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Income inequality and depression

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Income Inequality and Depression: The Role of Social Comparisons and Coping Resources

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Abstract

In the present contribution, we address the idea that income inequality can 'get under the skin' and worsen the symptoms of depression. We investigate whether this effect can be explained by country differences in the average coping resources citizens have at their disposal, as well as the average extent to which they engage in social comparisons. In addition, we examine whether coping resources can protect individuals from the detrimental effect of inequality and whether the effect of inequality varies according to socio-economic (SES) positions. We use multilevel techniques on a sample of 43,824 respondents collected by the European Social Survey (ESS) 2006/2007 in 23 European countries and find that individuals in countries with greater income inequalities report more depressive symptoms. Although social comparisons are associated with more depressive symptoms, they do not explain the effect of inequality and neither do coping resources. However, we do find that coping resources can protect against the stress of living in a society with high income inequality. Our results provide some support for the idea that inequality is most corrosive to the mental health of the people in the middle of the income hierarchy.

Introduction

Depression is a crippling mood disorder characterized by a persistent loss of pleasure and an overwhelming experience of negative emotions, whose consequences for the lives of those affected can be disastrous (Penninx *et al.*, 2000; Simon *et al.*, 2001; Kane and Garber, 2004). It is a deeply personal experience but its occurrence is strongly related to the social position of individuals (Turner, Wheaton and Lloyd, 1995; Lorant *et al.*, 2003). Therefore, many sociological studies have examined depression, stress, and their social correlates. Earlier studies looked at the role of major life events (Pearlin, 1989; Aneshensel, 1992) and later moved from a mechanistic view towards integrating the objective circumstances of individuals and the perceptions of these

circumstances (Ross and Mirowsky, 2006). Nowadays the focus has shifted towards inquiring whether the organization of society in terms of the unequal distribution of resources can also be harmful to individuals' mental well-being (Sampson, Morenoff and Gannon-Rowley, 2002; Wilkinson and Pickett, 2009a; Layte, 2012; Prag, Mills and Wittek, 2014). If this is the case and inequality can aggravate depression, then what are the mechanisms behind this detrimental effect? Can individuals protect themselves? Does inequality harm everyone, or are some groups more vulnerable than others? In the present article, we seek answers to these questions.

Our study will address the above topics in a 4-fold manner. First, we examine whether European countries with higher inequalities also display higher average

depressive symptoms. Second, we examine two lines of reasoning in favour of a positive relationship between inequality and depressive symptoms, i.e., inequality as a contextual stressor and inequality as detrimental to the population's levels of social support and psychological coping resources. The first line of reasoning relies heavily on the work of Wilkinson and Pickett (2009a), authors who conceptualize inequality as a contextual stressor that works via social comparison processes. The second argument was not explicitly formulated in the literature, although cues are found in the works of authors such as Rosenberg and Pearlin (1978) and Wilkinson and Pickett (2009a). We integrate the fragmented cues and posit that inequality can hinder the formation of non-material coping resources such as supportive relations and psychological coping resources. The reduction of coping resources owing to high inequality could explain higher levels of depressive symptoms in more unequal countries.

Third, we examine the buffering role of non-material coping resources for the relationship between inequality and depression. The literature suggests that coping resources can reduce (moderate) the harmful effects of stressors on well-being (House, Umberson and Landis, 1988; Scheier and Carver, 1992; Thoits, 1995; Carver and Connor-Smith, 2010). This literature primarily addresses individual-level events or problems; however, the addition of contextual stressors is a logical extension. We propose that if inequality serves as a contextual type of stressor, then individuals' non-material coping resources should serve as buffers and help mitigate the stress reaction and subsequently reduce their depressive symptoms. Fourth, an additional contribution of the article regards the potentially different effect of inequality for individuals with different socio-economic (SES) position.

Our research questions are the following: (i) to what extent do country differences in income inequality relate to individuals' depressive symptoms?; (ii) to what extent is the relationship between inequality and individuals' depressive symptoms explained by more social comparisons and fewer non-material coping resources in more unequal countries?; (iii) do individuals with more non-material coping resources experience a weaker effect of inequality than individual with fewer coping resources?; and (iv) does the relationship between inequality and depression symptoms differ for individuals with different relative SES positions?. To address these questions, we use the third round of the European Social Survey (ESS) because of the richness of the measures of interest, the extensive coverage of European countries, and the methodological rigor that

ensures a high degree of cross-country comparability (Jowell *et al*., 2007).

Background

The idea that the structure of society in general and income inequality in particular can 'get under the skin' and make people sick has received much attention in the epidemiological and sociological literature (Marmot, 2005; Wilkinson and Pickett, 2009a; Layte, 2012). Despite the numerous studies that addressed the relationship between income inequalities and (physical and mental) health, there is an extensive and yet unresolved debate about the empirical validity of this idea. Some authors argued that the relationship is spurious, plagued by un-measured confounding factors (Lynch *et al*., 2004), whereas others argued that this relationship is causal and focused on elaborating the potential mechanisms at work (for an extensive discussion of the debate surrounding the role of inequality for health please see John Lynch *et al*. (2004) and Leigh, Jencks and Smeeding (2009)). In the present article, we contribute to the debate by exploring two potential causal mechanisms as follows: (i) inequality as a contextual stressor and (ii) inequality as detrimental to the population's levels of social support and psychological coping resources.

