Gross Domestic Product (GDP) per capita was controlled to adjust for differences in country wealth.

Method and Modelling Strategy

To test the hypotheses we derived from the theory, we estimate multilevel (random coefficient) models, with respondents nested in countries (Snijders and Boskers, 2012). Our models include random intercepts, thus allowing for country-specific constant terms in the regression equations. To facilitate interpretation of interactions and the random components, all continuous predictor variables have been grand-mean centred. We have tested a variety of alternative model specifications including random slopes and different shapes of the Gini coefficient (see the Supplementary Materials); however, they all lead substantially to the same conclusions.

In the first models (Model 1a and 1b) of Table 2, we check for the presence of an inequality–health correlation and an income gradient in health, controlling for various crucial covariates such as GDP per capita, and test Hypotheses 1 and 2. In Models 2a and 2b, we add the income comparison orientation variable to the equation, and in Models 3a and 3b, we enter the interaction between income inequality and income comparison orientation variable to test Hypotheses 3 and 4.

Results

Results of our analyses are presented in Table 2. Models 1a and 1b show that there is an income gradient both in psychological well-being and in self-rated health: the higher one's income, the better one's psychological well-being and the better one's overall health. This confirms Hypothesis 1, which had posited a positive relationship between relative income and health. For self-rated health, the gradient is somewhat steeper as all income groups are significantly worse off than the highest income quintile. For psychological well-being, the fourth quintile

does not differ significantly from the fifth, and thus gains in well-being seem to level off more strongly for each additional Euro.

With respect to Hypothesis 2, we find a negative effect of income inequality on both psychological well-being and self-rated health, and that is while holding individual income and country wealth constant. This confirms Hypothesis 2, which had suggested that there would be such a negative relationship. For a one-point increase in the Gini coefficient (approximately the difference between Ireland and Great Britain), psychological well-being drops by 0.007, and self-rated health is reduced by .016. For an increase of the Gini coefficient by one standard deviation (4.7), psychological well-being drops by $(SD(X)/SD(Y) \times b = 4.7/0.46 \times 0.007)$ 0.068 standard deviations, and self-rated health is reduced by $(4.7/0.78 \times 0.016)$ 0.10 standard deviations. Substantially, this effect is small, but this in line with the findings of earlier research such as Kondo *et al.* (2009).

Our control variables behave as suggested by earlier research: women report somewhat lower psychological well-being and general health than men, those who are married or cohabiting report being healthier than those who are not married or cohabiting, and health and psychological well-being decline with age.

Models 2a and 2b add income comparison orientation to the equation. Income comparison orientation is negatively related to psychological well-being and self-rated health, meaning that individuals who find income comparisons more important have worse mental and overall health. When comparing the coefficients of the income quintiles across the respective models, we see that there has been no substantial change in their sizes. This indicates that the income gradient in health is not mediated by income comparison orientation.

Models 3a and 3b then test Hypothesis 3, which had posited that income comparison orientation moderates the income gradient in health in the sense that those who are more prone towards income comparisons suffer more from low income. Both for psychological well-being and self-rated health we can see that none of the interaction terms are significant, and thus we do not find any empirical support for this hypothesis.

Models 4a and 4b test Hypothesis 4, which had stated that the negative health effects of income inequality will be worse for those who are more strongly oriented towards income comparisons. Again, the interaction terms are not significant, and thus we also do not find support for this hypothesis.

Sensitivity Analyses

To assess the robustness of our findings, we have conducted various sensitivity analyses, which are

Table 2 Psychological well-being and self-rated health regressed on several predictors (random intercept models)

