The income inequality thesis revisited

van Deurzen, I.A.

Publication date:
2015

Document Version
Publisher's PDF, also known as Version of record

Ioana van Deurzen was born on January 25, 1978 in Oradea, Romania.
She received her Bachelor's degree in Sociology from Oradea University in 2002.
In 2008 she started a Research Master in Social Cultural Studies at Radboud University, The Netherlands and obtained her Master's degree cum laude in 2010.
In the same year she started as a PhD candidate at the department of Sociology at Tilburg University, writing this dissertation.
She currently works as a post-doctoral researcher at the department of Sociology at Tilburg University, The Netherlands.

STUDIES ON THE RELATIONSHIP BETWEEN INCOME INEQUALITY AND WELL-BEING

THE INCOME INEQUALITY THESIS REVISITED

IOANA VAN DEURZEN

THE INCOME INEQUALITY THESIS REVISITED

STUDIES ON THE RELATIONSHIP BETWEEN INCOME INEQUALITY AND WELL-BEING

IOANA VAN DEURZEN

Ioana van Deurzen

The income inequality thesis revisited. Studies on the relationship between income inequality and well-being

Cover design:
Cornel Sevastra

Printed in Romania by treira
(www.treira.ro)

The income inequality thesis revisited.

Studies on the relationship between income inequality and well-being

Proefschrift

ter verkrijging van de graad van doctor aan Tilburg University op gezag van de rector magnificus, prof.dr. E.H.L. Aarts, in het openbaar te verdedigen ten overstaan van een door het college voor promoties aangewezen commissie in de aula van de Universiteit op maandag 9 november 2015 om 16.15 uur

door
Ioana Andreea Pop,
geboren op 25 januari 1978
te Oradea, Roemenië

Promotor:	Prof.dr.ing. W.J.H Van Oorschot
Copromotor:	Dr. E.J. Van Ingen
Overige commissieleden:	Prof.dr. R. Layte
	Prof.dr. R.J.A. Muffels
	Prof.dr. H.G. van de Werfhorst

CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1.

INTRODUCTION

1.1. Income inequality and its relevance for well-being

The topic of the present dissertation is the relationship between income inequality and well-being and has as starting point the so called "income inequality thesis". Briefly, the "income inequality thesis" argues that there is a "threshold of material living standards after which the benefits of further economic growth are less substantial" (Wilkinson & Pickett, 2009b, p. 10). Instead, it is the level of income inequality that makes a difference in the well-being of the population, with more equal societies having better "performance" on a wide range of social problems such as physical and mental health, educational performance, violence, imprisonment or social mobility (Wilkinson, 2006; Wilkinson & Pickett, 2009b). The appeal of the "income inequality thesis" resides in the fact that it provides one straightforward solution to a large variety of social problems. As Wilkinson and Pickett state: "if the United States was to reduce its income inequality to something like the average of the four most equal of the rich countries (Japan, Norway, Sweden and Finland)... rates of mental illness and obesity might... each be cut by almost two-thirds, teenage birth rates could be more than halved, prison population might be reduced by 75 per cent, and people could live longer while working the equivalent of two months less per year."[… added] (Wilkinson & Pickett, 2009b, p. 261).

Such straightforward solution to solve so many societal problems is, no doubt, compelling and it parallels the concerns surrounding the increasing inequalities that took place in the high income countries (Piketty, 2014). The increasing income disparities between members of society were framed as ethically wrong by important international organizations such as the World Health Organization (WHO) who stated that "social injustice is killing people on a grand scale" (CSDH, 2008, p. 26). Furthermore, social movements such as "Occupy Wall Street" are a good illustration of the social conflicts emerging as the result of increasing income inequalities, e.g., by claiming that "We Are The 99% that will no longer tolerate the greed and corruption of the 1%." (OSN, 2015). It was a logical step that the academic and social concerns with the effects and trends of income inequality have reached the policy makers, especially those active in the field of public health, e.g., "There is ... strong empirical justification for a concern with growing income inequalities..." (CSDH, 2008, p. 38), or "In any country, economic inequality ... needs to be addressed to make progress towards health equity." (idem, p. 120).

It would seem that the situation is clear: reducing income inequalities is the key to create better, healthier, more successful societies

(Wilkinson & Pickett, 2006). However, as I will briefly discuss in the overview of the literature (section 1.3), a closer look at the studies published over the last 30 years shows that the evidence is far from being definitive, i.e., despite an impressive body of research that investigated whether income inequality has an effect on population well-being, results have been contradictory and inconsistent. In addition, the research testing the "income inequality thesis" varies greatly in terms of the country selection, choice of well-being measures, choice of explanatory variables, years when data were collected and operationalization of the theoretical concepts. These differences in research designs are one of the reasons why it is so difficult to summarize previous empirical findings and derive strong conclusions about the nature of the relationship between inequality and well-being.

In the present dissertation I aim to shed more light on the topic by conducting four empirical studies that will provide a better understanding of whether, for whom and under what conditions high levels of inequality could be detrimental for well-being. The contribution of this dissertation toward advancing the "income inequality thesis" is fourth-fold. First, I will evaluate and test some of the mechanisms that were proposed in the literature to explain the empirical relationship between higher inequality and worse well-being, i.e., the material pathway, the psychosocial pathway and the institutional pathway. In addition, I will also develop and test an additional mechanism not previously presented in the literature, i.e., a path through the level of societal corruption.

Second, I make the observation that the majority of the previous literature did not pay attention to the potentially different effects of inequality on various types of well-being measures. In the present dissertation I choose the well-being measures in such a way to allow an evaluation of the differential effects of inequality on two dimensions of well-being, i.e., 1) physical health and 2) mental health and well-being. I maintain that this distinction should be made because a closer look at some mechanisms suggests a differential strength of the relationship between inequality with mental and physical well-being and because some mechanisms could be more relevant for the relationship between inequality and one or the other dimension of well-being.

Third, I note the point made by previous research that the detrimental effect of inequality on health should be stronger in those countries where the limits of economic growth are reached (Wilkinson & Pickett, 2009b). In other words, researchers have argued that the effects of inequality on health should be most visible in high income countries (HICs), and a large part of the literature has followed this lead and tested the "income inequality thesis" in samples composed of wealthy countries.

Against this idea I maintain that the mechanisms that were advanced in the literature to explain why higher inequality should relate to worse health and well-being are formulated in general terms and could very well apply everywhere in the world. Furthermore, some of them should even be more relevant for the low and middle income countries (LMICs). Therefore, I purposively choose samples of countries with different levels of economic development in order to be able to derive conclusions on the role of the sample composition for the relationship between inequality and well-being.

Fourth, the majority of previous research has paid little attention to the potential differential effect of inequality for individuals with different characteristics. However, I will argue that some mechanisms could work differently for individuals with different socio-economic characteristics and in addition, some individual characteristics could act as protective factors against the potential detrimental effect of inequality on well-being. Subsequently, when the design of the studies allows it, I evaluate both theoretically and empirically the differential effect of inequality on well-being for different social categories.

To sum up the above, in this dissertation I focus on the relationship between inequality and well-being. Throughout this dissertation well-being will be measured mostly via some kind of health measure. This choice is motivated by the following two reasons. First, majority of the literature that examined the "income inequality thesis" looked at the relationship between inequality and some measures of health. I aim to contribute to this body of research and thus, the comparability of my results with those of previous research is central. Second, health is a very important area of human life and the claims of the supporters of the "income inequality thesis" have a very important policy component: if high inequality can indeed "get under the skin" and make people sick, addressing inequality could prove vital for improving the life of millions.

The general research questions that are at the basis of the dissertation are the following:

(1) what is the empirical relationship between inequality and different dimensions of well-being?

(2) what is the empirical relationship between inequality and well-being across countries with various levels of economic development?

(3) how can the relationship between inequality and well-being be explained?

(4) is the relationship between inequality and well-being the same for individuals with different characteristics, e.g., different income or coping resources?

In the remaining of this chapter, I will first discuss in short the main mechanisms that were proposed to explain the empirical observations that higher inequality was found to relate to worse well-being and then I will present a brief overview of the literature that examined the relationship between inequality and well-being. I will end the chapter with giving an overview of the two parts of this dissertation and of the four empirical studies conducted.

1.2. Pathways linking income inequality and health outcomes

In this section I will give a brief overview of three pathways that were advanced as explanations for the empirical observation that (at least in some samples and periods) higher inequality was found to relate to worse well-being. These pathways will be further detailed, critically analysed and put to the test within the space of the empirical studies that compose this dissertation. These are not the only mechanisms that were proposed in the literature to explain the relationship between inequality and well-being but I chose to discuss only them because they are fundamental for the empirical studies in this dissertation. The reader who is interested in other more comprehensive overviews of the mechanisms that were proposed to link inequality to health and well-being is advised to consult the following papers: Kawachi and Kennedy (1997a), Kawachi and Kennedy (1999), Wagstaff and van Doorslaer (2000), or Leigh, Jencks, and Smeeding (2009).

As stated before, majority of studies that aimed to provide tests for the "income inequality thesis" defined well-being by health. First, income inequality could relate to health through a material pathway. This mechanism is also known in the literature under the name of "absolute income hypothesis" or the "statistical artefact" criticism. The mechanism works in the following way: all else equal, if a monetary transfer occurs from the rich to the poor, the societal income inequality would be lower but the average income would remain unchanged. The impact of the monetary transfer for the health of the poor would be significant, i.e., the additional money would allow the acquisition of goods and services that would improve health. However, the transfer would not negatively affect the health of the rich with the same strength as it would positively impact the health of the poor. This is due to the non-linear relationship between income and health at individual level: an increase in income results in stronger health gains for the poor than for the rich. Subsequently, at aggregate level, we

would observe that between countries with similar average income, the ones with lower income inequality will display better average health outcomes.

Second, income inequality could impact health though a psychosocial pathway as advocated by Wilkinson and Pickett (2009b). According to these authors, income inequality serves as a measure of how hierarchical a society is. In this view, income is important not in its absolute value, but in its relative value compared to the other members of society. Material hierarchies lead to status differentiation and, through social competition for resources and social comparisons of individuals on different levels in the income hierarchy, they are at the basis of psychosocial effects of income inequality: stress and anxiety. In turn, the authors argued, the stress associated with the prolonged negative social comparisons within an unequal society is a precondition for increased vulnerability to a wide range of health problems, which affects the health of individuals across all social stratums.

Third, inequality could relate to health through an institutional pathway. Economists have argued that inequality has short and long run consequences for the organization and development of societies (Galor & Zeira, 1993), resulting in a strong negative empirical relationship between inequality and investments in public goods such as the health services and infrastructure. On the other hand, good health services and infrastructure are instrumental for improving the population health. Subsequently, in countries with higher income inequality the public health services and infrastructure would be less developed than in countries that are more equal and as the result the public health would be worse.

A different version of the institutional pathway was advanced by Lynch (2000) and Coburn (2004) who argued that inequality is a result of a specific historical, political and economic development that also shaped a particular country's infrastructure through specific policies and arrangements affecting education, health, labour market, etc. The arguments of these authors imply that inequality has a spurious relationship with health because it reflects effects of unmeasured characteristics of the country's infrastructure. In contrast, the economic literature argue for a causal relationship between inequality and the country's resources that are relevant to health.

1.3. A brief overview of the literature linking inequality to well-being

The starting point of the academic preoccupation with the relationship between inequality and health was the seminal article by Rodgers (1979). The author put together a dataset covering 56 low and high income countries and he was the first to show that population health measures such as life expectancy or infant mortality rate were negatively associated with income inequality. Following studies using the same macro level research design provided mixed evidence. While some authors found supporting evidences for a relationship between societal income inequality and population well-being measures (Cantarero, Pascual, & Sarabia, 2005; Kawachi & Kennedy, 1997b; Wilkinson, 1992) others concluded that this relationship is not robust or cannot be replicated with newer data (Ash & Robinson, 2009; Deaton & Lubotsky, 2003, 2009; Mellor & Milyo, 2001; Ram, 2006).

The growing inconsistencies in the findings of the ecological studies testing the "income inequality thesis" went hand in hand with an increased criticism of these studies' research design. Two main critical points were raised, first regarding a potential "statistical artefact" and second, regarding the ecological fallacy committed by some authors. The "statistical artefact" criticism originated in the study by Gravelle (1998), who argued that the empirical relationship observed at country level was just a result of the population composition. His argument was that between two countries with the same level of average wealth, the country where the incomes are more unequally distributed has a larger part of the population living in precarious conditions and poverty. In turn, the low level of material resources relate to worse health because the poor lack adequate shelter, food or access to medical services. It follows that, by aggregation, the country with the higher level of inequality will have more people with bad health and thus, will score lower on aggregated health indicators. The second criticism regarded the ecological fallacy committed when inferring conclusions about mechanisms working at individual level based on evidence found at macro level (Ellison, 2002; Jen, Jones, & Johnston, 2009). The studies by Wilkinson and Pickett (Wilkinson, 1999; Wilkinson & Pickett, 2009b) were especially targeted as being sensitive to the ecological fallacy criticism, because the authors developed a full argumentation on how inequality affects the well-being of individuals by specifying processes that take place at individual level, while supporting their claims with evidence derived from macro level analyses.

Following up on this criticism, the research focusing on the relationship between inequality and aggregated well-being scores was marked by a methodological shift toward the use of multi-level models as the preferred method to establish a genuine contextual effect of inequality on health (Duncan, Jones, & Moon, 1998; Wagstaff & van Doorslaer, 2000). Multi-level models allowed the use of individual level measures of health and well-being and the proper control for the composition of the population. The shift from ecological types of studies toward multi-level and longitudinal types of analyses was an important step in the process of disentangling the contextual effect of income inequality net of individual characteristics.

As Ellison (2002) states, the underlying problem of the ecological approach for the study of income inequality thesis is that "none of the cross-sectional ecological studies […] can actually establish that income inequality precedes the social and material circumstances which undermine health at an individual level. Longitudinal studies, multi-level modelling and path analyses should provide better evidence of causality…" (Ellison, 2002, p. 563).

An important issue related to the multi-level analyses is the level of aggregation where income inequality was measured. Regarding this issue, Wilkinson and Pickett argued that inequality should be measured at the level of society and not at the level of neighbourhoods because: "The reason a small, deprived neighbourhood within a rich nation is likely to have poor health is not because of the inequality within that neighbourhood, but because the neighbourhood is deprived in relation to the rest of society. Its low socioeconomic status in relation to the rest of society is indicated by its relatively low average income." (Wilkinson & Pickett, 2009b, p. 503). On the other hand, the authors argue, the societal income inequality is "predictive of population health because it serves as a measure of the overall burden of stratification relative to others within each society" (idem).

Regardless of the level of aggregation where inequality was measured, multi-level studies also produced mixed findings (Blakely, Lochner, & Kawachi, 2002; Hildebrand & van Kerm, 2009; Jen et al., 2009; Lopez, 2004; Oshio & Kobayashi, 2009; Subramanian & Kawachi, 2004, 2006; Wong, Cowling, Lo, & Leung, 2009). As a way out of this accumulation of results, a meta-analysis of 9 cohort studies and 19 cross sectional studies published latest in the year 2007 found a modest negative effect of income inequality on health (Kondo et al., 2009). Still, the authors urge for caution when interpreting their results because of two reasons: first, they found high heterogeneity between the studies included in the meta-analysis and second, the relationship between inequality and health was

attenuated when the research design could account for other unmeasured contextual characteristics.

Another direction pursued by the research investigating the relationship between inequality and health was to integrate the temporal dimension in the analysis. Two aspects can be differentiated when talking about time in relation to the "income inequality thesis". First, as Coburn (2004) noticed, one would expect a latency period between social conditions (e.g. income inequality) and their effects on health. Following this observation, several studies investigated whether income inequality had lagged effects on health. The conclusions were again contradictory: some authors concluded that lagged measures produced different findings (Blakely, Kennedy, Glass, & Kawachi, 2000; Subramanian & Kawachi, 2004) while others found that lagged measures were not associated with health outcomes (Mellor & Milyo, 2003) or that using contemporaneous and lagged measures did not make a difference (Subramanian & Kawachi, 2006).

Second, there is the problem of the relationship between income inequality and health through time. In other words, if the relationship between income inequality and health is causal in nature, one would expect that changes in the income inequality level would relate to changes in the health outcomes. More than that, since the "income inequality thesis" argues for a universal relationship between inequality and health, this relationship should be observed not only within a specific country but across countries. However, using longitudinal designs, some authors found evidence that an increase in income inequality was detrimental for health (Cantarero et al., 2005; Hildebrand & van Kerm, 2009) while others found that income inequality measures were not significantly related to health measures across time and countries (Chung & Muntaner, 2006; Mellor & Milyo, 2001; Shi, Macinko, Starfield, Politzer, & Xu, 2005).

An important characteristic of the literature that examined the "income inequality thesis" is the focus on samples of HICs, partially motivated by the argument that inequality should be more relevant to health when the limits of economic growth are reached (Wilkinson & Pickett, 2009b). However, some authors also examined the relationship between inequality and well-being measures in samples of LMICs and the results were mixed and even contradictory to expectations derived from the "income inequality thesis". For instance Biggs, King, Basu, and Stuckler (2010), who focused on a sample of Latin American countries, found that an increase in inequality measured by Gini Index of income was associated with a significant *increase* in life expectancy and with a significant *decrease* in mortality and infant mortality rate. Other studies used mixed samples of

countries, pooling together low, middle and high developed countries. An example is the study by Babones (2008), who found a significant negative relationship between income inequality and indicators of population health. The author, however, points out that the results were not robust in different subsamples of countries. On the other hand, Jen, Jones et al. (2009), using data from the World Value Survey and applying multilevel models, found no significant relationship between income inequality and self-rated health.

An important point that needs to be considered when analysing the relationship between inequality and well-being in LMICs regards the measurement of inequality. These countries are characterised by high levels of informal labour arrangements and a large part of the households still depend on subsistence agricultural practices. Because of these reasons it is very difficult to measure the level of disposable income of the household and subsequently, to compute reliable measures of income inequality. As a result, part of the studies that empirically evaluated the "income inequality thesis" in samples of LMICs measured inequality using indicators of wealth based on the assets available and the characteristics of the household (Fox, 2012).

Another characteristic of the literature testing the "income inequality thesis" is that it aims to establish an overall relationship between inequality and well-being measures and only a minority of studies paid attention to the differential effect of inequality for individuals with different socio, economic and demographic characteristics. A reason behind this overwhelming neglect of potential differential effects for different groups in society could be traced to the methodological difficulties of estimating these effects. Only when the multi-level studies were advanced it was possible to estimate cross-level interactions and formally examine whether the contextual effect of inequality on well-being is different for some groups in comparison with others. When the work on this dissertation started, there were few studies that followed this research path, e.g., Subramanian and Kawachi (2006) or Subramanian, Kawachi, and Kennedy (2001). The picture presented by these studies was to some extent contradictory – in one study the health of affluent groups in the US society had less to suffer from high income inequality while the other study found that both the advantaged and the disadvantaged groups are affected by high levels of state inequality. I note that these studies miss a detailed theoretical discussion of the reasons why some social groups could be affected more than others by living in an environment with high inequality.

This brief review of the literature that empirically tested the "income inequality thesis" is far from being comprehensive. Instead my aim was to trace the developments of the preoccupation with the "income inequality

thesis" and to pinpoint some important characteristics that define the academic research on this topic.

1.4. The overview of the dissertation

The general research questions of the dissertation are divided into several sub-questions that are addressed by four empirical studies written as journal articles[1]. These four empirical studies are presented in Chapter 3 to Chapter 6 and are divided into two parts corresponding to the distinction I make between effects of inequality on 1) physical health and 2) mental health and well-being. In addition, Chapter 2 deals with the problem of measurement of both inequality and of well-being, the implications for the cross-country comparative research and the way it was addressed in the four empirical studies.

1.4.1. Effects of inequality on physical health

Chapter 3. Inequality, wealth and health. Is decreasing income inequality the key to create healthier societies?

The supporters of the "income inequality thesis" maintain that reducing disparities in income is the key to create healthier societies, and that this is particularly true and relevant for the economically high-developed countries. The implication is that the effect of income inequality would be dependent on the level of economic development of the country. However, this idea is rarely analysed adequately, because empirical studies that addressed the relationship between income inequality and population health mostly used samples of wealthy countries, while countries that are less economically developed received relatively little attention. In addition, many of the previous studies are cross-sectional in nature but, despite the limitations of the cross-sectional methodology, authors postulated conclusions in terms of the benefits of *decreasing* the income inequality. However, in order to conclude that a reduction in inequality would improve health, we need to perform dynamic analyses, using longitudinal type of data, in which changes in inequality and changes in health are examined.