Income Inequality as a Contextual Stressor

Regarding the 'social stress' mechanism, Wilkinson (1999) takes a central position and argues that inequality works like a type of contextual social stressor. According to the author, inequality is accompanied by greater status competition and more awareness of one's own SES position and the position of peers. Subsequently, the natural inclination to engage in social comparisons (Wood, 1989), and especially to those with a better social status (Schor, 2000), is argued to be stronger. Engaging in frequent upward social comparisons could result in negative emotions, such as feelings of shame, inadequacy, frustration. In turn, these emotions could increase the depressive symptoms of those who experience them.

There is sufficient proof linking the experience of stressful events to more depressive symptoms or even to the onset of major depression episodes (Ross, 2000; Gilman *et al*., 2003; Sapolsky, 2004). However, there are no data on the amount of stress experienced as a result of the long-term exposure to inequality. It is reasonable to assume that the stress due to inequality is much weaker than the stress experienced after the occurrence of a negative life event, and most likely will not

aggravate mental illness to the point of reaching clinical depression. However, it could be strong enough to aggravate symptoms of depression. The implication of these arguments is that the average level of depressive symptoms of the population should be higher in countries with higher income inequality than in countries with lower income inequality (*H1*) and that social comparisons mediate this relationship (*H2*).

Wilkinson and Pickett (2009a, 2009b) also advocate that inequality is bad for (nearly) everyone based on the assumption that social comparisons only (or mostly) work upwards (i.e., if all individuals compare themselves upward, all individuals find themselves doing worse than their reference group). Against this assumption, we suggest that the extent of engagement in social comparisons varies according to social group. Individuals at the top of the hierarchy benefit from engaging in downward comparisons (e.g., feelings of self-esteem or pride) and have the opportunity to do so. Thus, the position in the higher ranks of the social hierarchy might foster psychological resources that are protective against stress (Twenge and Campbell, 2002), which might buffer against the effects of income inequality on depressive symptoms. Individuals at the bottom of the hierarchy might be less prone to engage in social comparisons because they have other priorities, e.g., managing the chronic economic strain of their day-to-day life (Pearlin, 1989). The group in the middle can afford to attempt to 'keep up with the Joneses'. In other words, they are the most eager to get ahead, with the lifestyles of higher status groups as their example. However, few will be able to reach the desired rank in the hierarchy, leaving the majority dissatisfied with their situation. Based on the above, we expect the effect of income inequality on depressive symptoms to be strongest in the middle range of the social hierarchy and weaker among the individuals at the bottom and at the top of the social hierarchy (*H3*).

Income Inequality and Individuals' Coping Resources

Although results of previous research are somewhat ambiguous, there are indications that social support, self-esteem, and optimism relate to better mental health (Scheier and Carver, 1992; Thoits, 1995; Cruess *et al.*, 2000; Makikangas, Kinnunen and Feldt, 2004). Furthermore, high levels of inequalities could be detrimental to the accumulation of these non-material coping resources. Regarding the relationship between inequality and social support, Wilkinson and Pickett (2009a) argue that the invidious social comparisons that characterize

countries with higher inequality are corrosive for trust and social cohesion. In more unequal countries, the authors argue, individuals are more interested in going up the ladder at the expense of family life and other relationships. As a result, the social ties weaken and less social support is available to individuals.

Income inequality could also lower self-esteem. There is convincing empirical evidence that individuals' SES positions and their sense of self-worth are strongly related, and that social comparison is an important mechanism explaining this association (Rosenberg and Pearlin, 1978; Twenge and Campbell, 2002). Individuals compare themselves with each other and estimate their level of success in relation to their peers' accomplishments, and this process constitutes the building blocks for their self-esteem. In contexts with high income inequality, where status differences are more visible, individuals with low and medium social standing have more opportunities to engage in social comparisons with those with higher standing, and as a result they can experience more feelings of shame. In turn, these negative emotional outcomes could decrease the level of self-esteem, especially if individuals place the blame for their subordinate position on themselves (Twenge and Campbell, 2002). As a result, the overall self-esteem in more unequal societies could be lower.

In addition, societies with high income inequalities might also have lower levels of optimism. Previous research has shown that low SES relates to less optimism (Heinonen *et al.*, 2006). This relationship has been attributed to the adaptive strategies used when managing high levels of social stress, i.e., constant vigilance for possible threats, which in time may lead to less trust, expectations of negative outcomes, and lower levels of optimism. Expanding these arguments, the overall levels of optimism might be lower in more unequal societies, where status competition is argued to be higher and social-evaluative threats, such as threats to self-esteem and social status, may occur more frequently.

If the above-mentioned arguments hold, in countries with higher inequalities there will be fewer non-material coping resources available to individuals; thus, they will be less protected when faced with stressors that increase the symptoms of depression. Subsequently, we expect that the positive relationship between higher income inequality and higher levels of depressive symptoms to be mediated by individuals' non-material coping resources, i.e., social support and psychological coping resources (*H4*).