Predictor variables	(1a) Psychological well-being	(1b) Self-rated general health	(2a) Psychological well-being	(2b) Self-rated general health	(3a) Psychological well-being	(3b) Self-rated general health	(4a) Psychological well-being	(4b) Self-rated general health
Household income (<i>ref.</i> fifth quintile)								
First quintile	-0.134*** (-12.30)	-0.229*** (-12.96)	-0.130*** (-11.95)	-0.226*** (-12.80)	-0.130*** (-11.95)	-0.226*** (-12.80)	-0.130*** (-11.93)	-0.226*** (-12.80)
Second quintile	-0.0812*** (-7.45)	-0.149*** (-8.41)	-0.0777*** (-7.16)	-0.147*** (-8.29)	-0.0778*** (-7.17)	-0.146*** (-8.29)	-0.0777*** (-7.16)	-0.147*** (-8.30)
Third quintile	-0.0290** (-2.71)	-0.0944*** (-5.44)	-0.0260* (-2.45)	-0.0926*** (-5.34)	-0.0261* (-2.45)	-0.0925*** (-5.34)	-0.0261* (-2.45)	-0.0929*** (-5.35)
Fourth quintile	-0.0157 (-1.48)	-0.0471** (-2.73)	-0.0131 (-1.23)	-0.0454** (-2.63)	-0.0131 (-1.24)	-0.0450** (-2.61)	-0.0131 (-1.23)	-0.0457** (-2.65)
Gini coefficient	-0.00650* (-1.97)	-0.0156* (-2.44)	-0.00654* (-2.00)	-0.0156* (-2.45)	-0.00651* (-1.99)	-0.0157* (-2.46)	-0.00653* (-1.99)	-0.0156* (-2.45)
GDP per capita (logged)	0.148*** (6.27)	0.284*** (6.26)	0.142*** (6.07)	0.281*** (6.22)	0.142*** (6.07)	0.280*** (6.21)	0.142*** (6.06)	0.280*** (6.21)
Female (<i>ref.</i> male)	-0.0801*** (-12.38)	-0.0397*** (-3.78)	-0.0790*** (-12.27)	-0.0390*** (-3.72)	-0.0790*** (-12.28)	-0.0393*** (-3.75)	-0.0790*** (-12.27)	-0.0392*** (-3.74)
Married/cohabiting (<i>ref.</i> not married/cohabiting)	0.113*** (16.39)	0.0347** (3.11)	0.113*** (16.55)	0.0350** (3.14)	0.113*** (16.56)	0.0352** (3.15)	0.113*** (16.55)	0.0350** (3.14)
Age	-0.00261*** (-9.01)	-0.0136*** (-28.94)	-0.00288*** (-9.95)	-0.0138*** (-29.25)	-0.00288*** (-9.97)	-0.0138*** (-29.25)	-0.00288*** (-9.94)	-0.0138*** (-29.23)
Education in years	0.00464*** (4.87)	0.0157*** (10.14)	0.00508*** (5.36)	0.0159*** (10.32)	0.00507*** (5.34)	0.0160*** (10.33)	0.00506*** (5.34)	0.0159*** (10.30)
Income comparison								
orientation								
comparison orientation								
Income comparison × first quintile			-0.0243*** (-13.93)	-0.0150*** (-5.29)	-0.0243*** (-12.16)	-0.0154*** (-5.34)	-0.0242*** (-5.65)	-0.0116 (-1.67)
Income comparison × second quintile								
Income comparison × third quintile								
Income comparison × fourth quintile								
Intercept	0.872*** (3.72)	0.225 (0.50)	0.929*** (3.99)	0.256 (0.57)	0.929*** (3.99)	0.259 (0.58)	0.929*** (3.99)	0.259 (0.58)
Variance (income comparisons)								
Variance (intercept)	0.00454*** (-17.02)	0.0174*** (-13.08)	0.00446*** (-17.10)	0.0172*** (-13.12)	0.00445*** (-17.09)	0.0172*** (-13.12)	0.00446*** (-17.09)	0.0172*** (-13.12)
Variance (residual)	0.1896*** (-159.54)	0.496*** (-67.04)	0.187*** (-160.55)	0.496*** (-67.18)	0.187*** (-160.48)	0.496*** (-67.18)	0.187*** (-160.56)	0.496*** (-67.19)
N	18,356	18,356	18,356	18,356	18,356	18,356	18,356	18,356

Source: European Social Survey 2006/07. *t* statistics in parentheses.