The aim of this chapter is to examine the relationship between population health, as measured by life expectancy, and the country's wealth and income inequality among countries with various levels of economic

[1] All of the four journal articles were written with co-authors, and thus they are written in the plural. When referring to them I will use "we" instead of "I".

development. We aim to improve upon the testing of the "income inequality thesis" by examining these relationships not only cross-sectional but also within a dynamic framework, i.e., we look at the relationship between changes in inequality and changes in health. In this study we ask the following research questions: 1) *to what extent the levels of and the changes in income inequality and wealth relate to population health?* and 2) *is the strength of these relationships different for countries with various levels of economic development?*. Furthermore, from a methodological point of view we inquire 3) *whether the use of dynamic or static models testing the relationship between income inequality, wealth and population health leads to divergent conclusions?*.

We discuss the most frequent mentioned pathways that were proposed in the literature to explain the empirical observation that a higher level of inequality was found to relate to worse health. We reason that these mechanisms could very well apply to all countries but the strength of the relationship will differ between countries with different level of economic development. In fact, we expect that this relationship will be weaker among high income countries than among low and middle income countries. In order to test our hypotheses we use a large sample covering 140 countries and 2360 country-year observations ranging from 1987 to 2008, and we conduct our analyses separately for subsamples of countries defined by their level of economic development.

Chapter 4. The Link between Inequality and Population Health in Low and Middle Income Countries: Policy Myth or Social Reality?

The starting point of this chapter is an influential policy idea that states that reducing inequality is beneficial for improving health and health equity in the LMICs. Our observation is that although the LMICs are the focus of these recommendations, evidence was often cited from research that examined samples of HICs (e.g., Pickett and Wilkinson (2007)). We argue that in the light of the profound cultural, economic, and political differences between the LMICs and the HICs, it is questionable whether such findings from the HICs can be transferred to fundament policies targeted at improving population health in the LMICs. Furthermore, the limited literature that examined the relationship between inequality and health among LMICs revealed contradictory results. We conclude that there is still much work to be done in order to better understand why these inconsistencies have emerged.

The chapter contribute to the literature by examining the relationship between inequality with health and health inequality among the LMICs, with a focus on disentangling potential mechanisms at work. We examine two potential explanations of the relationship between inequality and health:

(1) the position stating that any relationship between inequality and health is just a statistical artefact due to composition effects, and (2) the position stating that inequality relates to population health via its relationship with the level and coverage of those country level resources that are relevant for improving health, i.e., the health services and infrastructure.

The specific research questions that guide our study are: (1) *to what extent is inequality associated with the health of individuals living in LMICs?*; (2) *can we find evidence for a genuine contextual effect of inequality on health, independent of composition effects due to the population's structure?*; (3) *to what extent is a potential contextual effect of inequality on health mediated by the country's resources relevant to health?* In order to find answers to these questions we utilize individual level data collected by the Demographic and Health Surveys (DHSs) project, funded by the United States Agency for International Development (DHS, 2013). Our working data samples consists of: (1) a sample of 373735 women nested in 33 countries for whom we have information on anemia status; (2) a sample of 152485 children with age less than 71 months nested in 30 countries, for whom we have information on their anemia status and (3) a sample of 455692 women nested in 52 countries for whom we have information on the experience of child mortality.

1.4.2. Effects of inequality on mental and emotional health and well-being

Chapter 5. Income inequality and depression: The role of social comparisons and coping resources

Many sociological studies have examined depression, stress and their social correlates. Earlier studies looked at the role of major life events and later moved from a mechanistic view toward integrating the objective circumstances of individuals and the perceptions of these circumstances. Nowadays the focus has shifted toward inquiring whether the organization of society in terms of the unequal distribution of resources can also be harmful to individuals' mental well-being.

In this chapter we look at the relationship between inequality and depressive symptoms of Europeans and we examine more closely potential mechanisms behind this relationship. This study contributes to the literature by examining 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. Furthermore, we examine

closely the buffering role of non-material coping resources for the relationship between inequality and depression and the potentially different effects of inequality according to SES position.

The specific research questions that we formulate are: 1) *to what extent do country differences in income inequality relate to individuals' depressive symptoms?*; 2) *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?;* 3) *do individuals with more non-material coping resources experience a weaker effect of inequality than individual with fewer coping resources?*; and 4) *does the relationship between inequality and depression differ for individuals with different relative SES positions?*. To address these questions, we use the third round of the European Social Survey (Jowell & Team, 2007) and we test the hypotheses formulated on a working dataset that consists of 43824 respondents nested in 23 European countries.

Chapter 6. The effect of inequality on well-being: exploring corruption as an alternative mechanism

The starting point of this chapter is the observation that, while the literature exploring the relationship between income inequality and well-being is extensive, there is little progress made on deciphering the mechanisms behind this relationship. Subsequently, in this chapter we do not focus on the direct effect of income inequality on population well-being but instead we propose and test an alternative mechanism that was not yet explicitly formulated in the literature. We argue that the relationship between inequality and well-being could be causal and mediated by the level of societal corruption. Furthermore, we also address the complex relationship between inequality and corruption, because corruption could also influence inequality and thus we could be dealing with a reinforcing loop, a vicious circle in which both inequality and corruption reinforce each other and ultimately could damage the population well-being (Apergis, Dincer, & Payne, 2010; Chong & Gradstein, 2004; Gupta, Davoodi, & Alonso-Terme, 2002; Rothstein & Uslaner, 2005).

Subsequently, the main research question of this chapter is: 1) *can we find evidence for a causal mechanism linking inequality to population well-being via an effect on corruption?* In order to find answers to this question we use a dataset covering 77 world-wide countries.

CHAPTER 2.

MEASURING INCOME INEQUALITY AND WELL-BEING

In this chapter I will briefly discuss the measurement of income inequality and of well-being as they appeared in previous research and I will give an overview of the measurements used in the empirical studies that are part of this dissertation.

2.1. Measuring income inequality

The major statistical agencies base the calculation of various income inequality measures on the disposable income from all sources, after taxes and transfers, among households, with adjustments for differences in household composition. Eurostat, for example, uses household disposable income, which is measured by summing up all monetary incomes received from any sources by each member of the household (including income from work and social benefits) plus income received at the household level, and deducting taxes and social contributions paid (EUROSTAT, 2010b). In order to adjust for the differences in household composition, this total is divided by the number of "equivalent adults" using a standard equivalence scale, the so-called "modified OECD" scale. In this approach a weight of 1 is attributed to the first adult in the household, a weight of 0.5 to each subsequent member of the household aged 14 and over, and a weight of 0.3 to household members aged less than 14. The resulting figure is called "equivalised disposable income" and is attributed to each member of the household.

The argument behind utilizing the "equivalised disposable income" for calculating the degree of inequality within a society is that larger households have different levels of costs than smaller households and thus, the same level of disposable income for two different size households will result in a different level of welfare. This implies that without the correction for the household size, the individuals residing in a one-person household will weigh more for the overall income inequality distribution than the individuals residing in multi-persons households. The practice of adjusting for the household composition addresses these concerns, and the corrected income distribution will accurately reflect differences in the welfare position of the households within a society.

The resulting inequality distribution refers to the monetary *resources* (e.g. income) but another possibility would be to take into consideration the distribution of *consumption*. However, as a consequence of the households 'efforts to smooth consumption over time, resources are more unequally distributed than consumption. The implication of this observation for comparative research is immediate: when comparing inequality across

countries it is important to compare either measures based on consumption, or measures based on resources, but not mix the two.

2.1.1. Inequality measures

There are several types of condensed measures of inequality available, starting from simple ones to more complex ones. The simplest measure is the **range**, which summarize the difference between the highest and lowest observations of the distribution. The main limitation of this measure reside in the fact that it only uses information on two values from an entire dataset.

Another easy to compute measure of inequality is the **range ratio**, which is calculated by dividing the value at a certain percentile by the value at a lower percentile. Like the range, range ratios only look at two distinct data points, throwing away the great majority of the data, reason why these measures are the least preferred. A variation of the range ratio is the **quintile share ratio.** An example is the S80/S20 income quintile share ratio, which is calculated as the ratio of total income received by the 20 % of the population with the highest income (the top quintile) to that received by the 20 % of the population with the lowest income (the bottom quintile). This measure uses more information as the simple range ratio; however, it still does not use information on the whole population.

The **coefficient of variation** is another measure used to capture inequality, and is defined as the standard deviation of a variable divided by the mean. It is fairly easy to compute and it uses all the information available. The downside is that it can take any values from zero to infinity.

The **Gini coefficient** is one of the most popular measures of inequality, although the computation is more complex. Its calculation is derived from the Lorenz Curve, which is plotted by ranking the observations (e.g. individuals or households) from the lowest to the highest, based on the variable of interest (e.g. income). Next step is to plot the cumulative proportion of the population on the horizontal axis and the cumulative proportion of the income variable on the vertical axis. Mathematically, the Gini coefficient is equal to double the area between the equality diagonal and the Lorenz curve derived from the data, and has an interval ranging from 0 (perfect equality) to 1 (the case when only one member of the population holds all its resources). The main advantage of the Gini coefficient is that it incorporates all information available and it allows comparisons between various populations, regardless of their size and structure. However, Gini coefficient is not free from problems, e.g., Moran

(2003), demonstrated that comparisons between Gini coefficients based on Lorenz curves that intersect have to be made with caution.

Another group of inequality measures are based on Generalised Entropy (GE) theory. A measure of inequality derived from these principles is the **Theil Index**, which seeks to quantify the level of disorder within a distribution. It has the advantage of being additive across different subgroups or regions in the country. The Theil index, however, does not have a straightforward representation and lacks the appealing interpretation of other measures. In addition, it cannot be used to directly compare populations with different sizes and group structure.

2.1.2. Measurements of inequality in this dissertation

The intent of the present dissertation is comparative in nature, either by following countries through time or by looking at cross-sectional differences between societies. Concerns regarding the comparability of the measures used were crucial (Davidov, Schmidt, & Billiet, 2011). In addition, it was important to compare the results of the four empirical studies with results from previous studies. In order to accommodate these requirements regarding the comparability of the measures and of the results, inequality is measured consistently throughout the studies by the Gini coefficient. This measure is easily understandable, has a confined range, takes into consideration the whole information available and allows comparisons between populations with different size and compositions.

Three of the studies in this dissertation utilise the Gini Index of the income available for consumption, i.e., after taxes and transfers. In order to ensure a high level of comparability of the Gini Index of income between countries and time, we use as source for our measure the Standardized World Income Inequality Database (SWIID) (Solt, 2009). This dataset was developed as an effort to improve the comparability of the Gini Index of income across countries and periods and to address the biggest problems that affected comparative research, i.e., existent measures of income inequality were rarely comparable because of the differences in the definition of income (before or after taxes) or the differences in the reference unit (households or persons). The starting point of the SWIID dataset is the Gini Index measure from the World Income Inequality Dataset (UNU-WIDER, 2008). In the next step, this database was enriched with two measures of Gini Index derived from the Luxembourg Income Study – in gross and net income. Next, a procedure was developed to account for the fact that the data in the two original datasets differs with respect to: 1) the reference unit of the source data (e.g., household per capita, household adult

equivalent, household without adjustment, employee, person) and 2) the definition of income (e.g., net income, gross income, expenditures or unidentified). A custom missing-data algorithm was used to generate time series standardized on the Luxembourg Income Study household adult-equivalent gross and net-income data, which is considered nowadays to be the source with the highest quality and comparability. In all the three studies, I used either a lagged or an average measure of the Gini Index of the net income across several years before the year when the outcome variable was measured.

In Chapter 4, which focuses on a sample of LMICs, I opted to measure inequality by computing a Gini coefficient based on the distribution of wealth of the households as measured by an asset-based household wealth index. This decision owed to the fact that in the LMICs the structure of economy is much based on informal work contracts, seasonal work and subsistence agricultural practices. Within this context it is hard to collect accurate information about the wealth of the households expressed in some form of currency. The asset-based wealth index is regarded as a valid and reliable estimation of the long-lasting economic standing of the household (Smits & Steendijk, 2014), and it was calculated using easy-to-collect data on a household's ownership of selected assets, such as televisions or bicycles; materials used for housing construction; and types of water access (DHS, 2013).

2.2. Measuring well-being

A major part of the research around the "income inequality thesis" equated well-being with health status (Wilkinson & Pickett, 2006). The studies included in this dissertation are a contribution to this general literature, thus I align myself to this conceptualization of well-being as mostly referring to the health of individuals.

One of the most used measures was an overall measure of health, known under the name of "self-rated health" (SRH) (Browning & Cagney, 2002; Jen et al., 2009; Karlsson, Nilsson, Lyttkens, & Leeson, 2010; Kennedy, Kawachi, Glass, & Prothrow Stith, 1998). SRH was convenient to use due to its overwhelming presence in national and cross national surveys. Its utility as an overall health measure is given by its predictive power for mortality, a finding nowadays generally accepted in the literature (Bardage et al., 2005; Idler & Benyamini, 1997; Jylha, 2009; Jylha, Guralnik, Ferrucci, Jokela, & Heikkinen, 1998). However, SRH is not perfectly adequate for cross country comparative research. As an example, imagine

that two respondents in two populations, A and B, are asked to evaluate their overall health by using five response categories: “very good”, “good”, “fair”, “poor” and “very poor”. The assumption behind this question is that true health is an underlying latent variable. If the translation from the latent variable to categories would be optimal, individuals with exactly the same true level of health should respond identically between and within populations. However, in practice there is no reason to assume that individuals have and use the same definitions of what good or bad health is.

The implications of the above for cross cultural research are direct – the same level of the “true health” on the latent variable scale is categorised differently between different populations (Jurges, 2007; Jylha et al., 1998). The reasons for these differences between populations in their definition of what good or bad health are not entirely understood. Some authors suggest that it is the result of the interplay between multiple factors: culturally and historically varying conceptions of “health”, different reference groups, earlier health experiences, health expectations, positive or negative dispositions, mental health problems (Jylha, 2009). Whatever the explanations might be, the bottom line is that the use of SRH measure is debatable for cross- country comparative research.

A pertinent differentiation concerning the concept of health can be made between *physical* and *mental* health. In previous research, the measurements of these two dimensions of health vary between asking the respondents directly for health information to employing standard medical tests and inventories, including taking medical measurements, e.g., blood samples. As discussed before, within the framework of cross-country comparative research the bias that can affect the comparability of a construct is a serious concern: some constructs are culture specific or do not exist in some countries, individual items may have a specific contextual meaning, or there can be cultural traits that affect response styles and cause method bias (Davidov et al., 2011). If the measurement invariance of a specific construct is not established, any exercise of ranking and comparing countries based on their average scores is susceptible to lead to erroneous conclusions. A validated index of health symptoms is more likely to accurately measure what it is supposed to measure and in addition, researchers can test the measurement invariance of multiple-items scales. The results of standardized medical tests collected by specialized personnel are a step further toward accurate measurements of health status that are not affected by the willingness or memory of the subjects or by subjective definitions of what good or bad health is.

But not only can the health status of the individuals be assess, i.e., researchers also used macro level indicators evaluating overall population

health. Such measures are for instance life expectancy at birth or child and infant mortality, measures that were routinely used by studies investigating the "income inequality thesis" (Babones, 2008; Beckfield, 2004; Wilkinson & Pickett, 2009b). These measures tap into the physical dimension of health.

2.2.1. Health and well-being measurements in this dissertation

In three of the four empirical studies in this dissertation well-being was defined by the health status of individuals or of the population. The main cleavage between Part I and Part II is based on the type of health and well-being measures. Both studies in Part I use measures of physical health, i.e., life expectancy as a measure of population health in Chapter 3 and anemia status of mothers and their children and the experience with child mortality, as measures of individuals' health in Chapter 4. Chapter 5 in Part II used a measure of mental health, i.e., a scale of depressive symptoms, while Chapter 6 in Part II used a measure of positive well-being, i.e., happiness, which is a component of any mental health inventory.

Special attention was devoted toward selecting measures with high cross-country comparability, e.g., the anemia status was assessed by collecting blood samples in the field, which were afterward analysed in specialized labs. The advantage of this method is the use of standard medical tests and cut points, that ensures a higher degree of cross-country measurement equivalence. The mothers' experience with child mortality was calculated from their detailed birth history covering 5 years prior to the date of interview and there is little suspicion regarding the inability of women of recalling their births or not wanting to declare them. Furthermore, previous studies provided evidence for the reliability and validity across European countries of the scale of depressive symptoms used (Van de Velde, Bracke, Levecque, & Meuleman, 2010). The only measure of well-being that was assessed by only one item was happiness. Because of the one item measurement it was impossible to establish its equivalence between the countries in our sample. This being the limitation of the measure, the decision to use it owed to the need to maximize the size of the sample of countries in order to overcome concerns regarding the power of our analyses.

An overview of the empirical studies, the specific research design and measurements used are presented in Table 2.1.

Table 2.1: Overview of the studies included in this dissertation

Chapter in the book	Research design	Inequality measure	Health / well-being measure	Sample(s)
Chapter 3: Inequality, Wealth and Health: Is Decreasing Income Inequality the Key to Create Healthier Societies?	Macro level analysis. Panel data with world-wide countries followed through time. Cross-sectional and longitudinal.	Gini Index of income after taxes and transfers. Source: Standardized World Income Inequality Database (SWIID). 2-year lagged measures in comparison to the health measure	Dependent variable (DV): life expectancy at birth. Source: UN World Prospects, 1987 to 2008 Well-being dimension: objective, physical health. Measurement unit: societies.	140 countries and 2360 country-year observations.
Chapter 4: The Link between Inequality and Population Health in Low and Middle Income Countries: Policy Myth or Social Reality?	Multi-level analysis. Individuals nested in low and middle income countries. Cross-sectional.	Gini Index of household wealth Source: own calculations based on the asset-based wealth index collected from the respondents in the Demographic and Health Surveys.	DV 1: anemia status of women and of their children. DV 2: the women's experience of child mortality. Source: the Demographic and Health Surveys, 2000 to 2011 Well-being dimension: objective, physical health. Measurement unit: individuals.	73735 women nested in 33 countries with measurements for DV 1 152485 children with age less than 71 months nested in 30 countries with measurements for DV 1 455692 women nested in 52 countries with measurements for DV 2
Chapter 5: Income inequality and depression: The role of social comparisons and coping resources	Multi-level analysis. Individuals nested in European countries. Cross-sectional.	Gini Index of income after taxes and transfers. Source: Standardized World Income Inequality Database (SWIID). 5 years average before individual data was collected	DV: depressive symptoms measured by the restricted Centre for Epidemiologic Studies Depression Scale. Source: European Social Survey round 2006/2007. Well-being dimension: self-reported, mental health. Measurement unit: individuals.	43824 respondents nested in 23 countries
Chapter 6: The effect of inequality on well-being: exploring corruption as an alternative mechanism	Macro level analysis controlling for population composition. Cross-sectional.	Gini Index of income after taxes and transfers. Source: Standardized World Income Inequality Database (SWIID). 5 years average before individual data was collected	DV: societal happiness Source: European Values Study, wave 2008 and World Values Survey, wave 2005-2009 Well-being dimension: self-reported, subjective well-being. Measurement unit: societies.	77 countries

PART I.

EFFECTS OF INEQUALITY ON PHYSICAL HEALTH

CHAPTER 3.

INEQUALITY, WEALTH AND HEALTH. IS DECREASING INCOME INEQUALITY THE KEY TO CREATE HEALTHIER SOCIETIES?[2]

[2] A slightly different version of this chapter has been published in *Social Indicators Research* (Pop, van Ingen, & van Oorschot, 2013).

3.1. Introduction

Social scientist have long been interested in determining the role that objective material conditions play in shaping better, healthier or more successful societies (Pritchett & Summers, 1996; Torssander & Erikson, 2010; Wilkinson & Pickett, 2009b). Among the range of material conditions that could impact the wellbeing of societies, income inequality has captured nowadays the most attention. The appeal of the so-called "income inequality thesis" rests in the promise of a unique solution to a large variety of social problems ranging from physical and mental health to criminality, low social cohesion, teenage births, etc. As Wilkinson and Picket phrased it: "if the United States was to reduce its income inequality to something like the average of the four most equal of the rich countries (Japan, Norway, Sweden and Finland), ... rates of mental illness and obesity might ... each be cut by almost two-thirds, teenage birth rates could be more than halved, prison population might be reduced by 75 per cent, and people could live longer while working the equivalent of two months less per year." (Wilkinson & Pickett, 2009b, p. 268).