Studies of the differential vulnerability to stress suggest that individuals' non-material coping resources can also moderate the damaging effects of social stressors
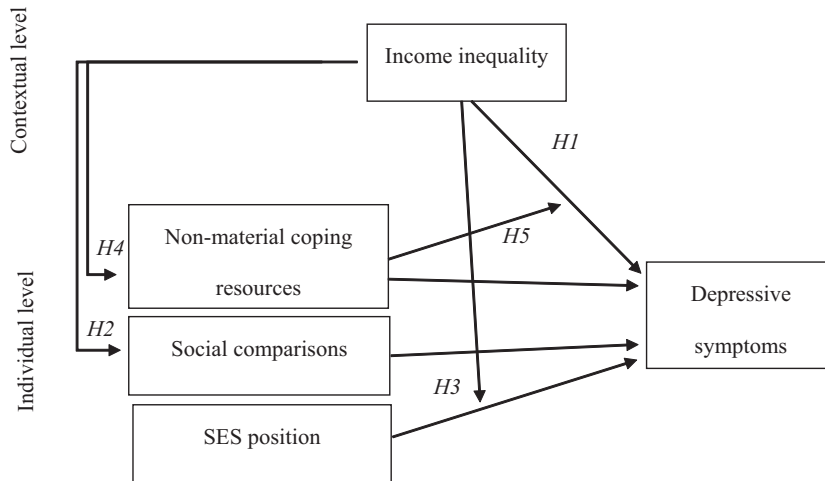
Figure 1. The structure of the hypotheses tested

(Thoits, 2010). First, individuals who have close contact with significant others cope better with stressful situations because of the emotional support received (Cohen and McKay, 1984), and individuals with high levels of self-esteem and optimism are more likely to adopt more efficient strategies to cope with adversities (e.g., active vs. passive; Scheier and Carver, 1992). These findings suggest that non-material coping resources are important moderators between social stressors and the intensity of the stress reaction. If income inequality serves as a contextual social stressor, then non-material coping resources should play the same role of mitigating the stress response. Thus, we expect the effect of income inequality on depressive symptoms to be weaker among individuals with higher levels of non-material coping resources (*H5*).

Figure 1 presents the above-mentioned hypotheses in graphical form.

Data

To test our hypotheses, we used round 3 of the ESS (Jowell *et al.*, 2007). Round 3 took place between 2006 and 2007 and covered 25 European countries. Extensive data were collected on personal and social well-being. For the present analyses, we used 23 countries, excluding Latvia and Cyprus because of differences in the measurement of social comparisons. We eliminated individuals with missing values on the dependent variable, which amounts to 0.72 per cent of the data, resulting in a working data set that consisted of 43,824 respondents nested in 23 countries. We used multilevel techniques,

which allowed us to disentangle compositional and contextual effects (Snijders and Bosker, 1999). In the current analyses, all continuous independent variables were standardized (mean = 0 and SD = 1).

Dependent Variable—Depressive Symptoms

The intensity of depressive symptoms was measured by the restricted Center for Epidemiologic Studies Depression Scale (CES-D8; Radloff, 1977), a scale with good reliability and validity across European countries (Van de Velde, Bracke and Levecque, 2010). Respondents were asked to indicate how often during the past week they experienced the following symptoms: feeling depressed, everything was an effort, slept bad, felt lonely, felt sad, could not get going, enjoyed life and felt happy. The scale was constructed as a sum scale ranging from 0 to 24 for respondents who provided at least five valid answers. In the present sample, the overall Cronbach's alpha was 0.83.

Country-level Variables

Income inequality was measured by the Gini Index based on the net income available for consumption. This measure was derived from the Standardized World Income Inequality Database (Solt, 2009), a data set that was developed with the purpose of increasing the coverage across countries and time while also improving the comparability across observations. The Gini Index ranges from 0 to 100, where 0 represents perfect equality and 100 represents maximum inequality. For each country, we averaged the figures pertaining to the period 2002–2006.

Individual-level Variables

To test our expectations regarding the differential effect of income inequality for individuals situated at different levels of the SES hierarchy, we determined individuals' relative income position within each country.

To derive individuals' *income position*, we used the measure provided in the ESS, which asked individuals to rate their net household income on an ordinal scale with 12 points and unequal income bandwidth. We first attributed to each individual the mean monthly income for his/her income band. Then, following the Eurostat (2011) procedure, we derived a household weight that was applied to the household income figures. Third, we converted the per-person equalized income in purchasing power parity (PPP) figures. The resulting variable stores each respondent's income available for consumption and is comparable between countries. The original household income variable had 21.44 per cent missing values. To manage the missing values, we performed multiple imputations for missing data (see the section on missing values below). *Relative income position* was computed from the income available for consumption PPP by deriving quintiles and deciles within each country. With the exception of the models testing the differential effect of income inequality for different SES positions, we used dummies based on income quintiles, with the middle quintile as the reference group.

Social comparisons were measured by one item. Only respondents who declared themselves to be currently employed in a job of any type (53.66 per cent of the sample) were asked whether it is important for them to compare their income with other people's income. The respondents were provided with a response scale ranging from 0 (not at all important) to 6 (very important). To manage the missing data, we used the strategy proposed by Allison (2001: p. 122). We imputed the missing values of the variable for all respondents, regardless of whether they received the question, and used the imputed variable in the main models along with a dummy for the respondents who did not receive the question owing to the filtering procedure.