P* < 0.05, *P* < 0.01, ****P* < 0.001.

presented in the Supplementary Materials. We show that our findings are by and large robust to different age cut-offs, a more detailed partnership variable, an alternative treatment of the missing data on income, a categorized Gini coefficient, random slopes for all predictors, and averaging the Gini coefficient over several years. Furthermore, we show the results of including different interaction terms.

Discussion

Using a sample of 18,356 Europeans from 23 countries, our study investigated the role of income comparisons in two important contemporary puzzles that medical sociology and social stratification research aim to solve: the socio-economic gradient in health and the negative income inequality–health correlation. In line with previous theory and evidence, we found an income gradient both in self-rated health and in psychological well-being, with the former being somewhat steeper than the latter. Furthermore, we found a negative correlation of income inequality with self-rated health and psychological well-being.

Our key finding, however, was that the individual importance attributed to income comparisons did *not* moderate the effects of relative income or income inequality on health. This finding suggests that those who are most likely to experience stress in income comparisons do not have health outcomes different from those who care less about income comparisons. Despite using two different, yet important and established, health outcomes and despite using only rather restricted models, we were not able to find a moderating effect of income comparisons.

This finding has important theoretical implications. It casts doubt on the crucial role that researchers such as Wilkinson and Pickett (2010) or Marmot (2004) have attributed to the mechanism of status differentiation that is assumed to link social stratification and health outcomes. One explanation might be that status hierarchies are irrelevant as a causal pathway; instead, it is other pathways that are linking SES, income inequality, and health. With respect to income inequality, this is in line with the recent findings by Beckfield (2004) and Kondo *et al.* (2009), who reported that the negative income inequality–health correlation is reduced or disappears when unobserved factors are accounted for. Another explanation of the associations found could be that individuals choose their reference groups wisely, for instance, identify with better-off others (Huguet *et al.*, 2009) and do not engage in ‘unhealthy’ upward income comparisons, a possibility that is consistent with earlier findings of social comparison research (Suls and

Wheeler, 2000). Regardless of which it is, our findings suggest that explanations of health inequities or negative effects of inequality that rely on status competition should be called into question.

Also, limitations of the current study need to be mentioned. Although income is an important, if not the most important, marker of social prestige in modern industrialized countries, future research should take other indicators of social status into account (Goldthorpe, 2010). A potential problem in our specific case was that we had only household income available, but our information on income comparison orientation referred to only one household member (in paid work). It would have been ideal to be able to distinguish between household income and incomes of individual household members, but to our knowledge, no large cross-national data sets have both information on health and different types of income. Even if that data were available, it would be difficult to make a clear-cut case for opting for one over the other. Families mostly pool their incomes, with women often being ‘secondary’ earners, which means that looking only at individual income might grossly misrepresent one’s actual resources and social position (cf. for instance, the ‘dominance principle’ of Erikson and Goldthorpe, 1992). Using individual income only as a status marker might have led to biases for groups such as housewives, secondary earners, the unemployed, or pensioners. Furthermore, our sample is restricted to those active on the labour market. Our findings with respect to the effects of income inequality and relative income were in line with those that are seen in general population samples. Despite the fact that the labour force is an important and large part of the population, it might cause some selectivity in our analyses, as those not working are more likely to be severely ill, or income comparisons might only have an effect for those outside of the labour force at the bottom of the income distribution. This affects the generalizability of our results, warranting further research. Also, our measure of social comparisons was rather limited. More detailed information on social comparisons, for instance, to whom one is comparing oneself to (Wolbring, Keuschnigg and Negele, 2013), and a multi-item measure of social comparison orientation (Schneider and Schupp, 2013) might yield deeper insights into the generating mechanisms of health inequalities.

Notwithstanding these limitations, our article provides important empirical evidence for two of the most important phenomena at the interface between social stratification research and public health research, the inequality–health association, and the SES gradient in health. Our findings suggest that the role of status

comparisons for these phenomena might not be as crucial as has often been assumed and that research should focus on alternative pathways for understanding these important associations.

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Supplementary Data

Supplementary data are available at ESR online.

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