While the list of associated social problems is extensive, most empirical work has focused on the relationship between income inequality and health, and decreasing inequalities in the distribution of income has been proposed as a key measure to improve population health (Kondo et al., 2009; Layte, 2012; Michael Marmot, 2005; Wilkinson & Pickett, 2006). The interest in the potential corrosive effect of income inequality on population health reflects, on the one hand, concerns of policy-makers with the persistent health inequalities that defy the general rise in the standard of living of the population (Mackenbach et al., 2008). On the other hand, it reflects an ethical view shared by organizations such as the World Health Organisation according to whom "social injustice is killing people on a grand scale" (CSDH, 2008, p. 26). In this context, the work of Rodgers (1979) who found a negative correlation between the level of income inequality of a country and the population health marked the starting point of a rich body of research which, at times, stirred intense debates between the supporters and the critics of the "income inequality thesis". Not surprisingly so, since the straightforward solution to address health inequalities by simply decreasing the income inequality of societies is compelling for policy-makers provided it is supported by empirical evidences. As Kondo and his colleagues argue, if indeed the relationship between inequality and population health is causal, "1.5 million deaths (9.6% of total adult mortality in the 15-60 age group) could be averted in 30

OECD countries by levelling the Gini coefficient below the threshold value of 0.3" (Kondo et al., 2009, p. 7).

A brief look at the previous literature reflects little agreement between scholars. For example, meta-analyses and reviews of the accumulated studies show that the current empirical evidence does not necessarily fully support the core idea that greater equality would benefit health. For instance, in a meta-analysis of 168 studies linking income inequality and population health, the outcomes of 87 studies (52 per cent) were supportive of the idea that higher income inequality relates to worse population health while the outcomes of the rest were partially supportive or not-supportive (Wilkinson & Pickett, 2006). Another meta-analysis evaluating only studies applying a multi-level design found a modest adverse effect of income inequality on population health, although the authors advise that these results need to be interpreted with caution given the heterogeneity between studies (Kondo et al., 2009). However, another extensive review of the literature ends with a more critical tone: among wealthy countries, the income inequality is not systematically related to population health (Lynch et al., 2004). Furthermore, Judge, Mulligan, and Benzeval (1998, p. 578), based on a review of the literature and their own analyses, caution again: "statistically significant associations between income inequality and population health in the developed world are anything but secure".

Apart from the lack of consensus among scholars regarding the empirical evidence, what supporters of the "income inequality thesis" maintain is that reducing disparities in the income distribution is the key to create healthier societies, and that this is particularly true and relevant for the economically high-developed countries. Thus, they argue that economic growth is relevant for the improvement of population health only for the countries that are less economically developed, because there is a "threshold of material living standards after which the benefits of further economic growth are less substantial" (Wilkinson & Pickett, 2009b, p. 10). When the threshold of wealth is reached, it is not the level but the distribution of income that would further improve population health. In other words, the effect of income inequality and of the wealth of societies on health is dependent on the level of economic development of the country. However, this idea is rarely analysed adequately, because empirical studies on the relationship between income inequality and population health are mostly limited to samples of wealthy countries, while countries that are less economically developed received relatively little attention (but see Babones (2008), Biggs et al. (2010) or Beckfield (2004) for examples of studies that examined this relationship among world-wide countries). Therefore, the first

aim of the current study is to examine how population health is affected by a country's wealth and income inequality and by the interplay between the two for countries with various levels of economic development.

We also note that many of the previous studies are cross-sectional in nature. However, despite the limitations of the cross-sectional studies, some authors postulated conclusions in terms of the benefits of decreasing the income inequality: "The evidence shows that *reducing* inequality is the best way of improving the quality of the social environment" [italics added] (Wilkinson & Pickett, 2009b, p. 29). As Ellison states: "none of the cross-sectional ecological studies […] can actually establish that income inequality precedes the social and material circumstances which undermine health at an individual level. Longitudinal studies, multi-level modelling and path analyses should provide better evidence of causality…" (Ellison, 2002, p. 563). In order to conclude that a reduction in inequality would improve health, we need to perform dynamic analyses, using longitudinal type of data, in which changes in inequality and changes in health are examined. The second aim of our study is thus to improve upon the testing of the "income inequality thesis".

Given the above, we formulate research questions along two lines, by looking at the *levels of* and at the *changes in* income inequality and wealth, and we ask to what extent they relate to population health and whether the strength of these relationships are different for countries with various levels of economic development. Furthermore, from a methodological point of view we inquire whether the use of dynamic or static models testing the relationship between income inequality, wealth and population health lead to divergent conclusions. Our strategy is to conduct our analyses separately for subsample of countries defined by their level of economic development, based on the analytical categories employed by World Bank (WorldBank, 2010). We chose this method to classify countries because of two reasons. First, this classification method was used in previous research in order to select the sample of countries used to provide evidences for the "income inequality thesis" (Wilkinson & Pickett, 2006). Second, this classification is widely used by prominent international economic institutions, such as World Bank or United Nations. We make use of high-quality comparable data on income inequality across countries and time that has recently become available (Solt, 2009). We enrich this initial dataset with information on societal wealth measured as GDP per capita and population health measured as life expectancy at birth. Our working sample covers a number of 140 countries and 2360 country-year observations ranging from 1987 to 2008. These data enable us to both replicate previous studies and improve upon them.

3.2. Theory and hypothesis

"Income inequality thesis" states that increasing societal wealth leads to improving population health only until a certain level of economic development. When this threshold of wealth is reached, i.e., for the case of high-developed economies, reducing disparities in income distribution is the key to further improve the health of the population (Wilkinson & Pickett, 2009b). However, scholars disagree with regard to the "authenticity" of the observed association between higher levels of income inequality and worse population health indicators, and critics of the "income inequality thesis" talk about a spurious relationship due to some unmeasured characteristics (Lynch et al., 2004). Other scholars approached these debates by focusing on the potential mechanisms that might explain why greater inequalities would relate to worse health in sample of rich countries (Wagstaff & van Doorslaer, 2000). In the present contribution, based on the proposed mechanisms in the literature, we examine what the predicted outcomes in terms of the expected relationship between income inequality and population health are, and we discuss if these mechanisms would work the same for countries in different categories of economic development.

One of the main explanations is that the relationship between income inequality and population health has to do with the concave relation between income and health at individual level (Gravelle, 1998). The argument is the following: if a monetary transfer occurs from a rich individual to a poor one, at societal level one would observe a decrease in income inequality while the average income of the society remains constant. At individual level, the impact of the transfer on the health of the poor individuals will be significant, because it allows the acquisition of goods and services that positively influence health, while it will affect the health of the rich individuals only marginally. At aggregate level, we would observe that between countries with similar average income, the ones with lower income inequality would display better average health outcomes. In addition, within a country, reducing income inequality would relate to an improvement in population health.

Another prominent idea is that income inequality may serve as a measure of how stratified a society is (Wilkinson & Pickett, 2009a, 2009b). In this view, a person's income is important not in its absolute value, but in its relative value compared to the other members of society. Material hierarchies lead to status differentiation that, in turn, triggers social comparisons. Such social comparisons are at the basis of psychosocial effects of income inequality: stress and anxiety (Wilkinson, 1999). In turn,

the stress associated with the prolonged negative social comparisons within an unequal society is a precondition for increased vulnerability to a wide range of health problems. Subsequently, in countries with higher income inequality, generalized worse individual health would aggregate into worse societal health compared to countries with lower income inequality. The same would apply in periods characterized by an increase in income inequality.

Third, income inequality might also affect health through social wide effects such as eroding communities and violent crime. Regarding the corrosive effect on community life, the argument is that the gap between poor and rich leads to declining levels of social cohesion and trust, which in turn results in lower levels of social support and via this mechanism the health of the individuals would be negatively affected (Kawachi & Kennedy, 1997a). Regarding the effect of income inequality on raising the levels of violent crime, the argument is twofold: on the one hand, it was argued that the exacerbated feelings of shame and humiliation resulted from the strong differences in social statuses are triggers to the involvement in violent acts, and on the other hand, people living in environments characterised by crime, anti-social behaviour and violence would experience more stress which on the long term, would influence their health (Wilkinson & Pickett, 2009b). Again, the expectation is that via aggregation, generalised worse individual health would result in worse societal health in societies that are more unequal.

We argue that these mechanisms could very well apply to countries in all categories of economic development. For instance, in countries at the lower end of the wealth continuum, large income inequalities may cause political and social systems to be very unstable, with continuous conflicts and tensions. This is likely to decrease the level of social cohesion, to increase levels of violence and to enhance stress and anxiety in the population. In addition, there is no reason to suspect that the relationship between income and health at the individual level is not a general one, applying to countries in various levels of economic development. Therefore, the expectation is that the negative relationship between *levels* (H1a) or *changes* (H1b) in income inequality and life expectancy is applicable to countries in all categories of economic development.

While plausible to think that the negative relationship between income inequality and health is a general one, the strength of the relationship might be different between groups of countries with different levels of economic development. In the economic literature, it is sometimes argued that in societies with higher average income the public provision of essential goods and services is higher and the population has more

command over these goods and services (Anand & Ravallion, 1993; Ranis & Stewart, 2000). In turn, the provision of public services, the improved access to better living conditions and the capacity to better access and use the public goods through, for instance, increased levels of education, have their own effect on improving population health (Elo, 2009; Torssander & Erikson, 2010). As a result, higher level of economic development would provide more protection against the damaging effects of income inequality. This reasoning leads to modifying the previous expectations in the following direction: the expected negative relationship between *levels* (H2a) or *changes* (H2b) in income inequality and life expectancy is weaker among well-developed countries.

An important element of the "income inequality thesis" is the robust finding that the level of wealth of a country adds more to population health when the country is on a lower level of development, while in the countries with higher level of economic development this effect diminishes or even disappears (Preston, 1975; Pritchett & Summers, 1996). This observation can be explained by the fact that with an increase in wealth, population has more resources and better living conditions and the state also has more resources that can be invested in the health services and infrastructure, which in turn add to the health of the population. On the other hand, the relationship between wealth and health should be stronger for countries in the low-income group because the gains in population health deriving from economic growth should be more substantial than in the case of their richer counterparts. We therefore hypothesize that there is a positive relationship between the *levels* (H3a) or *changes* (H3b) in wealth and life expectancy, but the positive relationship between *levels* (H4a) or *changes* (H4b) in wealth and life expectancy is expected to be weaker as the level of economic development increase.

We also need to take into account that wealth and income inequality change simultaneous within a country from one year to another. If an increase in income inequality relates to a decrease in life expectancy, an increase in wealth might be protective for population health, diminishing the corrosive effect of income inequality. Our last hypothesis reads: in periods when an increase in wealth is observed, the negative effect of changes in income inequality on life expectancy is weaker (H5).

3.3. Data and methods

Income inequality. The most important measures for our study are the *level* and *changes* in income inequality of countries. Previous research already pointed at the issue of comparability of observations across time and countries (Judge et al., 1998; Leigh et al., 2009; Moran, 2003): "Many of the studies use multiple sources of income distribution data and/or data from a wide range of years, which makes comparability between countries questionable… In fact, we believe it is the generally poor quality of the income data that poses the most serious weakness in most of the studies we have reviewed." (Judge et al., 1998, p. 569).

To overcome these difficulties, we make use of a new dataset that was recently developed with the goal of increasing the coverage across country and time while also improving the comparability across observations: the Standardized World Income Inequality Database (SWIID) (Solt, 2009). The starting point of the SWIID dataset is the Gini Index measure from the World Income Inequality Dataset (UNU-WIDER, 2008). In the next step, this database was enriched with two measures of Gini Index derived from the Luxembourg Income Study – in gross and net income. Next, a procedure is developed to account for the fact that the data in the two original datasets differ with respect to several key elements: the reference unit of the source data (e.g., household per capita, household adult equivalent, household without adjustment, employee, person) and the definition of income (e.g., net income, gross income, expenditures or unidentified). A custom missing-data algorithm was used to generate time series standardized on the Luxembourg Income Study household adult-equivalent gross and net-income data, which is considered nowadays to be the source with the highest quality and comparability. For our study, we used the net-inequality series, which covers 153 countries with 3331 country-year observations.

Wealth and level of economic development. We derived the *level of economic development* of countries for a specific point in time using the level of GNI per capita in a certain year and the different benchmarks provided by the historical dataset compiled by World Bank (WorldBank, 2010). Based on the World Bank methodology, countries are classified in four analytical income categories: low-income, low middle-income, upper middle-income and high-income. Preliminary analyses showed similar patterns in the effects obtained in the low middle and upper middle-income category, and for reasons of parsimony, we collapsed these two categories into one.

The World Bank historical dataset provides information starting from 1987. For some countries and years, we have incomplete classifications. In order to deal with missing values, we replaced them with the closest valid value. Since the level of missing values is not alarmingly high and since the level of economic development is not expected to fluctuate suddenly from one year to another, we believe that this procedure is suited in order to keep these country-year observations in the analysis.

Note that due to the long period under investigation, 37 of the countries in our analyses undergo periods of transitions between categories, while 103 have the same level of economic development between 1987 and 2008. All of the 37 countries only go though one change: either from low to middle-income or from middle to high-income. However, within the time span under investigation, the number of years in each economic development category is different for each country. We opted to recode the level of economic development of the 37 countries, such that this measure to be time invariant, by looking at the numbers of years within each economic category and choosing the one with most years. Four of the countries had equal numbers of years in low and in middle-income categories and we opted for categorizing them as low-income countries. The reason for this choice is the fact that we assume structural differences between the categories of economic development owing to the differences in the availability of resources. However, the structural differences are not likely to be immediately seen due to institutional inertia, reason why these countries could still resemble the profile of others in the low income category.

In order to quantify the *wealth* and *change in wealth* of a country we used a measure of GDP per capita (PPP international $) derived from World Development Indicators (WorldBank, 2011). While the coverage of the country-years available from the SWIID dataset was quite good, for some country-years we had missing observations on the GDP per capita measure. These missing country-year observations were eliminated from analyses. Since an increase of 1 $ PPP in the GPD per capita is expected to have a very small effect on the level of life expectancy, in our analyses we used a rescaled measure by dividing the level of GDP per capita by 100.

Population health. Life expectancy at birth is a widely used measure of population health (Rodgers, 1979; Wilkinson & Pickett, 2009b). In order to provide results that are comparable with those of previous studies we use as dependent variable figures of life expectancy at birth, both sexes combined, derived from the UN World Prospects (2008). We matched these figures with the information on income inequality and wealth. We excluded

the country-year points where information on the dependent variable was not available.

Final samples. Previous studies have suggested that tax havens need to be excluded from analyses on income inequality and population health (Wilkinson & Pickett, 2009b). An argument for excluding them from the analyses is the fact that their level of measured wealth does not correspond to the social reality. We used the OECD (2009) classification of tax havens[3] and identified among our initial sample a number of five countries that we excluded from further analyses.

In addition, we excluded countries that were observed in only one time point. Our final working sample covers a number of 140 countries and 2360 country-year observations: 50 low income countries with 685 country-year observations, 61 middle income countries with 1084 country-year observations and 29 high-income countries with 591 country-year observations. Descriptive information of the measures used and the countries in the analyses is found in Appendix 3.1.

Analytical strategy: static estimation. For each sample of countries, we estimated the partial correlations between the level of income inequality and of life expectancy for each time-point, controlled for the level of GDP per capita. In the next step, we estimated the partial correlations between GDP per capita and life expectancy, controlled for the level of income inequality, in each available year in our sample. This approach was also used in some prominent ecological studies (Wilkinson & Pickett, 2006), in which support was found for a detrimental effect of income inequality on health. In our analyses, we used 2-year lagged measures of income inequality and wealth, to allow for a temporal ordering between the alleged cause and its alleged effect. The static estimation addresses only hypotheses that regard relationships between levels in the dependent and independent variables (i.e. H1a, H2a, H3a and H4a).

Analytical strategy: dynamic estimation. In order to estimate whether changes in our independent variables relate to changes in the independent variable we used a technique similar to fixed effects regression (P.D. Allison, 2009). The main advantage of this technique is that it controls

[3] Wilkinson and Pickett (2009b) used in their analyses another method to eliminate tax havens, namely they exclude from their sample of rich countries those that have a population lower than 3 million. Although it is true that tax havens are mainly located in islands that do have low population, the authors method also eliminated countries that are not considered tax havens by official monetary institutions, e.g. Luxembourg, Slovenia, Cyprus, or Slovenia.

for unobserved time-invariant variables, which are allowed to have whatever correlations with the observed ones. In essence, using fixed effects regression we test whether changes in income inequality and wealth are related to changes in life expectancy *within* countries. The disadvantage of this method is that it does not allow estimating time-invariant effects (e.g., the level of wealth).

In our case, we would like to simultaneously estimate the effects of changes in income inequality and wealth, but also the effects of levels of income inequality and wealth. P.D. Allison (2009) proposed a solution to this problem in the form of a hybrid fixed effects method. The basic idea of this method is to decompose the time-varying predictors into two parts, one representing between-country variation, and the other representing within-country variation. In practice, this is done by calculating (1) the country means of the time-varying covariates across the time span investigated and (2) the deviations within countries from these country means. Both these variables are then used as predictors. The coefficients for the within-country components (i.e., the deviations from the country means) will be identical to those of conventional fixed effects regression. The hybrid model is estimated using random effects methods in order to obtain correct standard errors. This method allows simultaneously testing hypotheses regarding the relationships between *levels* and *changes* in the dependent and independent variables (i.e., all our formulated hypotheses).

We used the hybrid fixed effects method to estimate models for samples of countries in the three analytical income categories. All the models included effects for the years of measurement as dummy variables (effects not presented).

In order to rule out concerns regarding potential multicollinearity between the wealth and the income inequality we checked the correlations between the GDP per capita and the SWIID Gini Index. In the country-period file of low-income countries the correlation was found to be -.21 ($p<.01$), for the subsample of middle-income countries the correlation was -.21 ($p<.01$) and for the high-developed countries the correlation was -.002 ($p=0.96$). For the cross-sectional dataset, we also computed the correlations between the GDP per capita and the SWIID Gini Index for each year in every subsample, and these were also not alarmingly high: in the low-income sample they ranged from -.60 to -.38, in the middle-income sample they ranged from -.62 to -.35, and in the high-income sample they ranged from -.56 to -.42.

3.4. Results

We start with a few descriptive analyses. Table 3.1 summarizes information on the trends in our dependent and independent variables. Life expectancy at birth increased across the pooled sample from an average of 66.3 years in 1987 to an average of 77.24 years in 2008. The rates of increase varied between the three categories: the stronger increase was observed in middle-income countries, followed by low–income and high-income countries.

Table 3.1 Averages of income inequality, wealth and life expectancy for the three categories of economic development (start and end point of the time series)

Variable	Sample	Average 1987	Average 2008[a]	Ratio average 2008[a] / average 1987	Change
Gini Index	**Pooled sample**	**36.72**	**34.10**	0.93	-
	Low–income countries	41.29	38.39	0.93	-
	Middle-income countries	39.93	39.60	0.99	-
	High-income countries	28.02	29.79	1.06	+
GDP per capita[b]	**Pooled sample**	**61.25**	**289.08**	4.72	+
	Low–income countries	8.43	15.95	1.89	+
	Middle-income countries	37.55	146.45	3.90	+
	High-income countries	141.62	400.69	2.83	+
Life expectancy	**Pooled sample**	**66.3**	**77.24**	1.17	+
	Low–income countries	55.08	59.67	1.08	+
	Middle-income countries	66.57	73.67	1.11	+
	High-income countries	75.31	80.03	1.06	+

Notes: [a] figures for low-income countries correspond to year 2006 since no data is available for this category for 2008. [b] Figures correspond to the GDP per capita divided by 100

For the whole sample, from 1987 to 2008 we observed a decrease of around 9 percent in income inequality. However, this trend was mainly caused by a decrease of income inequality within the group of low-income and middle-income countries while in the group of high-income countries we observed an increase in income inequality. We also note that the average levels of income inequality in low and middle-income countries were higher than the average income inequality observed in the sample of high-income countries, both in 1987 and 2008.

On average, we observed a strong increase of 472 percent of GDP per capita between 1987 and 2008. However, the rates of increase differed

between countries in various levels of economic development. The middle-income countries registered the strongest relative increase (in 2008 on average their wealth was 3.9 times higher than in 1987), followed by the high-income countries (2.83 times higher average wealth in 2008) and by low-income countries (only 1.89 times richer in 2006 compared to 1987).

3.4.1. Static estimation

Table 3.2 summarizes the results of the partial correlations between income inequality and life expectancy, controlled for GDP per capita. For each of the three samples of countries we present the number of years when we found a significant partial correlation between income inequality and life expectancy controlled for GDP per capita and the average of the significant partial correlations found.