We conceptualized non-material coping resources as individuals' *supportive relations* and *psychological coping resources*. Supportive relations were measured by two items that evaluate emotional support. First, the respondent was asked to state his/her agreement with the statement 'there are people in my life who really care about me' on a scale from 0 to 4. Second, the respondents were asked whether they have anyone with whom they can 'discuss intimate and personal matters'. Psychological coping resources were measured

by a 0–4 mean scale that combined several items that measure the following: (i) optimism (i.e., always optimistic about the future), (ii) self-esteem (i.e., two variables measuring whether the respondents feel good about themselves and feel as a failure), and (iii) resilience (takes me a long time to rebound). A higher score indicates a higher level of psychological coping resources.

Control variables at the individual level were gender (female as reference), age categories (<25, 25–34, 35–44, 45–54, 55–64, 65–74, and >75 years old), residence (living in a small town/suburbia, countryside/farm vs. living in a large city), employment position (in a paid job vs. in education, unemployed, retired/disabled, and other situation), and the level of completed education (primary vs. secondary or tertiary education).

Controlling for Composition

To correctly estimate the genuine contextual effect of income inequality on depression, we needed to rule out compositional effects due to individual-level income. To control for composition, we included the 'income available for consumption PPP' variable in all the models.

Treatment of Missing Values

To manage the missing values in the database, we used the chained equations multiple imputation method as implemented in ICE, a user-contributed add-on for the statistical software STATA (Royston, 2005). In practice, each variable is imputed given a model that is appropriate for the specific level of measurement. The models are estimated sequentially, starting from the variable with the lowest fraction of missing values. Imputed variables are then used in the following models. Several imputed data sets are created, each containing different imputed values. Analyses are conducted on each of the imputed data sets, and the estimates are then combined following Rubin's rules (Rubin, 1987).

To construct the imputation models, we followed the suggestions of Allison (2009) and Graham (2009). First, we eliminated missing values on the dependent variable. Second, all of the variables in the analyses were used in the prediction models. Regarding income, we imputed the 'income available for consumption PPP' variable. We used auxiliary variables to improve the prediction of the models (i.e., the education of the parents and of the partner and the household weight variable). Because the data set has a nested structure that we want to preserve, we performed all of the imputations within each country. We computed a number of 20 alternative data sets.

Table 1 summarizes the descriptive information of the variables in the models before the multiple

Table 1. Descriptive statistics

Variable	Minimum	Maximum	Per cent/mean	SD	N
CESD-8	0	24	6.17	4.24	43,824
PPP equalized per person income (per month)	38.38	22661.01	1432.09	1407.99	34,426
Important to compare income with others	0	6	2.28	1.86	22,904
Respondent presently in paid employment	0	1	53.66 per cent		43,648
Psychological coping resources	0	4	2.59	.67	43,824
There are people who care	0	4	3.33	.74	43,824
Someone with whom intimate and personal matters can be discussed	0	1	89.86 per cent		43,824
Education level: primary	0	1	13.28 per cent		43,658
Education level: secondary	0	1	60.33 per cent		43,658
Education level: tertiary	0	1	26.38 per cent		43,658
Occupational status: working	0	1	50.04 per cent		43,597
Occupational status: in education	0	1	8.48 per cent		43,597
Occupational status: unemployed	0	1	4.42 per cent		43,597
Occupational status: retired or disabled	0	1	26.38 per cent		43,597
Occupational status: other	0	1	10.69 per cent		43,597
Male	0	1	45.57 per cent		43,734
Female	0	1	54.43 per cent		43,734
Age: 14–24 years	0	1	13.58 per cent		43,824
Age: 25–34 years	0	1	15.13 per cent		43,824
Age: 35–44 years	0	1	17.50 per cent		43,824
Age: 45–54 years	0	1	16.98 per cent		43,824
Age: 55–64 years	0	1	15.56 per cent		43,824
Age: 65–75 years	0	1	12.17 per cent		43,824
Age: 75 + years	0	1	9.08 per cent		43,824
Residence: big city	0	1	19.58 per cent		43,703
Residence: small town/suburbia	0	1	42.83 per cent		43703
Residence: farm/countryside	0	1	37.59 per cent		43,703
Gini Index income	24	45	29.65	5.10	23

Source: European Social Survey 2006/2007, own calculations, variables with original metric, data set without treatment of missing values.

imputation procedures. Additional information on the average depressive symptoms per country, Gini Index of income, social comparisons, and non-material coping resources are presented in Annex 1. We also summarized detailed information on the samples with and without missing values for the income variable as Supplementary material. The samples did not differ dramatically in their composition.

Results

Aggregate Level
As illustrated in the left panel of Figure 2, we found a significant positive correlation between the average depressive symptoms per country and the level of income inequality (0.50). The countries with the highest prevalence of depressive symptoms were Ukraine, Russian Federation, Bulgaria, Portugal, Slovak Republic, and Hungary. On the other extreme we found Norway,

Denmark, Ireland, and Switzerland. However, we did not find any statistically significant correlations between the level of income inequality and the average level of coping resources or social comparisons.

Multilevel Analyses
In Table 2, we present selected results of the multilevel models that test *H1*, *H2*, and *H4*. The bottom of the table presents the variances at the individual and country level for each model. We first estimated a null model (random intercept; output not shown), which showed that the variance at the country level was 1.57 and the variance at the individual level was 16.49, yielding an intra-class correlation of 0.09. This relatively low figure suggested that individual factors are more important than country factors in determining depression. In Model 1, we included the measure of income inequality, after which we added the individual-level measures that allowed us to properly control for composition
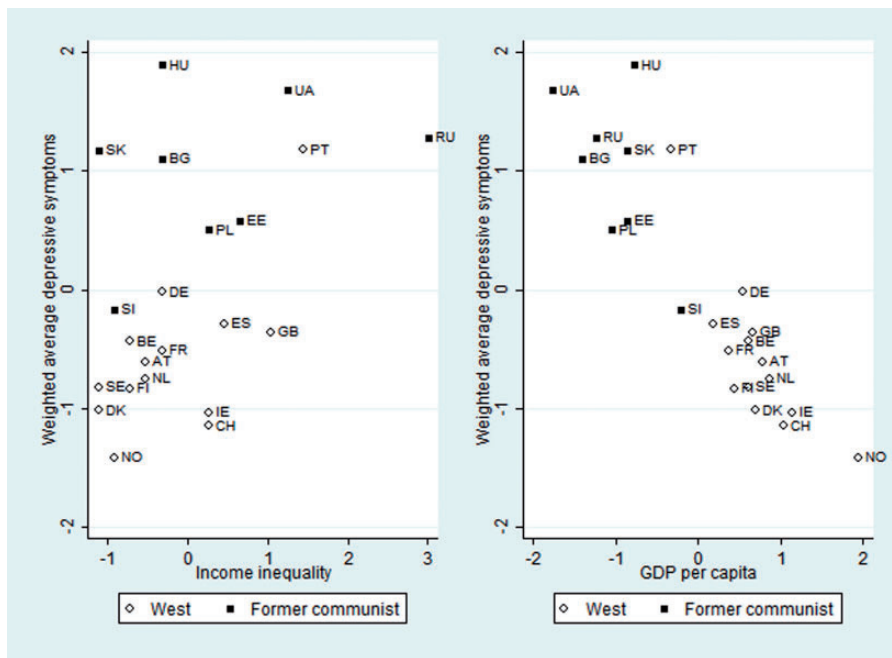
Figure 2. Means of depressive symptoms per country, income inequality and wealth in European countries

Notes. AT: Austria; BE: Belgium; BG: Bulgaria; CH: Switzerland; DE: Germany; DK: Denmark; EE: Estonia; ES: Spain; FI: Finland; FR: France; GB: United Kingdom; HU: Hungary; IE: Ireland; NL: Netherlands; NO: Norway; PL: Poland; PT: Portugal; RO: Romania; RU: Russian Federation; SE: Sweden; SI: Slovenia; SK: Slovak Republic; UA: Ukraine.

Table 2. Selection of the estimates of the multilevel models ($N = 43,824$ respondents in 23 countries)

Variable	Model 1		Model 2		Model 3		Model 4		Model 5	
Income inequality										
Gini Index income	**0.64**	(.23)	**0.61**	(0.22)	**0.60**	(0.20)	**0.51**	(0.17)	**0.50**	(0.17)
Social comparisons										
Important to compare income with others					**0.43**	(0.04)			**0.15**	(0.03)
Coping resources										
Psychological coping resources							**−1.97**	(0.02)	**−1.96**	(0.02)
There are people who care							**−0.35**	(0.02)	**−0.35**	(0.02)
Someone with whom intimate and personal matters can be discussed							**−1.08**	(0.06)	**−1.08**	(0.06)
Intercept	**6.17**	(0.23)	**6.83**	(0.25)	**7.03**	(0.26)	**7.67**	(0.21)	**7.83**	(0.22)
Other individual-level variables	No		Yes		Yes		Yes		Yes	
Variance country level	1.17		1.01		0.90		0.63		0.60	
Variance individual level	16.49		15.27		15.09		11.02		11.00	

Notes: All independent continuous variables in the models are standardized (Mean = 0, SD = 1) at individual or country level. Coefficients with standard errors in parentheses. Estimates derived from 20 alternative data sets with imputed values for missing cases and ulterior combined following Rubin (1987). Model 1 does not control for individual-level variables. Models 2–5 include all other individual-level variables: relative income positions, gender, age categories, residence, employment position, education, and 'income available for consumption PPP'. Models 3 and 5 also include a dummy variable 'respondent had a paid job' that was used to filter respondents that received the item on social comparisons. The coefficients of the other individual level variables are not presented in table, available on request from the authors. Bold coefficients are significant for $P < 0.05$, two-tailed tests.

(Model 2). In Model 3 and Model 4, we separately tested the mediation via social comparisons and via the non-material coping resources. In Model 5, we provided a simultaneous test of the two mechanisms.

We found that higher inequality was significantly related to more depressive symptoms (0.64 SE: 0.23 in Model 1, Table 2). Furthermore, income inequality explained 25 per cent of the variance at the country level. In Model 2 (Table 2), we adjusted for the individual-level variables and found that the effect of Gini Index of income was slightly reduced but remained significant. Thus, *H1* was not rejected.

In Model 3 of Table 2, we added the measure of social comparisons to test the expected mediation of the effect of income inequality on depressive symptoms. *H2* was not supported; the effect of Gini Index of income was not substantially reduced in Model 3 in comparison with Model 2. Additional analyses showed that there was no effect of Gini Index of income on the average level of social comparisons (0.03, SE: 0.05).