Table 3.2 Cross sectional correlations income inequality and life expectancy controlled for the level of GDP per capita

	LI	MI	HI
Number of years when correlation is *significant*	16 out of 18	9 out of 20	0 out of 20
Averages of *significant* partial correlation coefficients	-0.5	-0.31	-

Notes: Figures for income inequality and wealth 2 year lagged to the life expectancy figures HI: high-income countries, 1989-2008 (20 years). MI: middle-income countries, 1989-2008 (20 years). LI: low-income countries, 1989-2006 (18 years)

Looking at the number of years when the partial correlation was found significant, we note that this correlation was not robust in time and that there were differences between the three income categories in the prevalence of such significant relationships. We found a significant partial correlation in more years in the low-income countries (16 out of 18 years) than in middle-income countries (9 out of 20 years) while in the high-income countries the correlation was not significant in all the 20 years observed. All the significant correlations were negative. Based on the "income inequality thesis" argument we expected to find a negative relationship between income inequality and life expectancy in every sample of countries and in every year. Based on the above, hypothesis 1a did not receive general support by our cross-sectional analyses.

Looking at the averages of the significant correlations we note that this average was the highest in the low-income sample, somewhat lower in the middle-income sample and is statistically indistinguishable from zero in

the high-income sample. We expected the negative effect of income inequality on population health to be weaker in countries with higher level of economic development. Our cross-sectional analyses provide support for hypothesis 2a, however, one needs to keep in mind that the relationship per see was not found to be robust in time and was not significant in the high-income countries.

In Table 3.3 we summarize the results of the partial correlations between GDP per capita and population health indicators controlled for the level of income inequality. The structure of Table 3.3 is the same as for Table 3.2. In the low-income countries, the relationship was found significant in 17 out of 18 years, in middle-income countries in 14 out of 20 years and in high-income countries in none of the 20 years observed. All these significant correlations were positive. Furthermore, looking at the strength of the significant partial correlations we note that the stronger relationship between GDP per capita and life expectancy was found in low-income countries, followed by middle and high-income countries. This said our cross-sectional analyses provide some support for our expectations stated in hypotheses 3a and 4a, although the relationship was not robust in time.

Table 3.3 Cross sectional correlations GDP per capita and life expectancy controlled for the level of income inequality

	LI	MI	HI
Number of years when correlation is *significant*	17 out of 18	14 out of 20	0 out of 20
Averages of *significant* partial correlation coefficients	0.66	0.41	-

Notes: Figures for income inequality and wealth 2 year lagged to the life expectancy figures HI: high-income countries, 1989 – 2008 (20 years). MI: middle-income countries, 1989 – 2008 (20 years). LI: low-income countries, 1989-2006 (18 years)

Additional static estimations

In additional models, we used the full sample of countries and for each year we estimated two separate regressions with life expectancy as dependent variable, and as predictors GDP per capita, Gini Index, dummies for the level of economic development (low-income category as reference) and the interactions between the economic development dummies with GDP per capita and respectively Gini Index. Across the 21 years in the analyses, the average un-standardised effect of GDP per capital on life expectancy was for low-income countries .86, in middle-income countries it dropped to .05 while for the high-income countries it dropped further to .004.

Regarding the effect of Gini Index on life expectancy we observed a similar pattern: across the series of 21 years, the average un-standardised effect was -.32 in the low-income countries, -.13 in the middle-income countries and -.07 in the high-income countries. These results supported the same conclusion as the previously presented static estimation results: the level of economic development seems to moderate the effect of the levels of wealth and of income inequality on life expectancy.

3.4.2. Dynamic estimation

Table 3.4 summarizes the results of the hybrid fixed effects model for the subsamples of countries based on their level of economic development. In Model 1 we estimated the effects of levels and changes in income inequality (e.g., the coefficient of the variable "dGini" reflects the effect of changes in income inequality within a country while the coefficient of the variable "Mean Gini" reflects the effect of the average levels of income inequality of a country). In Model 2, we introduced the levels and changes in wealth and tested their relationship with life expectancy, while in Model 3 we present the controlled effects of the income inequality and wealth. In Model 4, we added the interaction between changes in income inequality and changes in wealth, thus testing whether within a country the effect of changes in income inequality depends on the changes in the levels of wealth.

We first look at the effect of income inequality. According to the "income inequality thesis", we expected that levels and changes in income inequality to be negatively related to life expectancy and this relationship to be weaker as the level of economic development is higher, but still significant in the high-developed economies. Looking at the results presented in Model 1, we observed a different picture. In the categories of low and middle-income, countries with higher average levels of income inequality in the period 1987-2008 had lower life expectancy, as the thesis predicted. However, in the high-income category, the average income inequality was not significantly related to life expectancy. This said our results do not provide full support for hypothesis 1a.

In Model 1, we also tested whether changes in income inequality were related to changes in life expectancy. Our results showed that only in the low-income countries changes in income inequality were significantly related to changes in life expectancy, but in opposition to our expectations derived from the "income inequality thesis", an increase in income inequality related to an *increase* in life expectancy. In the middle and high-income countries, we found negative effects, in line with the thesis, but they

did not reach significance. Based on these findings, hypothesis 1b was not confirmed.

We argued that higher levels of economic development would "temper" the negative relationship between levels of income inequality and health. In Model 1, the effects of average levels of income inequality clearly showed a decreasing trend in their strength, with the strongest relationship being observed in low-income countries, followed by a weaker one in middle-income countries and a very weak and statistically not different from zero in high-income countries. The confidence intervals of the effects of the level of income inequality on life expectancy for the three samples (not in table) were not overlapping only for the high-income countries and low-income countries. Based on these findings we partially accept hypothesis 2a according to whom the level of economic development moderates the effects of the level of income inequality on life expectancy. However, significant differences in the effects of income inequality on life expectancy due to this moderation were found only between the low and high-income countries.

Looking at the differences in the effects of changes in income inequality on life expectancy between economic development categories, we also expected that the *negative* relationship between changes in income inequality and changes in life expectancy to be weaker with higher economic development. However, as previously noted, we did not observe a consistent negative and significant relationship between changes in income inequality and life expectancy in the three income categories. Thus, our data did not provide support for hypothesis 2b.

We now turn to the effect of changes and levels of wealth on life expectancy. In Model 2 the variable "dGDP per capita" estimates the effect of changes in wealth within countries while the variable "Mean GDP per capita" estimates the effect of levels of wealth between countries. In the categories of low and middle-income, countries with higher average levels of wealth across the period 1987-2008 also had higher average levels of life expectancy. In addition, for the high-income countries we did not find a significant relationship between average wealth and average life expectancy, although the effect was in the expected direction. These results provide support for hypothesis 3a. The strength of the effects was also variable between the three economic development categories; the level of wealth had a stronger relationship with life expectancy in the low-income category, a weaker one in the middle-income category and was close to zero in the high-income category. The confidence intervals of the effects were clearly not overlapping. Based on these findings we accept hypothesis 4a according

to whom the level of economic development moderates the effect of the level of wealth on life expectancy.

Model 2 also showed that in general changes in wealth were positively related to changes in life expectancy; however, only for the low income countries this effect was significant. This result is consistent with our expectations that for richer countries further increase in wealth ceases to play a significant role in the health of the population. When inspecting the confidence intervals of the effects we found that they were overlapping only in the high-income category and in the middle-income. Subsequently, our longitudinal analyses provide partial support for hypothesis 3b and full support for hypothesis 4b.

Model 3 presents the estimated effects of income inequality and wealth controlled for each other, and looking at the estimates, previous conclusions remained unchanged. Note that the negative significant effects of the average levels of income inequality became weaker as compared to Model 1 (a decrease of 15% for the low-income countries and 19% for the middle-income countries). Furthermore, Model 3 improved the overall explained variance more compared to Model 1 (where we had only the uncontrolled effect of income inequality) than compared to Model 2 (where we had only the uncontrolled effect of wealth). For the low-income countries, the improvement in explained variance was the highest, while for the high-income countries it was very modest. These observations suggests that wealth has more weight in explaining variability in life expectancy than income inequality, and this is particularly valid for the low and middle-income countries.

In Model 4, we introduced the interaction between changes in income inequality and in GDP per capita, as a mean to test whether changes in income inequality have a different relationship with changes in life expectancy based on changes in wealth. For all the three samples, the interaction was negative; however, it did not reach significance. This said we do not find evidence that the effect of changes in income inequality on life expectancy within a country is dependent on the changes in wealth, and thus we cannot accept hypothesis 5.

The static and the dynamic estimation agree on several points. On the one hand, based on both type of analyses we did not find support for the expectation that the level of income inequality is negatively and significantly related to life expectancy in all categories of economic development or in all time points, as stated in hypothesis 1a. Most surprising, based on both type of analyses we concluded that in the high-income countries the relationship is statistically not distinguishable from zero. Second, the moderation hypotheses received some support from both

types of analyses, and the differences in the effects of income inequality and wealth on life expectancy were more clearly seen between the countries most farther away on their degree of the economic development (i.e., low-income vs. high-income countries). All in all, both static and dynamic estimations point to the fact that income inequality and wealth are both most important for life expectancy in the low-income countries, suggesting a different pattern of relationships than that implied by the "income inequality thesis".

Table 3.4 Results of the hybrid fixed effects model. Dependent variable is life expectancy

	Model 1			Model 2			Model 3			Model 4		
	LI	MI	HI	LI	MI	HI	LI	MI	HI	LI	MI	HI
Constant	**81.22** (6.1)	**79.77** (2.56)	**80.42** (1.50)	**48.85** (2.22)	**67.68** (1.32)	**79.16** (.78)	**69.04** (4.92)	**75.41** (3.13)	**78.79** (1.91)	**69.16** (4.98)	**75.54** (3.16)	**78.79** (1.95)
dGini[a]	**.10** (.02)	-.01 (.02)	-.007 (.01)				**.10** (.02)	-.013 (.02)	-.006 (.01)	**.10** (.02)	-.02 (.02)	-.008 (.01)
dGDP per capita[a]				**.07** (.03)	.001 (.005)	.0008 (.0007)	**.09** (.03)	.0004 (.005)	.0008 (.0007)	**.09** (.03)	.0005 (.005)	.0008 (.0007)
Mean Gini[b]	**-.54** (.14)	**-.21** (.06)	-.004 (.05)				**-.46** (.10)	**-.17** (.06)	.01 (.05)	**-.46** (.10)	**-.17** (.06)	.01 (.05)
Mean GDP per capita[b]				**.73** (.13)	**.06** (.02)	.004 (.003)	**.67** (.11)	**.04** (.02)	.004 (.003)	**.67** (.11)	**.04** (.02)	.004 (.003)
Interactions												
dGini*sGDP per capita										-.003 (.007)	-.002 (.001)	-.00007 (.0002)
R within	0.18	0.319	0.93	0.15	0.32	0.92	0.18	0.32	0.93	.188	0.32	0.93
R between	0.22	0.16	0.13	0.34	0.14	0.17	0.51	0.22	0.17	.51	0.22	0.17
R overall	0.28	0.14	0.52	0.51	0.19	0.53	0.62	0.22	0.54	.62	0.22	0.54
Nr. observations	585	960	533	585	960	533	585	960	533	585	960	533
Nr. groups	47	60	29	47	60	29	47	60	29	47	60	29

[a] scores as deviations from country specific mean [b] Means over time and within country. Estimation based on random effects models (standard errors of parameters in parenthesis). Bold coefficients significant for $\alpha < .05$. Bold & italics coefficients significant for $\alpha < .10$. Dummies for years included (effects not shown). Measures of dGini and dGDP per capita have a 2 years lag to the life expectancy figures. LI: low-income countries MI: middle-income countries HI: high-income countries

3.5. Discussion

In the present study, we set out to answer the question whether income inequality is related to population health throughout a long period of time (1987-2008) and using a global sample of countries. We looked at the interplay between income inequality and wealth of the countries, and the way in which these two contextual characteristics affect health, as measured by life expectancy. We used high quality comparative data covering 140 countries and 2360 country – year observations and including low – middle- and high-income countries. This extends previous research, which usually focuses only on the high-income countries. Moreover, we provided both static and dynamic tests of our hypotheses. We derived the following scenario from the literature. On the one hand, levels and changes in wealth should positively relate to life expectancy, but the strength of the relationship should be weak or non-existent among high-income countries. On the other hand, levels and changes in income inequality should negatively relate to life expectancy, the relationship should be weaker with higher levels of economic development but it would remain significant in the group of high-income countries. Subsequently, this scenario accommodates the claim that in the high-income countries further economic development does not significantly add to the health of the population, but the key to further improve the health of these societies is to diminish the inequality in incomes (Wilkinson & Pickett, 2009b).

Regarding the relationship between wealth and life expectancy, our expectations received support from the data both when employing static or dynamic types of analyses: higher levels and positive changes in countries' wealth were related to higher life expectancy, and this positive relationship was weaker for countries with higher level of economic development. Furthermore, as expected, the relationship between wealth and life expectancy was moderated by the level of economic development. i.e., it became non-significant for the high-income countries. These findings are in line with previous results (Preston, 1975; Pritchett & Summers, 1996) and it emphasizes the importance of economic growth for the health situation in poorer countries. Regarding the relationship between levels of income inequality and life expectancy, we found that the expected negative relationship is not robust in time. The lack of robustness of the association between income inequality and health is a fact acknowledged even by supporters of the "income inequality thesis". For instance, in their review of the literature, Wilkinson and Pickett (2006) mention the fact that the negative association between income inequality and population health

temporary disappears in studies using data from between the later 1980s and mid-1990s. Their explanations for these findings have to do with structural processes that evolved in parallel with the increase in income inequality, and which worked toward making population health better, rendering thus the relationship between income inequality and health non-significant. However, critics of the "income inequality thesis" have advocated that the observed relationship between income inequality and health is spurious precisely because the developments in the income inequality are strongly correlated to other structural characteristics such as community infrastructure, educational and health policies, transportation, etc. (Coburn, 2004; Lynch, 2000). These un-measured factors might actually influence population health, and income inequality might be just picking up their effects. These two positions rise two questions: first, to what extent can we consider the (in some years) observed relationship between income inequality and life expectancy as being a genuine effect of income inequality?, and second, for the years where the relationship was not observed, could this be due to some parallel processes at work? Unfortunately, due to data limitations, we are unable to address these questions, but future research might want to examine more closely these alternatives. However, our results suggest more than just a temporary disappearance of the relationship between income inequality and population health, seeing that for countries with high level of economic development the observed relationships between levels and changes in income inequality and life expectancy were not significant. These findings are in line with the results of Beckfield (2004) who, using a similar fixed effects design, also did not find a significant relationship between changes in income inequality and population health. In his opinion, one important reason for the discrepancy in his (and our) findings and supporting evidences presented in the literature is the quality of data and the data modelling strategy. “Using a larger sample, better (though still imperfect) income inequality data, and more statistical controls reduces support for the inequality-health hypothesis, but accounting for unmeasured heterogeneity with a fixed-effects approach eliminates support. This suggests that heterogeneity bias may be the most serious limitation of the “classic” cross-national work in this area.” (Beckfield, 2004, p. 240). The same conclusion was also derived by Kondo et al. (2009) who found that in their meta-analysis of multilevel studies, the effect of inequality on the individuals’ health was much attenuated when studies could account for unmeasured regional characteristics.

Note that this methodological explanation could only apply to explaining the results of the dynamic estimation, while our static, cross-

sectional analyses also support the same conclusion. This is most remarkable since a more recent study that replicates the original study of Rodgers (1979) with a larger sample of countries and with measures pertaining to the year 2000 did find a cross-sectional association between income inequality and life expectancy (Ram, 2006). One explanation for the different findings is the fact that we perform our analyses on samples of countries based on the level of economic development, while in the above mentioned study the author uses a pooled sample with countries in different levels of development. However, the fact that we failed to observe any significant correlation between income inequality and life expectancy in the high-income sample is still in contradiction with findings from studies that only look at rich sample of countries (Wilkinson & Pickett, 2006). For this discrepancy we advance two potential explanations, the first substantive and the second methodological in nature.

From a substantive stand-point we argue that the high-developed countries have certain characteristics that counter the (potential) negative effect of income inequality on health. On the one hand, a floor / ceiling effect of the possible life expectancy might be at work. In the rich countries the starting average life expectancy at the beginning of the period under investigation is already high, and further indefinite increase might not be physically possible. On the other hand, in the high-developed countries the health services and infrastructure were already at high levels in 1987 and they were available for everyone, due to the social protection system. Furthermore, an increase in income inequality in these rich countries does not mean a dramatic or immediate decrease in the quality or the access to health services. These two factors that are characteristic for the high-income countries (i.e., a high life expectancy coupled with a natural limit of the life-span and high quality health services) could imply that the elasticity of life expectancy under the conditions with different levels and changes in income inequality might be very low.

The second explanation for the fact that previous studies did find cross-sectional associations of income inequality with health measures is the sample bias, as pointed out also by other scholars (Babones, 2008). In additional analyses we tested this explanation by conducting a simulation where random combinations of 21, 20, 19, 18, 17, 16 and 10 countries were draw from a sample of 23 high-income countries in the year 2000, and we repeated the static estimation procedure (the syntax for running such a test using the open-source statistical package R is presented in Appendix 3.2). Our results showed that the composition of the sample of high-income countries in the analysis is one of the reasons why for certain combinations of countries a significant association is found between income inequality

and life expectancy. In order to circumvent critics regarding a "cherry picking" manner of selecting the countries in the samples used to test the "income inequality thesis" (Snowdon, 2010), we followed the guidelines of prominent institutions such as World Bank and OECD in defining the composition of the sample of countries in various levels of economic development. However, the question of why in some groups of high income countries the association between income inequality and life expectancy was found significant and in other groups no is a pertinent one and deserves further investigation.

Another finding of our study was that, for the low-income countries, an increase in income inequality goes hand in hand with an *increase* in life expectancy. This result is in line with Biggs et al. (2010) who also observed a positive relationship between income inequality and life expectancy in a sample of low and middle income countries. We might tentatively attribute this result to the increasing development of health services and infrastructure in the low-income countries under the pressure of two forces, an external and an internal one. The external force regards the extent of the foreign aid and international efforts targeted at developing countries, and recent research has shown that the foreign aid in the form of health assistance (e.g., vaccination, medicines, health technologies etc.) has positively contributed to improving population health in these countries (Mishra & Newhouse, 2009). The internal force might be related to a form of collective action instigated by the interests of a growing middle class in order to address a common problem: the spread of diseases. This phenomenon was also documented in the 19th century Europe when epidemics affected major cities as Paris and London and when the solution for this problem was the construction of citywide sewage systems, a public service with wide implications for the health of the population, both rich and poor citizens (De Swaan, 1998). If income inequality increased while the health services and infrastructure also developed, the effect of income inequality might pick up the effect of these unmeasured social characteristics. Unfortunately, we do not have available data to test this possibility, which leaves it as an open invitation for future research.

Finally, we also argued that higher level of economic development would also have a moderating role, by providing protection against the damaging effects of income inequality. Our findings provide support for this idea: average societal income inequality had the strongest negative relationship with life expectancy in low-income countries and the weakest in the high-income countries.

To sum up, the "income inequality thesis" did not receive general and full support from our data. More often than not we found non-

significant results and also effects in the opposite direction as expected. Furthermore, we found large differences in the effects of wealth and inequality between countries at different levels of economic development. Referring back to the title of this study, this has implications for the way in which the health of societies can be improved. Contrary to claims in the literature, our data did not support the idea that a reduction of income inequalities would increase the population health in the high-income countries. In less developed countries, this may be a good strategy though. The same goes for considering economic growth as a strategy to enhance health: our data indicated that this might work in less developed economies, but not in well-developed countries.

Our results not necessarily falsify the “income inequality thesis” but they do show, however, that the choice of model and the composition of the sample can have far-reaching consequences for the conclusions drawn. Future research can provide better insight in the relationship between income inequality and population health by focusing on the explanation of the differences and similarities encountered between groups of countries even from the same categories of economic development and by investigating the role of the structural processes that are associated with the developments in the income inequality. Analyses that look at within-country and in time processes could provide detailed exploration of the complex relationships between the structural factors and their effects on individual health. In addition, other lines of research could focus on the underlying mechanisms at work, empirically testing the causal chain proposed.

CHAPTER 4.

THE LINK BETWEEN INEQUALITY AND POPULATION HEALTH IN LOW AND MIDDLE INCOME COUNTRIES: POLICY MYTH OR SOCIAL REALITY[4]

[4] A slightly different version of this chapter has been published in *PlosOne* (Van Deurzen, Van Oorschot, & Van Ingen, 2014). Earlier versions of this paper have been presented at the International Sociological Association (ISA) conference 2014, Yokohama, Japan, at the IMPALLA-ESPANET conference 2013, Luxembourg, Switzerland and the European Consortium for Sociological Research (ECSR) conference 2013, Tilburg, The Netherlands.