In Model 4 of Table 2, we added individuals' non-material coping resources, i.e., the psychological coping resources scale and the two social support measures. All three measures had a negative and significant effect on the dependent variable. However, the effect of the Gini Index of income decreased only marginally; its coefficient was reduced from 0.61 to 0.51 and remained significantly different from zero. Additional analyses showed that there was no effect of inequality on the average level of non-material coping resources. Thus, we concluded that the expected mediation of non-material coping resources of the relationship between income inequality and depressive symptoms (*H4*) was not supported by our data.

In Table 3, we present results derived from multilevel models that tested *H3* stating that groups in intermediate positions of the SES hierarchy could suffer the most from income inequalities. To test this hypothesis we estimated Model 2 in Table 2 by adding cross-level interactions between Gini Index of income and the relative income positions. We opted to contrast the poorest and the richest to the individuals situated in between these extreme positions because we only have 23 countries in our analyses and statistical power was a concern. The literature does not provide any clear guidelines on how to decide who the poor, the rich, and the people in the middle of the SES hierarchy are, and therefore, we used several alternative cut points.

All interactions were negative, thus in the expected direction; however, they did not reach the standard statistical significance level with the exception of the model

Table 3. The differential effect of inequality for different socio-economic positions ($N = 43,824$ respondents in 23 countries)

SES positions	The effect of Gini Index income
Highest SES position (richest 40 per cent in the country)	0.58
Middle SES position (20 per cent population)[a]	0.77
Lowest SES position (poorest 40 per cent in the country)	0.57[b]
Highest SES position (richest 30 per cent in the country)	0.56
Middle SES position (40 per cent population)[a]	0.67
Lowest SES position (poorest 30 per cent in the country)	0.54
Highest SES position (richest 20 per cent in the country)	0.54
Middle SES position (60 per cent population)[a]	0.61
Lowest SES position (poorest 20 per cent in the country)	0.55
Highest SES position (richest 10 per cent in the country)	0.44
Middle SES position (80 per cent population)[a]	0.60
Lowest SES position (poorest 10 per cent in the country)	0.51

Notes: Estimates calculated starting from Model 2, Table 2 plus interaction terms, on 20 alternative data sets with imputed values for missing cases and ulterior combined following Rubin (1987).

[a]The reference category.

[b]Significantly different from the effect for the reference category for $P < 0.05$, two-tailed.

where we contrasted the poorest 40 per cent in a country to the middle 20 per cent.

The assumptions behind *H3* were that individuals with different income position have different opportunities and incentives to involve in social comparisons and to build up protective psychological coping resources. Further analyses (results available as Supplementary material) showed that social comparisons increased from the richest to the poorest in a country, which contradicted our reasoning. However, richer individuals had more psychological coping resources, which was in line with our arguments. Thus, *H3* received mixed support.

Next, we tested the potential buffering effect of non-material coping resources (*H5*). We expected that the effect of income inequality on depressive symptoms is

Table 4. Estimates of the interaction between Gini Index income and measures of non-material coping resources ($N = 43,824$ respondents in 23 countries)

Interaction with	Gini Index income
Psychological coping resources	***−0.09*** (0.05)
There are people who care	−0.04 (0.04)
Someone with whom intimate and personal matters can be discussed	**−0.29** (0.12)

Notes: All continuous variables (dependent and independent) in the models are standardized. Coefficients with standard errors in parentheses. Estimates derived from 20 alternative data sets with imputed values for missing cases and ulterior combined following Rubin (1987). Models based on Model 4 in Table 2 plus one interaction between a measure of income inequality and a measure of non-material coping resources (coefficients not presented, available on request from the authors).

Bold coefficients are statistically significant for $P < 0.05$ while bold + italics are statistically significant for $P < 0.10$, two-tailed tests.

weaker among individuals with more non-material coping resources. To test this expectation, we estimated the interactions of the Gini Index of income with each of the non-material coping resources. These interactions were estimated in separate models that were extensions of Model 4 in Table 2. The results are presented in Table 4.

The analyses provided mixed support for *H5*. All of the interaction terms were negative, but only two of three terms were significant, as follows: the interaction with the psychological attributes ($P < 0.10$) and with having someone to talk to ($P < 0.05$).

Additional Analyses

To test the robustness of our findings, we performed a series of additional analyses. To deal with the skewed distribution of our dependent variable we constructed two dummy dependent variables using as cut points a score of 3 and a score of 10. Re-estimating Models 1–5 (Table 2) with these two alternative dependent variables led to identical conclusions.

Next, we re-estimated our models for a trimmed sample, by eliminating the individuals that were <25 years old and >65 years old. Our conclusions remained identical.

We also re-estimated our models on the data set with missing values not imputed. The conclusions derived from the Models 1–5 in Table 2 were identical. Differences were found for the estimates and the confidence intervals of the cross-level interactions, i.e., the signs of the estimates were the same, the standard errors remained somehow stable, but the strength of the effects differed between the two samples. This was most visible for the models testing the cross-level interactions between the income positions and Gini Index of Income;

the effects were stronger and hence more often significant in the non-imputed data.

Next, we tested whether the effect of Gini Index of income is robust when including in our models other country characteristics. For this test, we considered the wealth of the country as measured by the GDP per capita PPP and the East–West divide, characteristics that are relevant both to the level of depressive symptoms and to the level of inequality in our sample, as illustrated in Figure 2. When GDP per capita PPP was added to Model 5 in Table 2, we observed a decrease of the effect of Gini Index of income from 0.51 to 0.21 ($P < 0.05$, one-tailed test of significance). When we added a dummy that differentiated between West–East countries, we observed a decrease of the effect of Gini Index of income from 0.51 to 0.37 ($P < 0.05$, two-tailed test of significance).

Discussion

We began this article with the question of whether income inequality can 'get under the skin' and worsen symptoms of depression. We examined the following two potential mechanisms through which higher inequality might relate to higher levels of depressive symptoms: inequality as a contextual stressor and inequality as detrimental to the population's levels of non-material coping resources. In addition, we extended previous literature by examining the moderating effect of the non-material coping resources on the inequality's effect on depressive symptoms and by examining the strength of this effect for different income groups. Based on multilevel analyses of 23 European countries and 43,824 respondents, we come to the following main conclusions.

First, in line with recent results from previous studies (Cifuentes *et al.*, 2008; Layte, 2012), we found empirical support for the idea that among European countries, income inequality relates to depression, even after controlling for compositional effects. However, our analyses showed that the relationship between inequality and depressive symptoms was sensitive to contextual confounding factors. Especially the countries' wealth seemed to matter the most, which implies that the countries' material circumstances (and not only those of individuals) also explain the differences in depression between nations. This finding also points towards the need for future elaborations on the complex relationship between contextual factors and their effects on mental health.

Second, regarding Wilkinson's theory about the mechanisms through which income inequality affects

health (Wilkinson and Pickett, 2009a), we found that the relationship between income inequality and depression was not mediated by social comparisons. Our analyses showed that in countries with higher inequality, people did not engage more in social comparisons of their income. In line with recent studies (Layte and Whelan, 2014; Prag, Mills and Wittek, 2014), we conclude that the idea of inequality acting as a contextual stressor through social comparison processes and increased status anxiety is far from being as definitive as Wilkinson and Pickett (2009a) argue. However, we note that the measure of social comparisons that was available to us is rather crude. Improvements in the measurements of social comparisons are needed to test this mechanism in greater detail. More precisely, the idea of social comparison of status positions is general and ambiguous. Only comparisons regarding income were available in the data set; thus, future research should also examine other aspects associated with social status.

Third, we found mixed evidence regarding the role of non-material coping resources such as self-esteem, optimism, or social support for the relationship between inequality and depression. First, we did not find evidence for their role as explanatory factors for the observed relationship between inequality and depression. Second, we found evidence supporting the idea that individuals with more psychological resources or social support are better protected against the detrimental effect of inequality. We conceptualized non-material coping resources as preceding depression and we reasoned that in contexts with higher levels of income inequality, the level of these coping resources is lower, hence depression symptoms are more frequent. A problem behind this reasoning is that the relationship between depression and non-material coping resources could go both ways. If the level of non-material coping resources of individuals is caused by depression, this could explain why the effect of inequality was not reduced when we accounted for them. We note that previous literature found the impact of non-material coping resources on depression to be stronger than the reverse effect (Patten *et al.*, 2010; Sowislo and Orth, 2013). Also, in models where depression was not included, we did not find evidence for the role of inequality as impeding the accumulation of non-material coping resources such as self-esteem, optimism, or social support, and this finding already sheds enough doubt on the tenability of the mediation tested. However, given the fact that recent studies did find a significant relationship between higher income inequality and lower levels of social support, albeit for older Europeans (Ellwardt *et al.*, 2014), we encourage research that can shed more light on the complex

relationship between inequality, non-material coping resources, and depression. In addition, we note that the ordering between depression and non-material coping resources does not affect the conclusions that we draw on the role played by the latter for the relationship between inequality and depression.

Our study has some limitations that need to be kept in mind. We used income as a proxy for the status position of individuals and for the measurement of status heterogeneity within a country and by this we follow the arguments of Wilkinson and Pickett (2009a). However, critics from social stratification research have disputed the idea of income inequality as the best proxy for the degree of status differentiation in society (Goldthorpe, 2010). In line with this criticism, we agree that the available income for consumption only refers to the capacity to purchase goods. Currently, the type of goods and the embraced lifestyle are also important for the individuals' social identity (Bourdieu, 1984; Holt, 1997) and could easily become reasons for the invidious social comparisons referred to by Wilkinson and Pickett (2009a). We believe that for a better understanding of the comparison mechanisms of relative status positions, one should measure more directly the various aspects related to status, among which income is only one aspect. Even within the same social context, parallel social hierarchies can coexist, each with its own logic and status determinants, e.g., family background, occupation, political or religious adherence (Stacey, 1960). In-depth country studies are likely helpful here, and within- and between-country studies should complement each other to enhance our knowledge of this matter.

One possible alternative mechanism that we were unable to test within the space of this study is provided by Ross and Mirowsky (2002, 2006). The authors argue that under conditions of higher inequality, status competition and scarcity is likely to increase and the presence of those with privileged positions could appear threatening to disadvantaged individuals because, when competing for scarce resources, their chances to realize social and material goals would be lower. As a result, this gives rise to feelings of powerlessness and mistrust that could exacerbate depression. We believe that this alternative mechanism that could explain the empirical relationship between inequality and depression fully deserves the attention of future research.