4.1. Introduction

During recent years, income inequality has been flagged as the true villain of our times, a root cause of a wide range of social problems. Especially the relationship between inequality and health was extensively discussed among scholars and public policy practitioners (Macinko, Shi, Starfield, & Wulu, 2003; M. Marmot, 1998; OXFAM, 2013; R. G. Rajan, 2010; Wilkinson & Pickett, 2009b). Organizations such as United Nations (UN), Save the Children and the World Health Organization (WHO) stressed that, in order to improve health, tackling inequalities is a priority that needs to accompany the efforts to alleviate absolute poverty in the low and middle income countries (LMICs) (Save The Children, 2012; UN, 2012; WHO, 2008). For example, the UN Task Team's work on the post-2015 UN Development agenda made this point very clear: "High levels of inequalities can jeopardize the well-being of large segments of the population […] and have subsequent effects on health, nutrition and child development" (UN, 2012:6). Furthermore, WHO emphasized that inequality is not only relevant for improving the average health but also for closing the health gap between the rich and the poor in the LMICs: "In any country, economic inequality ... needs to be addressed to make progress towards health equity." (WHO, 2008: 120).

Although the LMICs are the focus of these recommendations, evidence was often cited from research that examined samples of high income countries (HICs) (e.g., (Pickett & Wilkinson, 2007)). The evidence for a detrimental effect of income inequality on health among wealthy countries is extensive - by now more than 160 studies looked at this relationship (Wilkinson & Pickett, 2006). Furthermore, a recent meta-analysis of multi-level studies conducted in HICs found a small but significant negative effect of income inequality on individuals' health (Kondo et al., 2009). The authors cautiously conclude: "if the inequality-mortality relation is truly causal, then the population attributable fraction suggests that upwards of 1.5 million deaths (9.6% of total adult mortality in the 15-60 age group) could be averted in 30 OECD countries by levelling the Gini coefficient below the threshold value of 0.3" (Kondo et al., 2009:7). However, in the light of the profound cultural, economic, and political differences between the LMICs and the HICs, it is questionable whether such findings from the HICs can be transferred to fundament policies targeted at improving population health in the LMICs.

We note that the number of studies that examined the inequality-health nexus among the LMICs is far more limited than the number of

studies that focused on HICs. For instance Biggs, King et al. (2010), found an unexpected result in a sample of Latin American countries, i.e., the increase in inequality measured by Gini Index of income was associated with a significant increase in life expectancy and with a significant decrease in mortality and infant mortality rate. In a previous study (see Chapter 3) we corroborated these conclusions: in our ecological analysis of time series data we found that increasing inequality in incomes related to increasing life expectancy in low income countries but not in middle and high income ones. Other studies used mixed samples, pooling together low, middle and high income countries, e.g., Babones (2008), who found a significant negative relationship between income inequality and life expectancy and infant mortality. However, a different study using a mixed sample of countries found that the negative relationship between inequality and life expectancy or infant mortality rate was not robust when controlling for unmeasured heterogeneity (Beckfield, 2004).

In relation to specific health measures such as child mortality rate, which is an important target of the Millennium Development Goals (UN, 2010), an ecological study among 46 developing countries found income inequality not to be associated with under 5 mortality rate (McGuire, 2005), while another ecological study found higher levels of income inequality to relate to higher levels of infant mortality rate (Ram, 2006). K. Rajan, Kennedy, and King (2013) found that income inequality in India was not associated to child mortality rate when it was measured at state level but the relation was positive for the district level analysis. Another study that estimated the relationship between inequality and child mortality rate at the level of neighbourhoods in Rio de Janeiro, Brazil, found a statistically not significant relationship (Szwarcwald, Andrade, & Bastos, 2002).

The brief overview of the literature that examined the relationship between inequality and health in LMICs did not aim to be comprehensive but we wished to point out the contradictory results from previous studies. It is clear that there is still much work to be done in order to better understand why these inconsistencies have emerged. This is also our main goal in the present study: we aim to expand and contribute to the literature by examining the relationship of inequality with the health and health inequality among the LMICs, with a focus on disentangling potential mechanisms at work. In order to address this aim we utilized measures of health with high cross-country equivalence and we employ multilevel models that allow separating compositional from genuine contextual effects (Duncan et al., 1998).

In the next sections we examine two potential explanations of the relationship between inequality and health: (1) the position stating that any

relationship between inequality and health is just a statistical artefact due to composition effects, and (2) the position stating that inequality relates to population health via its relationship with the level and coverage of those country level resources that are relevant for improving health, i.e., the health services and infrastructure. The research questions that guide our study are: (1) to what extent is inequality associated with the health of individuals living in LMICs?; (2) is there evidence for a genuine contextual effect of inequality on health, independent of composition effects due to the population's structure?; (3) to what extent is a potential contextual effect of inequality on health mediated by the country's resources relevant to health? We discuss below the two potential explanations of the relationship between inequality and health and derive corresponding hypotheses that are presented in a graphic form in Figure 4.1.

4.2. Theoretical background

The statistical artefact argument

Gravelle Gravelle (1998) argued that the relationship between inequality and health is a statistical artefact due to the non-linear relationship between material resources (income, wealth) and health at individual level. Take as an example of this argument a society that undergoes a process of redistribution of wealth from the rich to the poor. The consequence is that the living circumstances of the poor will improve with beneficial consequences for their health. However, the health gains among the poor are larger than the health loss of the rich as consequence of the wealth redistribution. Also, as a result of redistribution, the inequality will decrease. Thus, between two societies with the same level of overall wealth, the one with lower inequality will have better aggregated population health.

Research among HICs concluded that, at least in this context, the relationship between inequality and health is not entirely compositional (Babones, 2008; Ellison, 2002). However, this type of reasoning could be particularly pertinent for the LMICs, because of the lack of extensive welfare arrangements that would counteract the effects of poverty. Official figures estimate that more than 40% of the African population cannot secure enough food on a day to day basis (UN, 2006), thus the level of absolute poverty is extremely high. Next, in the LMICs the access to the health-related goods and services is strongly related to the level of individual resources because of the high share of the private financing of the health sector, either via private insurance or out-of-pocket payments (Kruk,

Prescott, & Galea, 2008; McIntyre, Thiede, Dahlgren, & Whitehead, 2006; Simms, Rowson, & Peattie, 2007). In addition, most LMICs do not have special programs to protect the poor or allow them a fair access to health services. It is thus clear that in the LMICs bad material circumstances can have disastrous consequences for individuals' health. Consequently, the level and distribution of material resources in the population can (at least partially) explain an observed relationship between inequality and the average health.

Inequality and the countries' resources relevant to health

The "statistical artefact" proposition does not exclude the possibility that inequality might also have a genuine contextual effect on health. In this contribution, we explore one such possible mechanism – through the level of those country's resources that are most relevant to health, i.e., the health infrastructure and services available for the population.

Economists have argued that inequality has short and long run consequences for the organization and development of societies (Galor & Zeira, 1993), resulting in a strong negative empirical relationship between inequality and investments in public goods. Several explanations for this empirical observation were advanced. First, a self-interest mechanism might be at work: in countries with high inequality, the small rich elite is not eager to offer the resources needed for the poor majority to elevate and ultimately challenge its position (Bourguignon & Verdier, 2000). For instance, the small rich elite would not be motivated to facilitate the access to health services by reducing the level of out-of-pocket payments. Second, environments with higher inequality have high levels of socio-political instability, which in turn will most likely also facilitate a self-interest attitude (Perotti, 1996). This mechanism could be exemplified by the observation that the majority of the health expenditures in the LMICs are directed toward hospitals located in cities, where the rich population resides, while the medical posts in rural areas are severely under-funded (Simms et al., 2007). Third, economic literature has shown that inequality leads to underdevelopment and reduced growth (Deininger & Olinto, 2000; Easterly, 2006), resulting in low levels of resources available for investments in public goods even if there is political will to do so. Last but not least, Lynch (2000) argued that inequality is a result of a specific historical, political and economic development that also shaped a particular country's infrastructure through specific policies and arrangements affecting education, health, labor market, etc. The arguments of this author imply that inequality has a spurious relationship with health because it reflects effects of unmeasured characteristics of the country's infrastructure. In contrast, the first three

mechanisms from the economic literature argue for a causal relationship between inequality and the country's resources that are relevant to health.

Summing up the above theoretical arguments we expect that in LMICs with higher inequality the average health to be worse than in LMICs where the inequality is lower (*H1*). Then, we expect that the strength of this relationship to become weaker when the material circumstances of individuals *(H2)* and the country's resources relevant to health *(H3*) are taken into account.

Figure 4.1 Graphical representation of the study's hypotheses

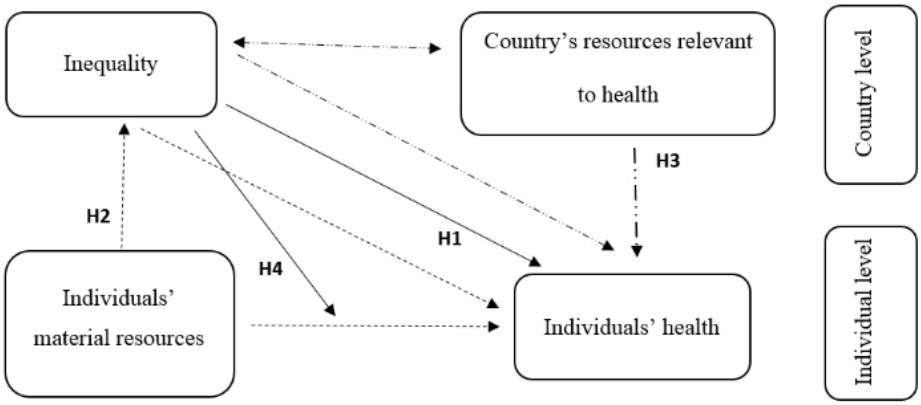


Figure 4.1 notes: Mediation paths depicted using different line types

The above arguments focused only on the relationship between inequality and the average level of health. However, it is also possible that inequality has a different relationship with the health of the poor and of the rich. If we accept the idea that inequality deters the development and investments in public health services and infrastructure, one can argue that rich individuals have the advantage of more resources that can protect them from low quality public health services, e.g., they can access private clinics or seeks medical help outside the borders. Poor individuals, deprived of material possibilities, have to use what is available to them, and this might contribute to widening the health gap. Thus, in LMICs with higher inequality, the health gap between the rich and the poor is expected to be higher, in other words, the health inequality to be higher (*H4*).

4.3. Data and methods

Selection of the data. We utilized individual level data collected by the Demographic and Health Surveys (DHSs) project, funded by the United

States Agency for International Development (DHS, 2013). The specific surveys used are nationally-representative household surveys that provide data for a wide range of monitoring and impact evaluation indicators in the areas of population, health, and nutrition. Data collection is typically conducted every 5 years using instruments with similar questions, although the sample is not identical from wave to wave. The data used in this study was collected among all eligible women in the selected households, i.e., women of reproductive age, usually between 15 and 49 years old, and their children with the age lower than 71 months.

Selection of the countries and years in our analyses was dictated mainly by the choice of dependent variables – the particular information is not collected in every country, every wave or for all the surveyed population. We limited the time span of our data to the period between 2000 and 2011 in order to ensure that enough contextual information is available. Because we are interested in differences between countries, we decided to pool together the different waves of data collected in one country. Next, we collected contextual data as average across the years between waves, or, when only one wave was available, as average for five years prior and including the year of data collection. Unfortunately we had to eliminate countries where the contextual data was not available (e.g., Zimbabwe).

Dependent variables. We focus on two measures of health: anemia status of women and of their children and the women's experience of child mortality, i.e., the death of at least a child born in the last 5 years. Our choice of health measures was guided by several criteria. First, the health measures had to comply with the assumptions of comparative research, i.e., they had to be equivalent between countries. The anemia status was assessed by collecting blood samples in the field that were afterward analysed in specialized labs (Rutstein & Rojas, 2006). The advantage of this method is the use of standard medical tests and cut points, ensuring thus a higher degree of cross-country measurement equivalence. The mothers' experience with child mortality was calculated from the detailed birth history information covering 5 years prior to the date of interview. We do not have reasons to suspect that the interviewed women lied or were unaware about their births history that covered the previously 5 years before the interview took place.

Second, the health measures had to be relevant health concerns. On the one hand, reducing child mortality rate is one of the most important priorities of the Millennium Development Goals (UN, 2010). Furthermore, child mortality is a widely accepted population health indicator when examining the inequality-health relationship (Beckfield, 2004; Biggs et al., 2010; Wennemo, 1993; Wilkinson & Pickett, 2009b). Our variable is the

translation of the ecological measure of under 5 mortality rate from country level to individual level. On the other hand, anemia is particularly relevant when examining women's health, i.e., is linked to more frequent hospitalization and is considered an indirect cause of maternal mortality (Brabin, Hakimi, & Pelletier, 2001; S. Li, Foley, & Collins, 2004; Riva et al., 2009; Ronsmans, Graham, & group, 2006). In relation to children's health anemia was linked to poor cognition and motor development, but also to education achievement and behavioural problems (Grantham-McGregor & Ani, 2001). These pieces of evidence position anemia as a public health problem.

Third, these health measures have a strong relationship with the material circumstances of individuals (e.g., availability of good quality nutrition, shelter and overall living conditions) (Balarajan, Ramakrishnan, Özaltin, Shankar, & Subramanian, 2011), but child mortality is also dependent on the availability of medical assistance and infrastructure (Fay, Leipziger, Wodon, & Yepes, 2005; McGuire, 2005). We believe that the different relationship between our two health measures and individual and country specific circumstances will help shed more light on the mechanisms linking inequality to health in the LMICs and improve the robustness of our conclusions. Fourth, from a practical point of view enough data had to be available in order to allow estimation of multilevel models.

Anemia is a condition in which the blood has a lower than normal number of red blood cells, or when the red blood cells do not contain enough haemoglobin, a protein-based component that helps cells carry oxygen throughout the body. Anemia was diagnosed with a blood test (Rutstein & Rojas, 2006). The anemia status was re-coded by the DHSs team into 4 categories, ranging from "severe", "medium", and "mild" to "no anemia". For reasons of parsimony, we recoded this variable into 2 categories: "no anemia" vs. "any sign of anemia". In our models "no anemia" was the reference category. Standard DHS protocol requires that informed consent be obtained from participants in anemia testing and that confidentiality be ensured. After receiving the authorization to download the biomarker information, the data was treated as confidential, and no effort was made to identify any household or individual respondent interviewed in the survey.

The experience of child mortality was calculated using birth history information. We determined for each woman if any of her children born maximum 5 years before the survey died and contrasted this category to women who did not experience the death of a child born during the same time interval (the reference category).

Individual level variables. We measured the *material resources of the individuals* by means of an asset-based household wealth index. The DHSs do not provide a measure of individual income because of the difficulties associated to the collection of this information in the LMICs, e.g., the extension of informal labour agreements or the significant size of population that subsist on agriculture. Thus, in the LMICs, providing a correct estimation of household income is subject to serious bias but respondents can answer accurately questions about their assets.

The lack of income information in the DHSs does not create an impediment for our analysis. Previous research that examined the costs of illness in the LMICs have shown to be frequently above 10% of household income (McIntyre et al., 2006). When faced with the costs of illness, households have specific coping strategies among which the most important are converting assets into currency or reducing their consumption. In this context, it is clear that in the LMICs assets are a more important resource for health than income. In addition, it is generally accepted that assets are good indicators of the long term socio-economic position in the LMICs.

The asset-based wealth index was calculated using easy-to-collect data on a household's ownership of selected assets, such as televisions and bicycles; materials used for housing construction; and types of water access and sanitation facilities. DHSs collected data on a number of identical assets in all countries and, in order to accommodate geographical and economic differences, e.g., owning a boat is not a relevant asset in a desert country, also collected data on several country specific assets. Subsequently, the assets based indexes are valid indicators of the wealth differences within a country in a specific time point, but they cannot be directly compared between countries and time points. The cross-country comparative research needs an index that uses the same criteria for rating households between countries and years (McKenzie, 2005).

In order to develop a measure that is comparable between countries and years we followed the method proposed by Smits and Steendijk (2014) to derive the International Wealth Index (IWI). The authors based the calculation of IWI on a series of assets, i.e., possession of consumer durables – TV, refrigerator, phone, bicycle, car, a cheap utensil and an expensive utensil, the housing characteristics – the number of sleeping rooms, quality of the floor material and quality of the toilet facility, and the access to two public services – access to clean water and electricity. Furthermore, they used principal component analysis in order to derive asset specific weights which show the relative contribution of each asset to a household's wealth score. These weight were used to derive a raw IWI score

for each household, who in the next step was rescaled to range from 0 to 100.

IWI had a mean of 42.3 (SD: 28.6) in the women anemia sample, 33.8 (SD: 27.3) in the children anemia sample and 35.2 (SD: 27.9) in the child mortality sample. In our analyses we used dummies based on quintiles calculated for each of the three sample, with the poorest 20% as reference category. Note that this method of calculating the wealth quintiles resulted in an absolute wealth hierarchy (across all countries in a sample) and not a relative one (within each country).

Contextual measures. Because of the difficulties of collecting reliable income information in the LMICs, asset-based wealth indexes are regarded to be a more accurate estimation of the real economic conditions of the household. This is the reason why recent studies that explored effects of inequality on health among LMICs used inequality measures based on possession of assets (Fox, 2012; La Ferrara, 2002), a course of action that we also followed. *The household wealth inequality* was based on the IWI measure that we derived at household level, which we used to calculate a Gini Index of Household Wealth.

The country's resources relevant to health. From the World Health Organization statistics website we first collected three measures: a measure of *governmental spending on health* measured in PPP international $; a measure of *private financing of health* as the percentage of total health spending financed by private insurance and out-of-pocket payments; and a measure of the *coverage of basic health services* as the percentage of children under 1 year that received measles vaccine, measure that is also considered a good estimation of the effectiveness of the health sector in the LMICs (Simms et al., 2007). In addition to these contextual measures we also used as a contextual control variable the *level of wealth of the country* measured as GDP per capita PPP constant 2005 international dollars derived from the World Development Indicators dataset 2012 (WDI, 2012).

Control variables. We also included in our analyses a set of individual level control variables that might confound the relationship between health and material resources. We first used a set of control variables that were common for both dependent variables. *Education level* (of the mother) was provided as a categorical variable that differentiated between women with no education (reference category), primary education, secondary education and tertiary education. *The age* of the women (mothers) was used in the analyses as dummies of 5 years age categories with the age 15 to 19 years old as reference category. *Residence*: a variable recording whether the respondent lived in urban or rural area. *Marital status* of the women (mothers) was measured as categorical variable with 3

categories: those women never married (reference category), those that at the time of the interview were married / living together and those that used to be in a relationship (widows, divorced or not living together with the partner for other reasons). The variable *number of household members* measured the size of the household.

The specific control variables are the following: 1) for the dependent variable anemia status, women sample, we included *pregnancy status* and whether the woman was *breastfeeding* or not, because these two situations have a significant effect on the chance to be tested with anemia (de Benoist, McLean, Egli, & Cogswell, 2008); 2) for the dependent variable anemia status, children sample, we included the *anemia status of the mother* as previous research has shown that infants born to anemic mothers have higher chances to be also tested with iron deficiency (Allen, 2000); 3) for the dependent variable experience of child mortality, we included the *number of children born during the last 5 years*, as the chance to experience child mortality is higher with more children born.

Our working data samples consists of: (1) a sample of 373735 women nested in 33 countries for whom we have information on anemia status; (2) a sample of 152485 children with age less than 71 months nested in 30 countries, for whom we have information on their anemia status and (3) a sample of 455692 women nested in 52 countries for whom we have information on the experience of child mortality. We present descriptive information on the variables in our models in Appendix 4.1. The list of countries in our each sample is presented in Appendix 4.2.

Method of analysis. In order to formally test our hypotheses, we estimated binary logistic multilevel models, separate for each sample. We eliminated the missing values on the dependent and independent variables. The level of missing values for the dependent variables was low, e.g., only 8.7 percent of the women selected for anemia tests did not have a valid measurement. The level of missing values for the independent variables was also very low. We standardized the independent continuous measures at contextual or individual level (Mean=0, SD=1). To account for possible period effects, we included dummies for the year of data collection. Due to the high correlation between GDP per capita and the governmental spending on health, we could not simultaneously use the two variables in our models. We opted to include the GDP per capita measure. In order to test whether the health gap between the rich and the poor is wider in countries with higher levels of inequality, we estimated a model where we introduced the interaction between Gini Index of Household Wealth and the household wealth dummies.

4.4. Results

We first examined whether the level of wealth inequality was associated with the prevalence of anemia, the experience of child mortality and with the country's resources relevant to health (see Table 4.1). Because of the way our dependent variables were measured (i.e., 1 stands for the worse health status) we expected to find a positive correlation between the level of household wealth inequality and the aggregated health indicators.

Table 4.1 Ecological correlations of Gini Index of Household Wealth with average population health and other contextual measures in the three samples of LMICs

Correlations of Gini Index of Household Wealth with:	Women anemia sample [a]	Children anemia sample [b]	Experience of child mortality sample [c]
Aggregated health	**.39**	**.76**	**.80**
Private financing of health	.07	.11	.15
Measles vaccination	**-.63**	**-.61**	**-.53**
GDP per capita	**-.72**	**-.71**	**-.63**

Notes: Estimates in bold are correlation coefficients that are statistically significant for $\alpha < .05$.

[a]: women anemia sample, dependent variable aggregated for 373735 women in 33 countries.

[b]: children anemia sample, dependent variable aggregated for 152485 children with age lower than 71 months in 30 countries.

[c]: experience of child mortality sample, dependent variable aggregated for 455692 women in 52 countries.

We found that higher levels of household wealth inequality were positively correlated with higher prevalence of anemia and of experience of child mortality. Note that the correlation in the women anemia sample was half in strength in comparison with the correlations found in the child anemia and experience with child mortality samples. Also, Gini Index of Household Wealth was negatively and significantly correlated with the coverage of measles vaccination - our proxy for the coverage of basic health services / effectiveness of the health sector, and with the GDP per capita. The correlation with the share of private financing of health was statistically not significant. Based on these figures, we found the first evidence that linked higher levels of inequality with worse health and with less country's resources that are relevant for population health (albeit not all).

Inequality, resources and average health

Table 4.2, 4.3 and 4.4 present selected effects from multilevel models testing our hypotheses.

Table 4.2. Results of the logistic multilevel regression for dependent variable anemia status (373735 women in 33 countries)

	Model 1	Model 2	Model 3	Model 4	Model 5
Gini Index of Household Wealth	**.25** (.09)	.12 (.09)	.10 (.08)	-.07 (.13)	.16 (.11)
Household wealth (richest 5th quintile)		**-.56** (.01)	**-.44** (.02)	**-.44** (.02)	**-.29** (.09)
Household wealth (4th quintile)		**-.40** (.01)	**-.31** (.01)	**-.31** (.01)	**-.19** (.07)
Household wealth (3th quintile)		**-.24** (.01)	**-.18** (.01)	**-.18** (.01)	***-.10*** (.06)
Household wealth (2nd quintile)		**-.12** (.01)	**-.09** (.01)	**-.09** (.01)	***-.06*** (.04)
Private financing of health				.05 (.08)	
Measles vaccination				-.13 (.10)	
GDP per capita				-.11 (.11)	
*Interactions Gini Index of Household Wealth**					
Household wealth (5th quintile)					.01 (.09)
Household wealth (4th quintile)					-.00 (.09)
Household wealth (3th quintile)					-.05 (.08)
Household wealth (2nd quintile)					-.04 (.05)
Control variables			**Yes**	**Yes**	**Yes**
Country level variance	.237	.236	.214	.191	.251

Notes: Effects on the log(Y) presented with standard error of estimates in parentheses. Estimates in bold are statistically significant for $\alpha < .05$, in bold + italics for $\alpha < .10$. Continuous variables are standardized. All models include dummy variables for the year of data collection – effects not presented.

First, we estimated a model with only an intercept allowed to vary between countries and with dummies for years (effects not presented in table). Based on this model, we estimated the initial country level variance and the intra-class correlation coefficients (ICC). For the women anemia sample, the initial between-countries variance was .30 and the ICC was .08, for the children anemia sample, the initial between-countries variance was .75 with a corresponding ICC of .18, while for the child mortality sample, the initial between-countries variance was .52 and the ICC was .14.

In Model 1 (Table 4.2, 4.3 and 4.4), we estimated the uncontrolled effect of Gini Index of Household Wealth. As expected, we found that higher Gini Index of Household Wealth was significantly related with higher chance to be tested with anemia or to the chance of women to experience the death of a child. The effect was more than double in the children anemia sample in comparison to the effect in the women anemia sample (.65 compared to .25). Additionally, around 70% of the country-level variance for the child mortality sample and around 54% for the children anemia sample could be attributed to differences in household wealth inequality between the countries, but only around 10% for the women anemia sample.

In Model 2 (Table 4.2, 4.3 and 4.4), we added the household wealth and we found that the odds to be tested with anemia of the women living in one of the richest 20% households in the sample were .57 lower compared to the women living in one of the poorest 20% households (exp(-.56)). Similarly, the odds of the richest to the poorest 20% women to experience the death of a child was .33 lower (exp(-1.09)). Thus, the health gap between the richest to the poorest women is larger when it comes to child mortality experiences than in the case of anemia. With regard to the children sample, the odds of the richest to the poorest 20% children to be tested with anemia was .48 lower (exp(-.73)).

In addition, the inclusion of household wealth in the model led to the reduction of the effect of Gini Index of Household Wealth of around 52%, 28% and 43% in the women anemia sample, children anemia sample and experience of child mortality sample. However, this effect was still statistically significant for the child anemia sample and for the experience of child mortality sample. Thus, our results provided support for the expectation that the empirical relationship between inequality and health is, at least partially, a result of a compositional effect due to the distribution of material resources in the population. This conclusion did not change when adding the additional individual level control variables (Model 3 in Table 4.2, 4.3 and 4.4).

In Model 4 (Table 4.2, 4.3 and 4.4), we added the country's resources relevant to health. We first observed that the effect of Gini Index of Household Wealth was further reduced, but for the child mortality sample and for the children anemia sample it remained statistically significant. However, the country's resources relevant to health had weak and mostly not significant relationships with the average health in the three samples. Still, compared to Model 3, the account of these contextual measures decreased the country-level variance with around 11% for the women anemia sample, around 3% for the children anemia sample and with around

24% for the child mortality sample. Thus, based on the above, we found some support for hypothesis 3.

Table 4.3. Results of the logistic multilevel regression for dependent variable anemia status (152485 children with age less than 71 months in 30 countries)

	Model 1	Model 2	Model 3	Model 4	Model 5
Gini Index of Household Wealth	**.65** (.11)	**.47** (.11)	**.44** (.10)	**.32** (.16)	**.61** (.14)
Household wealth (richest 5th quintile)		**-.73** (.02)	**-.48** (.03)	**-.48** (.03)	**-.44** (.08)
Household wealth (4th quintile)		**-.41** (.02)	**-.29** (.02)	**-.29** (.02)	**-.24** (.06)
Household wealth (3th quintile)		**-.22** (.02)	**-.17** (.02)	**-.17** (.02)	**-.11** (.05)
Household wealth (2nd quintile)		**-.10** (.02)	**-.09** (.02)	**-.09** (.02)	**-.09** (.04)
Private financing of health				-.02 (.10)	
Measles vaccination				-.05 (.14)	
GDP per capita				-.13 (.14)	
*Interactions Gini Index of Household Wealth**					
Household wealth (5th quintile)					**-.19** (.10)
Household wealth (4th quintile)					***-.18*** (.09)
Household wealth (3th quintile)					-.12 (.08)
Household wealth (2nd quintile)					-.02 (.07)
Control variables			**Yes**	**Yes**	**Yes**
Country level variance	.343	.352	.275	.266	.364

Notes: Effects on the log(Y) presented with standard error of estimates in parentheses. Estimates in bold are statistically significant for α <.05, in bold + italics for α <.10. Continuous variables are standardized. All models include dummy variables for the year of data collection – effects not presented.

Table 4.4. Logistic multilevel regression estimates for dependent variable experience of child mortality (455692 women in 52 countries)

	Model 1	Model 2	Model 3	Model 4	Model 5
Gini Index of Household Wealth	**.61** (.06)	**.35** (.05)	**.38** (.05)	**.22** (.08)	**.21** (.08)
Household wealth (richest 5th quintile)		**-1.09** (.03)	**-.17** (.04)	**-.17** (.04)	**-.17** (.07)
Household wealth (4th quintile)		**-.77** (.02)	**-.13** (.03)	**-.13** (.03)	-.08 (.05)
Household wealth (3th quintile)		**-.42** (.02)	-.02 (.02)	-.02 (.02)	.00 (.05)
Household wealth (2nd quintile)		**-.13** (.01)	**.07** (.01)	**.07** (.01)	.04 (.03)
Private financing of health				.02 (.04)	
Measles vaccination				**-.21** (.06)	
GDP per capita				-.07 (.06)	
*Interactions Gini Index of Household Wealth**					
Household wealth (5th quintile)					.02 (.07)
Household wealth (4th quintile)					.09 (.06)
Household wealth (3th quintile)					.04 (.06)
Household wealth (2nd quintile)					.04 (.04)
Control variables			**Yes**	**Yes**	**Yes**
Country level variance	.145	.137	.110	.083	.062

Notes: Effects on the log(Y) presented with standard error of estimates in parentheses. Estimates in bold are statistically significant for α = .05. Continuous variables are standardized. Models also include dummy variables for the year of data collection – effects not presented.

Inequality and the health gap

In Model 5 in Table 4.2, 4.3 and 4.4, we added the interactions between Gini Index of Household Wealth and the quintiles of household wealth contrasting the respondents living in absolute poverty (the 20% poorest in our samples) to the rest. The interactions were statistically not significant for p<.05 in all the three samples but the interaction coefficients found in the children anemia sample were all negative and for the richest 40% of households they were stronger and were statistically significant for p<.06. For instance, our results seemed to suggest that children born in the wealthiest 20% households had significantly lower chance to be diagnosed with anemia (odds ratio: exp(.61-.19) = 1.52) than children born in the

poorest 20% households (odds ratio: exp(.61) = 1.84). However, based on the results from the three samples, we did not find conclusive evidence that countries with higher levels of wealth inequality had higher levels of health inequality compared to countries with lower levels of wealth inequality.

The role of sample composition

By inspecting the scatter plots of the Gini Index of Household Wealth with the aggregated dependent variables we observed a clear clustering of African / non-African countries (see Appendices 4.3, 4.4 and 4.5). This observation raised questions regarding the role of the sample composition for our conclusions. We briefly explored this possibility for the child mortality sample. Unfortunately the number of countries in the women anemia sample and children anemia samples were too low and we could not perform separate detailed analyses.

We re-estimated Model 4 in Table 4.4 by including a dummy variable for the non-African countries and we observed a decrease of the effect of Gini Index of Household Wealth to the point where it turned statistically not-significant. Analyses on separate sub-samples showed that the particularity of the African countries is a feature of their socio-economic profile. For the sample of 28 African countries the uncontrolled significant effect of Gini Index of Household Wealth was fully explained when we took into account the individual level variables. Furthermore, the only contextual characteristic that decreased the chance of experiencing child mortality was the measles vaccination coverage, i.e., the measure of coverage of basic health services / effectiveness of health system. In the subsample of 24 non-African countries the uncontrolled significant effect of Gini Index of Household Wealth was explained both by compositional effects of individual material resources and by the country's characteristics relevant to health. In addition, in the non-African countries, both the measles vaccination coverage and the share of private financing were significantly related to the chance of women to experience child mortality.

4.5. Conclusion and discussion

In the present study, we set out to investigate the relationship between inequality and two measures of health: anemia status of women and their children and the experience of child mortality. We extended the previous literature by looking at these relationships among LMICs, by using health information on individuals collected in as much as 52 countries, and by analysing the relationship between inequality with average health and health inequality. We first examined whether countries with higher levels of

inequality also displayed worse health, and whether this relationship was robust to population composition. Second, we explored a potential mediation path linking inequality to health via the countries' resources relevant to health. Third, we were interested to see if the health gap between the rich and the poor was wider in more unequal countries. Based on our analyses we derive the following conclusions.

First, we found evidence supporting the idea that higher wealth inequality was associated with worse health in the LMICs. In our models, the chance of women and children to be tested with any form of anemia and the chance of women to experience child mortality was significantly higher with higher wealth inequality. This conclusion is in line with findings from other studies in the LMICs, albeit on different health outcomes or preconditions for health. To cite only a few results, wealth inequality was found to be positively associated with the chance to be tested HIV seropositive in sub-Saharan Africa (Fox, 2012) or inequality in income was found to be associated with higher levels of pre-term birth (Huynh, Parker, Harper, Pamuk, & Schoendorf, 2005) and with child malnutrition (Larrea & Kawachi, 2005).

Second, our results point toward the non-linear relationship between health and material resources within countries as the main reason why we initially found a significant association between higher household wealth inequality and worse health. In more unequal countries there are more people that have precarious living conditions and very low levels of material resources compared to countries where the material resources are more evenly distributed. Since in the LMICs large part of the health funding is based on the out-of-pocket payments and the policies to support the poor are scarce, material resources are very important for health and strong differences in individual wealth translate into strong differences in health. Thus, in the LMICs the relationship between inequality and health is, to a large extent, a "statistical artefact" (Gravelle, 1998).

However, composition effects had different weight for explaining the relationship between household wealth inequality and health, depending on the countries in the sample. We found that African countries had a specific profile – these are the countries where the poorest individuals are concentrated, and this concentration of low material resources at individual level fully explained the relationship between inequality and health. In comparison, among the non-African countries the health system characteristics mattered more for explaining the observed relationship between inequality and health. It is possible that the countries from the two geographic areas differ systematically in the development and accessibility of health services or in the type of public policies and welfare arrangements

aimed to protect the poor. For example, a good territorial coverage of health infrastructure will benefit a larger segment of the population, especially the poor population residing in remote rural areas. Also, policies that permit poor individuals to access the health services and infrastructure will increase the use of medical care, with positive effects on the overall health of the population. Due to data limitation we could not pursue these alternative explanations but we encourage future research to systematically examine the role of welfare arrangements and policies targeting the population's access to health infrastructure and services in relation to health.

Third, we found evidence suggesting that inequality could have a genuine contextual effect on health in the LMICs. Even after accounting for the differences between individuals in terms of household wealth and other characteristics, in those LMICs with higher household wealth inequality more women experienced child mortality and more children were tested with anemia. We examined one potential mechanism that could be behind this contextual effect: the argument that in countries with higher inequality, the country's resources relevant to health are less developed. Our results provided some support for this proposition: around 40% from the effect of Gini Index of Household Wealth on the propensity to experience child mortality was explained when the country's resources relevant to health were taken into account. Similarly, the reduction was around 48% in the children anemia sample. In the light of the robust and convincing economic literature linking inequality to reduced growth and lower investment in public goods and human capital (Bourguignon & Verdier, 2000; Deininger & Olinto, 2000; Galor & Zeira, 1993), it is reasonable to accept these results as a tentative empirical support for the proposed mechanism. However, because our data was cross-sectional, no strong claims regarding a causal chain can be made.

Fourth, we found that the relationships between the characteristics of the health system and our health measures were very weak and in majority of cases statistically not significant. In addition, we found evidence suggesting that health institutions had different weight for health among the African and non-African countries and for the two health indicators. These findings suggest that the mediating effect of health institutions could differ between different samples of countries and could be outcome specific. In this particular study, we cannot assert which of these possibilities has more weight. An answer to this issue would shed more light in the functioning of health institutions for health in the LMICs, with important implications for public policies.

Finally, our results indicate that a very prominent policy idea, i.e., that higher inequality is associated with a wider health gap between rich and

poor, is not supported by empirical evidence in an indisputable manner. It is not clear to us the reason why the health gap in anemia and the experience of child mortality between rich and poor women was not lower in those LMICs with lower household wealth inequality. Our results could be due to the choice of health measures, inequality measure, or maybe to some other factors that we did not account for. This remains an open question for future research.

We note that we only took into account two measures of physical health in our analyses, i.e., anemia status and the experience of child mortality, and we only looked at two potential explanations for the empirical relationship between inequality and health. However, inequality might relate to health via alternative mechanisms, e.g., inequality could act like a contextual stressor (Wilkinson & Pickett, 2009b) or it could reduce trust and social cohesion (Kawachi & Kennedy, 1999) and via these pathways it could lead to health problems. In addition, our investigated population is restricted only to women and infants, and thus we cannot be certain if our results also hold for the male population. However, since the Millennium Development Goals (UN, 2010) have a special focus on the health of women and children, the lack of generalizability of our conclusions to the whole population does not diminish their importance.

While the above are limitations of our research, we note that the measures that we utilized are (mostly) objective health measures, collected either via a blood test or via birth histories. Thus, the chance to be biased by the subjects' knowledge or willingness to declare the truth is null or extremely low. By using these two measures of physical health, we addressed concerns regarding the equivalence of health measures in cross-national comparative research (Jurges, 2007; Jylha et al., 1998) and increase the validity of our findings.

To sum up, our contribution shows that, in general, reducing inequality in the LMICs might not result in better average health of women and children. Instead, a more effective approach is to improve the wealth *among the poor households*, which will result in better living conditions, better nutrition and more resources for accessing medical services and as result, overall better health. Targeted policies aimed at improving literacy, developing community infrastructure and increasing the connections between rural and urban areas have the long term potential of sustainable improvement of the wealth of the poor in the LMICs. Of course, alleviating poverty among the poor will also lead to the reduction of overall inequality with potential spill over effects on economic growth and investments in public health infrastructure and services, which in turn could have a positive impact on health.

PART II.

EFFECTS OF INEQUALITY ON MENTAL HEALTH AND WELL-BEING

CHAPTER 5.

INCOME INEQUALITY AND DEPRESSION: THE ROLE OF SOCIAL COMPARISONS AND COPING RESOURCES[5]

[5] A slightly different version of this chapter was accepted for publication in *European Sociological Review* (Van Deurzen, Van Ingen, & Van Oorschot, 2015). An earlier version of this paper has been presented at the Second ESS Conference 2012, Nicosia, Cyprus.

5.1. 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 (Kane & Garber, 2004; Penninx, Deeg, van Eijck, Beekman, & Guralnik, 2000; Simon et al., 2001). It is a deeply personal experience but its occurrence is strongly related to the social position of individuals (Lorant, Deliege, Eaton, Philippot, & Ansseau, 2003; Turner, Wheaton, & Lloyd, 1995). Therefore, many sociological studies have examined depression, stress and their social correlates. Earlier studies looked at the role of major life events (Aneshensel, 1992; Pearlin, 1989) and later moved from a mechanistic view toward integrating the objective circumstances of individuals and the perceptions of these circumstances (Ross & Mirowsky, 2006a). Nowadays the focus has shifted toward inquiring whether the organization of society in terms of the unequal distribution of resources can also be harmful to individuals' mental well-being (Layte, 2012; Prag, Mills, & Wittek, 2014; Sampson, Morenoff, & Gannon-Rowley, 2002a; Wilkinson & Pickett, 2009b). If this is the case and inequality is harmful for depression, then what are the mechanisms behind the detrimental effect? Can individuals protect themselves? Does inequality harm everyone, or are some groups more vulnerable than others? In the present paper, we seek answers to these questions.

Our study will address the above topics in a fourfold 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 (2009b), authors who conceptualize inequality as a contextual stressor which 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 (2009b). 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 due to high inequality could explain higher levels of depressive symptoms in more unequal countries.

Third, we examine closely 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 (Carver & Connor-Smith, 2010; House, Umberson, & Landis, 1988; Scheier & Carver, 1992; Thoits, 1995). 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 paper regards the potentially different effects of inequality according to SES position. We analyse whether the size of these effects differs according to one's place in the country's SES hierarchy.

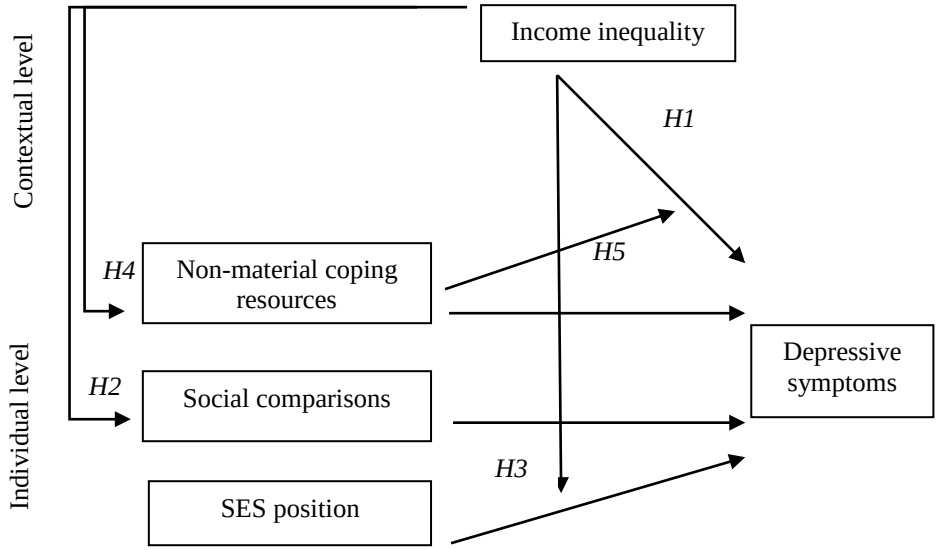
Our research questions are the following: 1) to what extent do country differences in income inequality relate to individuals' depressive symptoms?; 2) to what extent is the relationship between inequality and individuals' depressive symptoms explained by more social comparisons and fewer non-material coping resources in more unequal countries?; 3) do individuals with more non-material coping resources experience a weaker effect of inequality than individual with fewer coping resources?; and 4) does the relationship between inequality and depression differ for individuals with different relative SES positions?. To address these questions, we use the third round of the European Social Survey 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 & Team, 2007).