Another limitation is that our study did not examine whether there are gender differences in the effect of inequality on depressive symptoms. We took this decision because our study puts to the test the ideas of Wilkinson and Pickett (2009a) who argued that inequality affects mental health via increasing the engagement in social

comparisons. Since previous literature, e.g., Schneider and Schupp (2014) and Clark and Senik (2011) found no systematic variation in social comparison tendencies between males and females, we did not pursue further the gender differences in the effect of inequality on depression.

Given the small sample size, outliers were also a concern. For the full sample of 23 countries, we did not find outliers, although these were found when considering the West or the East subsample of countries (e.g., Portugal or Russia). The non-typical levels of depression recorded in these countries were previously documented (Cifuentes *et al.*, 2008) but a better understanding of why this is the case could be achieved only by in-depth country analyses. We examined the effect of omitting these countries from the analyses and we found that all results were robust with the exception of the cross-level interactions, and especially when Russia was excluded. We conclude that in our data, the results of the cross-level interaction effects are dependent on model specification (imputed/non-imputed data; place of the cut-points; in-/exclusion of outliers). One way future research can contribute is by using data from larger number of countries and enhance the power of the tests.

To sum up, our study contributes to the debate surrounding the role of income inequality for health in general, and mental health in particular. Based on our analyses, we cannot support the views that in countries with higher inequalities people engage more often in social comparisons or that they have fewer coping resources. We also found a pattern in our data, suggesting that inequality could be most detrimental for the individuals in the middle of the income hierarchies. And last, there is good news: the aggravating effect of inequality on depression was weakened by coping resources such as self-esteem, optimism, and having someone to talk about intimate problems.

Supplementary Data

Supplementary data are available at *ESR* online.

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Annex 1. Characteristics of the sample of 23 countries (means (SD) and percentages where applicable)

Country	CES-D8		Social comparisons		Psychological coping resources		There are people who care		Someone for intimate discussions (per cent)	Gini Index income	Sample size
Denmark	4.75	(3.30)	2.24	(1.46)	2.76	(0.63)	3.66	(0.55)	92.5	24	1,484
Sweden	4.98	(3.83)	2.36	(1.85)	2.59	(0.57)	3.44	(0.56)	92.9	24	1,921
Slovak Republic	7.38	(3.90)	2.80	(1.91)	2.32	(0.60)	3.06	(0.73)	86.4	24	1,756
Norway	4.26	(3.12)	2.31	(1.75)	2.61	(0.61)	3.43	(0.56)	92.7	25	1,748
Slovenia	5.77	(3.81)	2.49	(1.99)	2.61	(0.60)	3.13	(0.74)	91.4	25	1,471
Belgium	5.45	(4.13)	2.10	(1.85)	2.56	(0.68)	3.32	(0.78)	89.4	26	1,797
Finland	4.96	(3.32)	2.00	(1.49)	2.47	(0.58)	3.44	(0.64)	91.4	26	1,891
Austria	5.46	(3.93)	2.06	(1.81)	2.75	(0.65)	3.44	(0.71)	89.2	27	2,373
Netherlands	5.33	(3.77)	1.93	(1.76)	2.60	(0.60)	3.37	(0.64)	93.1	27	1,887
Bulgaria	7.70	(4.70)	2.35	(2.00)	2.44	(0.82)	3.40	(0.94)	84.7	28	1,361
Germany	6.05	(3.70)	2.09	(1.83)	2.76	(0.61)	3.35	(0.66)	94.9	28	2,906
France	5.61	(4.29)	2.35	(1.96)	2.55	(0.73)	3.01	(0.99)	88.0	28	1,986
Hungary	8.63	(5.11)	2.33	(2.13)	2.42	(0.79)	3.27	(0.86)	90.0	28	1,512
Switzerland	4.75	(3.36)	1.97	(1.80)	2.78	(0.58)	3.37	(0.67)	96.6	31	1,803
Ireland	4.89	(3.64)	2.15	(1.89)	2.70	(0.63)	3.46	(0.64)	91.9	31	1,789
Poland	6.59	(4.84)	2.58	(1.96)	2.53	(0.65)	3.22	(0.70)	89.5	31	1,710
Romania	7.26	(3.92)	2.45	(1.99)	2.62	(0.64)	3.25	(0.77)	71.0	31	2,091
Spain	5.61	(4.25)	2.65	(1.99)	2.70	(0.60)	3.51	(0.60)	93.7	32	1,874
Estonia	6.66	(3.93)	2.50	(1.88)	2.44	(0.62)	3.36	(0.66)	87.2	33	1,511
United Kingdom	5.83	(4.19)	2.14	(1.77)	2.55	(0.68)	3.52	(0.61)	91.8	35	2,394
Ukraine	8.36	(4.78)	2.67	(2.02)	2.42	(0.72)	3.22	(0.92)	85.1	36	1,957
Portugal	7.73	(4.52)	2.15	(1.79)	2.56	(0.67)	3.26	(0.77)	89.7	37	2,219
Russian Federation	7.83	(4.45)	2.50	(1.98)	2.43	(0.64)	3.13	(0.81)	88.7	45	2,383

Notes: European Social Survey 2006/2007, own calculations. Means/percentages are not weighted and calculated for the data set without treatment of missing values. Gini Index of income as mean >5 years before and including year 2006. Countries are ordered from smallest to highest Gini Index of income.