5.2. Theoretical background

The idea that the structure of society in general and income inequality in particular can "get under your skin" and make people sick has received much attention in the epidemiological and sociological fields (Layte, 2012; Michael Marmot, 2005; Wilkinson & Pickett, 2009b). 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, 2000), 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 Lynch et al. (2004) and Leigh et al. (2009)). In the present paper, we contribute to the debate by exploring two potential causal mechanisms as follows: (1) inequality as a contextual stressor and (2) inequality as detrimental to the population's levels of social support and psychological coping resources. We detail below the two mechanisms and derive hypotheses that are also presented in graphical form in Figure 5.1.

Figure 5.1. The structure of the hypotheses tested



Income inequality as a contextual stressor

Regarding the "social stress" mechanism, Wilkinson (1999) takes a central position and argues that inequality serves as 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 with 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 (Gilman, Kawachi, Fitzmaurice, & Buka, 2003; Ross, 2000; 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 (*Hypothesis 1*) and that social comparisons mediate this relationship (*Hypothesis* 2).

Wilkinson and Picket (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 they also 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 & 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 actually 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 (*Hypothesis 3).*

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 (Cruess et al., 2000; Makikangas, Kinnunen, & Feldt, 2004; Scheier & Carver, 1992; Thoits, 1995). 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 (2009b) 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 their 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 comparisons are behind this association (Rosenberg & Pearlin, 1978; Twenge & 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 & 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 employed 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 frequent.

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 (*Hypothesis 4*).

Studies of the differential vulnerability to stress suggest that individuals' non-material coping resources can also moderate the damaging effects of social stressors (Thoits, 2010). First, individuals who have close

contact with significant others cope better with stressful situations because of the emotional support received (Cohen & 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 & 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 (*Hypothesis 5*).

5.3. Data and methods

In order to test our hypotheses we utilized round three of the European Social Survey (Jowell & Team, 2007). Round three 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 dataset that consisted of 43824 respondents nested in 23 countries. We used multilevel techniques, which allowed us to disentangle compositional and contextual effects (Snijders & Bosker, 1999). In the current analyses, all continuous independent variables were standardized (mean 0 and std. 1).

Dependent variable. 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 et al., 2010). Respondents were asked to indicate how often during the last 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 provide at least 5 valid answers. In the present sample, the overall Cronbach's alpha was .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 (SWIID) (Solt, 2009), a dataset 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 to 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 (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 due 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 to 4 mean scale that combined several items that measure the following: (1) optimism (i.e., always optimistic about the future), (2) self-esteem (i.e., two variables measuring whether the respondents feel good about themselves and feel as a failure) and (3) resilience (takes me a long time to rebound). A higher score indicated a higher level of psychological coping resources.

Control variables at the individual level were gender (female as reference), age categories (younger than 25, 25 to 34, 35 to 44, 45 to 54, 55 to 64, 65 to 74, and over 75 years old), residence (living in a small town / suburbia, countryside / farm vs. living in a large city), employment status (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 utilized the chained equations multiple imputation method as implemented in ICE (Royston, 2005), a user-contributed add-on for STATA. 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 datasets, and the estimates are then combined following Rubin’s rules (Rubin, 1987).

To construct the imputation models, we followed the suggestions of Paul D. Allison (2009) and J. W. 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 dataset had a nested structure that we wanted to preserve, we performed all of the imputations within each country. We computed a number of 20 alternative datasets.

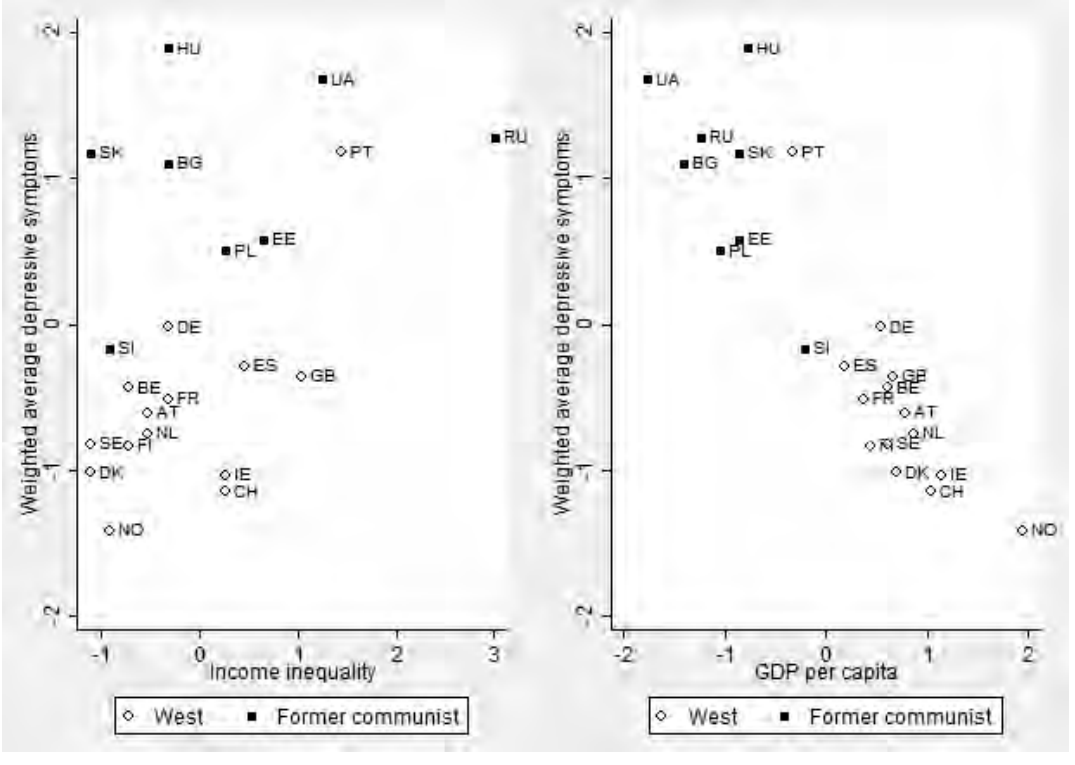
Appendix 5.1 summarizes the descriptive information of the variables in the models before the multiple imputation procedures. Additional information on the average depressive symptoms per country, Gini Index of income, social comparisons and non-material coping resources are presented in Appendix 5.2. We also summarized detailed information on the samples with and without missing values for the income variable in Appendix 5. The samples did not differ dramatically in their composition.

5.4. Results

Aggregate level

As illustrated in the left panel of Figure 5.2, we found a significant positive correlation between the average depressive symptoms per country and the level of income inequality (.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.

Figure 5.2. Depression, inequality and wealth among 23 European countries



Country codes: 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.

Multilevel analyses

In Table 5.1, we present selected results of the multilevel models that test hypotheses 1, 2 and 4. The bottom of the tables 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 .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 (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.

Table 5.1. Selection of the estimates of the multilevel models (43824 respondents in 23 European countries)

	Model 1	Model 2	Model 3	Model 4	Model 5
Income inequality					
Gini Index income	**.64** (.23)	**.61** (.22)	**.60** (.20)	**.51** (.17)	**.50** (.17)
Social comparisons					
Important to compare income with others			**.43** (.04)		**.15** (.03)
Coping resources					
Psychological coping resources				**-1.97** (.02)	**-1.96** (.02)
There are people who care				**-.35** (.02)	**-.35** (.02)
Someone with whom intimate and personal matters can be discussed				**-1.08** (.06)	**-1.08** (.06)
Intercept	**6.17** (.23)	**6.83** (.25)	**7.03** (.26)	**7.67** (.21)	**7.83** (.22)
Other individual-level variables	No	Yes	Yes	Yes	Yes
Variance country level	1.17	1.01	.90	.63	.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 datasets with imputed values for missing cases and ulterior combined following Rubin (1987). Model 1 does not control for individual-level variables. Models 2 to 5 include all other individual-level variables: relative income positions, gender, age categories, residence, employment status, 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. Bold coefficients are significant for $p < .05$, two-tailed tests.

We found that higher inequality was significantly related to more depressive symptoms (.64 SE: .23 in Model 1, Table 5.1). Furthermore, income inequality explained 25 per cent of the variance at the country level. In Model 2 (Table 5.1.), we adjusted for the individual-level variables and found that the effect of Gini Index of income was slightly reduced but remained significant. Thus, *Hypothesis 1* was not rejected. In Model 3 of Table 5.1., we added the measure of social comparisons to test the expected mediation of the effect of income inequality on depressive symptoms. *Hypothesis 2* was not supported; the effect of Gini Index of income was not substantially reduced in Model 3 in comparison to Model 2. Additional analyses showed that there was no effect of Gini Index of income on the average level of social comparisons (.03, SE: .05).

In Model 4 of Table 5.1., 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 .61 to .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 (*Hypothesis 4*) was not supported by our data.

In Table 5.2. we present results derived from multilevel models that tested *Hypothesis 3* stating that groups in intermediate positions of the SES hierarchy could suffer the most from income inequalities. In order to test this hypothesis we estimated Model 2, Table 5.2 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, 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 where we contrasted the poorest 40% in a country to the middle 20%.

The assumptions behind *Hypothesis 3* 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 presented in Appendix 5.4) 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, *Hypothesis 3* received mixed support.

Table 5.2. The differential effect of inequality for different socio-economic positions (43824 respondents in 23 countries)

SES groups	**The effect of Gini Index:**
Highest SES position (richest 40% in the country)	.58
Middle SES position (20% population)[a]	.77
Lowest SES position (poorest 40% in the country)	.57[b]
Highest SES position (richest 30% in the country)	.56
Middle SES position (40% population) [a]	.67
Lowest SES position (poorest 30% in the country)	.54
Highest SES position (richest 20% in the country)	.54
Middle SES position (60% population) [a]	.61
Lowest SES position (poorest 20% in the country)	.55
Highest SES position (richest 10% in the country)	.44
Middle SES position (80% population) [a]	.60
Lowest SES position (poorest 10% in the country)	.51

Notes: Estimates calculated starting from Model 2, Table 2 plus interaction terms, on 20 alternative datasets 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<.05, two-tailed

Table 5.3 Estimates of the interaction between measures of income inequality and measures of non-material coping resources (43824 respondents in 23 countries)

Interaction with:	Gini Index income
Psychological coping resources	***-.09*** (.05)
There are people who care	-.04 (.04)
Someone with whom intimate and personal matters can be discussed	**-.29** (.12)

Notes: All continuous variables (dependent and independent) in the models are standardized. Coefficients with standard errors in parentheses. Estimates derived from 20 alternative datasets 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 in table). Bold coefficients are statistically significant for p<.05 while bold + italics are statistically significant for p<.10, two-tailed tests.

Next we tested the potential buffering effect of non-material coping resources (*Hypothesis 5*). We expected that the effect of income inequality on depressive symptoms is 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 5.1. The results are presented in Table 5.3. The analyses provided mixed support for *Hypothesis 5*. All of the interaction terms were negative, but only two of three terms were significant, as follows: the interaction with the psychological attributes ($p<.10$) and with having someone to talk to ($p<.05$).

Additional analyses

In order to test the robustness of our findings we performed a series of additional analyses. In order 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 to 5, Table 5.1 with these 2 alternative dependent variables led to identical conclusions.

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

We also re-estimated our models on the dataset with missing values not imputed. The conclusions derived from the Models 1 to 5 in Table 5.1 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 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 5.2. When GDP per capita PPP was added to Model 5 in Table 5.1, we observed a decrease of the effect of Gini Index of income from .51 to .21, ($p<.05$, 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 .51 to .37 ($p<.05$, two-tailed test of significance).

5.5. Discussion

We began this paper 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 potential 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 toward 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 & Pickett, 2009b), 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 & Whelan, 2014; Prag et al., 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 (2009b) 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 quite general and ambiguous. Only comparisons regarding income were available in the dataset; 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, Williams, Lavorato, & Bulloch, 2010; Sowislo & 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, Peter, Prag, & Steverink, 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 utilized 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 (2009b). 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 life-style 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 (2009b). 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, etc. (Stacey, 1960). In-depth country studies are likely helpful here, and within- and between-country studies should complement each other in order to enhance our knowledge of this matter.

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 (2009b) 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.

One possible alternative mechanism that we were unable to test within the space of this study is provided by Ross and Mirowsky (2002, 2006b). 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 explaining the empirical relationship between inequality and depression fully deserves the attention of future research.

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; choice of the cut-points; in-/exclusion of outliers). One way future research may try to

improve the stability of the effects – and also enhance the power of the tests – is by using data from a larger number of countries.

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.

CHAPTER 6.

THE EFFECT OF INEQUALITY ON WELL-BEING: EXPLORING CORRUPTION AS AN ALTERNATIVE MECHANISM[6]

[6] An earlier version of this paper has been presented at the Interuniversitaire Werkgroep Sociale Ongelijkheid en Levensloop (ISOL) meeting 2015, Utrecht, The Netherlands.

6.1. Introduction

It is long acknowledged that the living environment has an important role for the well-being of individuals and factors such as poverty, inequality, noise or pollution have the capacity to influence their happiness, satisfaction or emotional well-being (Alesina, Di Tella, & MacCulloch, 2004; Prag et al., 2014; Sampson, Morenoff, & Gannon-Rowley, 2002b). Some of these environmental factors attracted more interest from the scientific community than others. A notable case is income inequality which was depicted as one of the greatest villains of our times: an insidious force subjecting individuals to threats to their social image and their self-worth on a daily basis, resulting in a climate of increased social tension and stress that ultimately translates into a lower level of well-being (Pickett & Wilkinson, 2015; Wilkinson, 1999). In the present study we also focus on the relationship between income inequality and well-being, and we concentrate on the mechanisms that might be at work.

The alleged detrimental effect of income inequality on health and well-being has become a hot topic after the seminal study conducted by Rodgers (1979) who showed that higher levels of inequality related to lower life expectancy and higher levels of child mortality in a sample of 56 world-wide countries. Following up on these results, hundreds of studies strived to determine if the original relationships found by Rodgers (1979) can be replicated in different samples of countries, for different measures of population well-being and with different designs. The first wave of ecological studies was criticized because of two main reasons: first, because authors were testing a relationship at macro level while inferring conclusions at individual level, which is a classic example of ecological fallacy and second, because the observed macro level relationship could have been just a “statistical artefact” due to the inability of the research design to control for the population composition (Gravelle, 1998). Following up on this critique, scholars have turn their attention to different methodologies that were more appropriate for disentangling the contextual and compositional effects (Duncan et al., 1998). However, regardless of the research design, the results of the studies that investigated the relationship between income inequality and well-being were not conclusive, with scholars finding supportive, unsupportive or partially supportive results (Wilkinson & Pickett, 2006).

Confronted with the accumulation of inconsistent and contradictory results, researchers turned their attention toward investigating the tenability of the mechanisms that were proposed to explicate the empirical observation

that (in some contexts and periods) higher inequality was associated with worse well-being. One of these mechanisms was proposed by Wilkinson (1996) who argued that with higher inequality the differences in status between individuals are more visible and the constant comparisons with the better off will frustrate individuals to the point of increasing status anxiety, decreasing trust and social support and, in turn, decreasing well-being (Wilkinson & Pickett, 2009b). However, recent research was not able to find evidence for the role played by social comparisons or social support as mediators between income inequality and mental well-being measures. (Prag et al. (2014); Van Deurzen et al. (2015)). Other studies that investigated the link between income inequality and status anxiety and trust as a mechanism leading to worse well-being found stronger evidence in its favour (Delhey & Dragolov, 2014; Layte, 2012; Layte & Whelan, 2014). Nevertheless, these studies focused only on samples of European countries and thus it is unknown whether these results hold for other contexts. In addition, the limited number of countries in these studies rise concerns regarding the power of the analyses.

Other researchers have tried to explicate the observed relationship between inequality and well-being by acknowledging the strong relationship between the economic conditions such as the level of income inequality and the institutional context of a country. In short, inequality is argued to relate to the systematic underinvestment in public goods such as health services and infrastructure, which in turn are instrumental for the health and well-being of the population (Coburn, 2004; Lynch, 2000). This mechanism could explain why the relationship between inequality and well-being was shown to be sensitive to the ability of the research design to account for potential contextual confounding factors (Beckfield, 2004), however, recent studies have found weak support for this argument (Layte, 2012; Van Deurzen et al., 2014). Nevertheless, these empirical findings do not disprove the validity of the rationale that there is a strong link between the level of inequality and the institutional context of a country. It does signal, though, that researchers have failed to identify the relevant institutional factors that are so close related to inequality and to health and well-being that, when taken into account, can reveal more about the mechanisms behind this relationship.

To sum up the above, while the literature exploring the relationship between income inequality and health and well-being is extensive, there is still much to be done in order to advance out knowledge regarding the mechanisms behind this relationship. Subsequently, in the present contribution we do not focus on the direct effect of income inequality on well-being but instead, we examine a potential indirect effect, i.e., we will

propose and test an alternative mechanism that was not yet explicitly formulated in the literature. We build upon the ideas of Lynch (2000) and Coburn (2004) regarding the strong relationship between income inequality and the institutional context of a society. However, against their argument that the relationship between inequality and health and well-being is spurious due to unmeasured contextual characteristics, we will argue that this relationship could be causal and mediated by the level of societal corruption. Subsequently, the main research question that guide our study is: can we find evidence for a causal mechanism linking inequality to population well-being through an effect on corruption?

In the next section we will elaborate on the causal mechanism proposed, by first discussing why inequality could be a cause of corruption and then by elaborating why corruption could be detrimental to well-being.

6.2. Theoretical background

Inequality and corruption

Sociological literature has made a strong argument for a causal link between inequality and corruption (You & Khagram, 2005). The authors argue that higher inequality could contribute to increasing the level of societal corruption via two pathways: a material and a normative one.

The material pathways argues that a higher level of inequality shapes the structure of opportunities and motivations of the population, which ultimately facilitates higher involvement in corrupt acts. You and Khagram (2005) reasoned that with higher inequality there are more poor people that will exert pressure for redistribution, which goes against the interests of the rich. As a result, the rich have more motives to use their money and social connections in order to prevent redistributive policies, which are not in their favor. The poor and middle class will want to control the involvement of the rich in corrupt practices, but their limited resources do not allow to fully monitor the corrupt activities. Furthermore, the authors argue, in environments with high levels of inequality a large part of the population is poor and competing for a limited amount of public goods and services, and this would be a motivation for involvement in acts of petty corruption in order to secure access to resources.

The above arguments, that draw heavily from the economical literature on redistribution models (Meltzer & Richard, 1981), received support from empirical studies. First, a recent study showed that, at least among the 22 European countries included in the analysis, individuals were on average more in favor of redistributive policies when the level of

inequality was higher (Finseraas, 2009). Second, other studies supported the idea that poorer individuals are more in favor of redistribution (Kaltenthaler, Ceccoli, & Gelleny, 2008) and that with high inequality the occurrence of political conflict episodes increased (Alesina & Perotti, 1996; Perotti, 1996). Furthermore, even though high inequality generates high demand for redistribution, higher inequality was found associated with lower government transfers (de Melo & Tiongson, 2006), and a reason for this could be the involvement of the rich in corrupt practices such as purchasing votes, which would allow them to secure their position of political power and oppose redistribution policies (Docquier & Tabbalouti, 2001). All things considered, these pieces of evidence provide support for the material pathway that was proposed by (You & Khagram, 2005).

You and Khagram (2005) also argued for a normative path and maintained that higher levels of inequality would be conducive of more tolerance for corrupt acts and as a result, there will be less restrain against involvement in corruption. However, the main link in this argument, i.e., that higher inequality relates to more tolerance for corrupt acts, did not receive empirical support from a recent study that found the opposite, i.e., among European countries higher levels of income inequality related to lower acceptance of corrupt acts (Pop, 2012). Thus, we are reluctant to make reference to the normative pathway as argumentation for a causal link between income inequality and corruption, but in the light of the supportive evidence for the material pathway we expect that higher inequality would be associated with higher levels of societal corruption (*hypothesis 1*).

Corruption and well-being

A common definition for corruption is “the private wealth seeking behavior of someone who represents the state or the public authority. It is the misuse of public resources by public officials, for private gains” (Andvig, Fjeldstad, Amundsen, Sissener, & Soreide, 2001, p. 5). Under this generic statement several types of corruption coexist: political corruption, economical corruption, administrative or petty corruption. However, no matter the form that it takes, at least within the context of a democratic society, corruption is seen as a negative, unwanted and dysfunctional characteristic with profound impact on the economic and social life (Treisman, 2007).

Previous literature produced a number of studies that looked at the relationship between corruption and well-being. To cite only a few results, Tavits (2008) found that in a sample of European countries, higher levels of corruption were associated with lower life satisfaction and Helliwell and Huang (2008) found that a honest government (i.e., a government that is not corrupt) is especially important for the life satisfaction of individuals in the

poorer countries but not in the rich ones. In relation to the emotional aspects of mental well-being, we were able to retrieve one study that found a negative significant relationship between experiences with corrupt acts and a measure of stress / anxiety in a sample of Sub Saharan Africa (Gillanders, 2011).

When considering these scattered results, it is worth asking the most basic question of all: why would corruption be related to well-being? The studies cited have devoted little attention to developing a detailed causal argument for this empirical relationship. Gillanders (2011) mentioned that the experiences with corruption could cause stress for those affected and via this mechanism they could impact mental health, while Tavits (2008) argued that corruption could influence the political efficacy, i.e., the belief held by people that they can influence political decisions that allow them to gain political representation of their interests. Building on these arguments, we propose that corruption could impact well-being via the following mechanisms.

First, in line with Gillanders (2011) we also argue that corruption could act like a type of contextual stressor. Corruption, by definition, implies that the rules of access to social and material resources do not work properly. For instance, when considering individuals with certain characteristics (e.g., education, qualifications) that compete for the same type of resources (e.g., job, housing) one would expect that the individuals with the best qualities will be more successful. However, in societies where "money can buy anything" there is no certainty that this is the case – jobs can be obtained by the ones who have more connections, cheap housing could be allocated to those who have the means to bribe the public officials and not to those who are entitled, etc. As a result, corruption could be appraised as a threat or a situation in which some damage or loss could occur to the individuals, and thus it could qualify for the status of a social stressor (Lazarus and Folkman (1984) as cited in Cohen, Kessler, and Underwood Gordon (1997)).

It follows that the individuals living in environments with high corruption will most likely have heightened expectations that they or their loved ones could be negatively affected by corrupt practices at any time. In turn, the constant expectation of something bad to happen could directly deteriorate well-being but it could also result in negative feelings such as anger, hostility and frustration. These negative feelings could be amplified by the miss-match between the expectation that the system is/should be fair and the direct and indirect evidence that, in fact, this is not the case, and subsequently they could further negatively impact well-being. In addition, previous research has shown that perceptions of injustice or experiences of

actual injustice were associated with lower well-being (Smith, Parrott, Ozer, & Moniz, 1994). Furthermore, the threat experienced due to the involvement of others in corrupt practices could result in a climate of lower trust (Rothstein & Uslaner, 2005) and this, in turn, could also negatively impact well-being.

Second, we draw from the writing of Mirowsky and Ross (1986) and Ross and Mirowsky (2006b), and we propose that corruption could influence the level of optimism, personal efficacy or locus of control of individuals, and could increase feelings of powerlessness. Faced with an unfair system that obstructs the legitimate access to social resources, individuals could feel powerless, especially if they cannot find a way to cope with the situation, e.g., they do not have the financial or networking resources to compete. Individuals could lose confidence in their capacity to solve problems or to obtain desired social resources, as their abilities and skills could prove irrelevant when competing against individuals who do no play according to the rules. Subsequently, they could conclude that the outcome of their endeavours is out of their control and this could decrease optimism regarding their chances to succeed in life. These mental states, i.e., powerlessness, low optimism, low personal efficacy / external locus of control, were all linked by previous research to worse well-being (Headey, 2008; Ross & Mirowsky, 1989; Scheier & Carver, 1992).

We note that the studies that estimated the prevalence of the involvement in corrupt acts in various countries around the world have reported that only around 24% of the population was directly involved in an act of corruption (Gillanders, 2011; C. Graham & Chattopadhyay, 2009; Hardoon & Heinrich, 2013). Nevertheless, we argue that corruption could be damaging for everyone, regardless of a direct or indirect experience with it. With more widespread corruption, individual are more likely to be aware of it, not only in a direct way but also indirectly via mass-media or via the experiences of friends or acquaintances, and thus, the effects of corruption described above could be experienced by the entire population. Thus, we expect that individuals living in countries with higher levels of corruption will report lower well-being than individuals living in countries with lower levels of corruption (*hypothesis 2*).

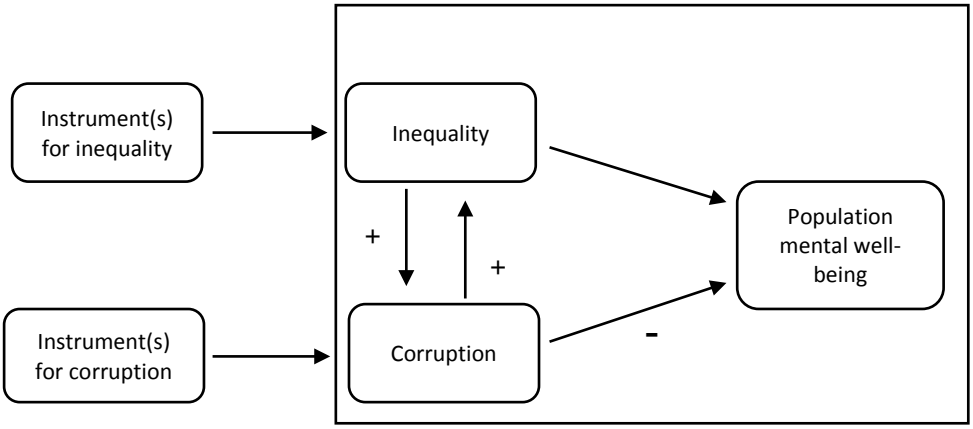
The non-recursive relationship between inequality and corruption

We argued that higher inequality could aggravate the level of societal corruption. However, this relationship is not that clear-cut, i.e., several studies argued and provided evidence for corruption as a cause of inequality or for a reciprocal relationship between inequality and corruption.

From the political literature, Rothstein and Uslaner (2005), starting from the analysis of the Scandinavian countries, argued that the “public

confidence in the integrity of its leaders and institutions was the basis for the compromise that provided for universal policies that would reduce inequality" (p. 58). Thus, the authors argued that the existence of impartial and uncorrupted governmental institutions was the foundation for the development of a universalistic welfare state that, on the long run, led to the reduction of the economic differences between individuals. If this is the case and corruption is causing inequality, it implies that corruption could (also) indirectly influence well-being via increasing the level of income inequality.

Figure 6.1. Graphical presentation of the non-recursive model estimated



Early economic literature also suggested that corruption could be a cause of inequality, e.g., Gupta et al. (2002) argued that in highly corrupt societies the social services available to the needy will be fewer because of the use of office in own favor and as a result the poor individuals will miss income-generating opportunities. Subsequently, their situation will not improve and on the long term their economic situation will lag behind in comparison to the rest of society, resulting in higher levels of economic inequality. However, recent empirical tests showed that the relationship between inequality and corruption could be non-recursive, i.e., we could be dealing with a reciprocal relationship, with both inequality and corruption influencing each other (Apergis et al., 2010; Chong & Gradstein, 2004).

The above brief examples illustrate the need to account for a possible non-recursive relationship between inequality and corruption.

A visual representation of our hypotheses is presented in Figure 6.1, Panel 1. Although the direct effect of income inequality on well-being is not the main focus of this study, we include it in our model and estimation in

order to account for the rich literature that argued for it (Pickett & Wilkinson, 2015).

6.3. Data and testing strategy

Our hypotheses regard the complex relationship between two societal level characteristics, i.e., inequality and corruption and their effect on the population well-being. It was important to test these hypotheses on a dataset with as many as possible countries, in order to overcome concerns regarding the power of our analyses. To accomplish this aim we used data collected by the European Values Study (EVS), wave 2008 (EVS, 2011) and from the World Values Survey (WVS), wave 2005-2009 (WVS, 2014). We measured well-being through the level of happiness of individuals, a measure that was present in both surveys.

EVS only covers European countries while WVS covers both European and world-wide countries. We decided to pool together the samples of those European countries that had data collected both in EVS and WVS. This procedure allowed us to put together a dataset covering 82 countries. However, we had to drop Jordan because of the lack in some of the individual level measures and Andorra, Kosovo, North Cyprus and North Ireland were dropped because of lacks in the contextual measures. The final dataset covered 77 countries and had information collected from 150256 individuals.

Dependent variable. Well-being was measures by the self-reported happiness of the respondents which is an overall assessment of the presence of positive emotions (Huppert & So, 2013). The original scale ranged from 1 (very happy) to 4 (very unhappy). We rescaled this variable so that a higher score to signify more happiness

Contextual level variables. *Income inequality* was measured by the Gini Index of net income available for consumption as retrieved from the Standardized World Income Inequality Database, version 4.0 (Solt, 2009). The Gini Index ranges from 0 to 100, a higher value indicating a higher level of income inequality. We used an average figure across 5 years before and including the year of data collection.

Corruption was measured by the Transparency International Perceptions of Corruption Index (CPI) for the year when data was collected. The CPI is calculated based on informed views of experts, analysts, and business peoples and focuses on the degree of corruption affecting the public sectors. A higher score on this index indicates a cleaner, less corrupt

environment. For our analyses we rescaled the CPI in order for a higher score to reflect a higher degree of perceived corruption.

Individual level variables. In order to control for composition effects due to the specific population characteristics of each country we included in our analyses the following individual level variables: *socio-economic status*, *gender* and *age* of the respondents.

Socio-economic status was measured by the *level of education* and the *employment status*. The variable *level of education* differentiated between individuals with maximum primary education, secondary education (reference category) and tertiary education. The variable *employment status* differentiated between those that had a paid job (reference category) versus those that were self-employed, retired, unemployed or had a different employment status.

The *gender* of respondent differentiated between males (reference category) and females, and *age* of the respondent was measured in 5 categories: from 18 to 24 (reference category), 25 to 34, 35 to 49, 50 to 64 and over 65 years old.

Testing strategy

In order to formally test our hypotheses we used a combination of methods, i.e., a two step-approach of analysis of multilevel data (Bryan & Jenkins, 2013) combined with estimation of non-recursive models using a full-information estimator and instruments as means to identify the model (Paxton, Hipp, & Marquart-Pyatt, 2011).

The 2 step-approach of analysis of multilevel data allows to account for the composition effects due to the uneven distribution of individual level characteristics in the population of the countries and it results in unbiased estimates with correct standard errors. It consists of one regression at the individual level (step 1) and another regression at the country level (step 2). At individual level we regressed on our dependent variable a set of individual level variables along with country dummies, a dummy for the survey where the data came from and dummies for the year of data collection. Based on the estimates of the individual level regression we computed the average happiness scores for each country, controlled for composition (when all else was equal, i.e., the value of individual level variables was set to zero).

The individual level measures were all relevant for explaining individual level differences in well-being and for controlling for compositional effects due to the uneven distribution of material resources in the population. The household income would have been the best option to account for compositional effects due to uneven distribution of material resources, however EVS and WVS did not have a similar measurement of

income. The EVS dataset comes with an already calculated measure of absolute income translated into purchasing power parity, which allowed us to test whether using only education and employment status would lead to different societal average happiness scores. Our tests showed that, at least on the EVS sample, using education and employment status or the income measure resulted in societal happiness scores that were highly correlated (.94, p<.00). We are thus confident that using only education and employment status as means to control for the compositional effects due to the uneven distribution of material resources in the population did not bias our results. Furthermore, we also tested whether including a measure of acceptance of corrupt acts will significantly influence the societal happiness scores, but this was not the case.

The figures for the average happiness for each country were used in the country level models as dependent variable. We employed a SEM model using a full-information estimator in order to account for the non-recursive relationship between inequality and corruption and to test our hypotheses.

Estimation of nonrecursive models and choice of instrumental variables

The SEM model using a full-information estimator implies an estimation procedure that uses the full information available including the correlation between the equations' disturbances (Paxton et al., 2011). As we presented in Figure 6.1, Panel 1, we have empirical data pertaining to 3 variables but we wish to estimate 4 parameters. Following Paxton et al. (2011) in order to be able to identify this model we used instruments, i.e., variables that are correlated only with one of the problematic variables but not with the other. The extended model that allowed us to test our hypotheses is presented in Figure 6.1.

After screening the literature and testing several possible instrumental variables for their validity and strength (see Paxton et al. (2011) for a step by step approach to testing), we decided to use the following measures. For income inequality we used as instrument the *mature cohort size*, i.e., the ratio of the population 40 to 59 years old to the population 15 to 69 years old, the same measure used in the study by You and Khagram (2005). Large cohorts tend to get lower income rewards from labor, and when the cohort is composed of individuals that are at their peak of their earnings, this will flatten the income inequality distribution (Higgings & Williamson, 1999). In addition, You and Khagram (2005) found no differences in acceptance of corrupt acts between the individuals in the mature cohort and the rest of the population, and thus they reason that the only way this demographic characteristic would influence corruption would be via its relationship with income inequality.

The data needed to compute the measure of *mature cohort size* was extracted from the UNECE (2015) and covered the period 2000 to 2009.

For corruption we used as instrument the *freedom of the press index*, computed as the average for the scores published by the Freedom House organization (FH, 2014) for the years 2000 to 2005. A higher score signifies less freedom of the press. Brunetti and Weder (2003) argued and provided evidence for a causal relationship running from higher freedom of the press to lower corruption. Mass-media has an important societal role as control institution, capable of exposing corrupt acts of the public officials. In a society with free press, businesses and tax payers can threaten to or reveal the extortive behavior to a journalist and thus increase the potential costs and penalties that the public officials could face when publicly revealed. Furthermore, independent journalists have incentives to investigate hidden corrupt activities, e.g., the fame and recognition when revealing such deeds.

Regarding the relationship between a free press and the level of income inequality, a free press could be instrumental for promoting the interests of those groups that bring forward arguments regarding the unfairness of high income disparities within society and that ask for more redistribution. The press could ensure that these pressures coming from the voters are heard and via this channel it could influence the political decisions leading to more redistributive policies and less income disparities in the society. This mechanism could work if in every society income inequality would be seen as unfair while reducing inequality would be seen as something socially desirable, and if voters would massively believe that it is the role of the government to tackle inequalities. However, recent research and data showed that high income inequality is not everywhere seen as unethical and unjust and there is not a universal support among voters for a strong intrusive welfare state that should reduce the level of income disparities (ISSP, 2009; Osberg & Smeeding, 2006). We see thus little support for the role of mass-media as a mean to pressure governments into adopting policies targeted at addressing the level of income inequality, and thus we believe that a free, independent press will not act as a direct cause of the level of income inequality.

Descriptive statistics of the individual level variables in our analyses can be found in Appendix 6.1. In Appendix 6.2 we present the country level scores for the contextual variables in our analyses.

6.4. Results

We start by presenting some descriptive information. As seen in Appendix 6.2, we observed a high variation in the level of happiness between the 77 countries in our analysis, with countries such as Denmark, Mexico, Netherlands or Canada displaying high levels of societal happiness and countries such as Iraq, Bulgaria, and Moldova displaying low levels of societal happiness. Bivariate correlations showed that income inequality and societal corruption were moderately correlated (.48, $p<.01$) and the level of societal happiness was significantly correlated with the level of corruption (-.43, $p=.00$). However, the level of societal happiness was not significantly correlated with the level of inequality (.10, $p=.41$).

Next we tested the non-recursive model presented in Figure 6.1. In Table 6.1 we present unstandardized coefficients and their associated standard errors while in Figure 6.2 we present the standardized coefficients. We estimated robust and bootstrapped standard errors and we present estimates from both models. We judged the fit of the model using the Comparative Fit Index (CFI), and the Standardized Root Mean Squared Error of Approximation (SRMSEA). CFI takes sample size and model complexity into account but in general the SRMSEA is regarded to be least affected by sample size. The SRMSEA indicates a good fit when it is < .05. An SRMSEA between .05 and .08 indicates an acceptable fit. The CFI is regarded as a good fit when it is > .970, or acceptable between .950 and .970.

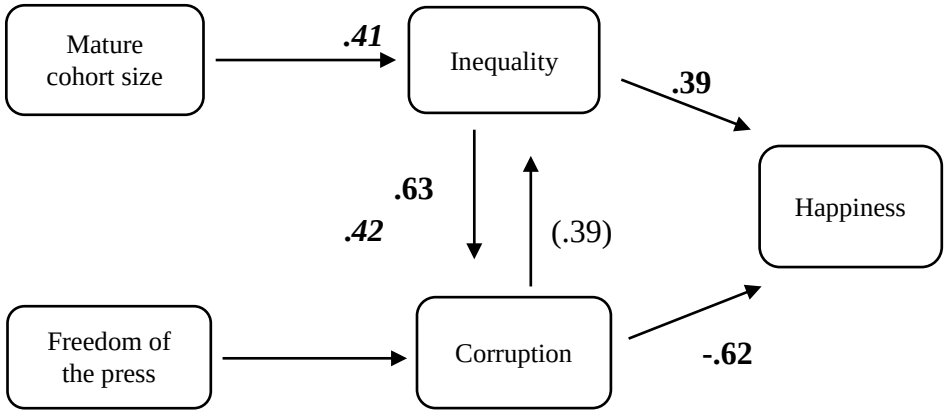
The key finding presented in Table 6.1 is the statistically significant effect of inequality on corruption, with a standardized effect that was considerable, i.e., .63 (shown in Figure 6.2). The effect of corruption on inequality was positive but it was not statistically significant. These findings provide support for hypothesis 1, where we expected that inequality will impact societal corruption. Regarding the effect of corruption on the societal level of happiness we found, as expected, that higher corruption related to lower happiness. This relationship was also very strong, as indicated by the standardized effect of -.62 (Figure 2). Based on this finding we concluded that hypothesis 2 received support from our data.

Table 6.1. Estimates of SEM model testing the relationship between inequality, corruption and happiness (77 countries)

	Model 1	**Model 2**
	ML with robust SE	**ML with bootstrap SE**
	Dependent variable: happiness	
Income Inequality	**.007** (.003)	**.007** (.003)
Corruption	**-.071** (.012)	**-.071** (.011)
	Dependent variable: Income inequality	
Corruption	1.571 (1.039)	1.571 (.890)
Mature cohort size	***-58.587*** (.30.788)	**-58.587** (26.926)
	Dependent variable: Corruption	
Income inequality	**.149** (.069)	**.149** (.064)
Freedom of press	***.044*** (.023)	**.044** (.020)
Covariances		
Income inequality & Corruption	-9.675 (6.249)	-9.675 (5.279)
CFI	.986	.966
SRMSEA	.034	.040

Notes: Unstandardized estimates with standard error in parentheses. Bold estimates are statistically significant for p<.05, two-tailed test. Bold + Italics estimates are statistically significant for p<.10, two-tailed test. The models allowed for the residual variances of inequality and corruption to be correlated.

Figure 6.2. Graphical presentation of the results of the non-recursive model estimated



Notes: Figures present standardized estimates corresponding to the model presented in Table 2, Model 1. Bold estimates are statistically significant for p<.05, two-tailed test. Bold + italics estimates are significant for p<.10, two-tailed test. Estimates in () are statistically not significant

Next, we calculated the indirect and total effects of income inequality and corruption on happiness (effects presented in Table 6.2). Our calculations showed that the indirect unstandardized effect of income inequality on happiness via increasing the level of societal corruption was -.012 and it was statistically significant. Thus, according to our data, an increase of one standard deviation in the Gini Index of income related to a decrease of almost half standard deviation in our measure of societal happiness via the proposed mechanisms. However, the total effect of income inequality on happiness, although negative, was substantially weaker and statistically not significant (-.004, SE: .007).

Table 6.2. Indirect and total effects of income inequality and corruption on happiness

	Estimate	SE	p	Standardized effect
Indirect effect of:				
Income inequality on happiness	-.012	.005	.03	-.419
Corruption on happiness	-.007	.004	.13	-.063
Total effect of:				
Income inequality on happiness	-.004	.007	.55	-.155
Corruption on happiness	-.078	.011	.00	-.723

Regarding the effects of corruption on happiness, we found that corruption did not impact happiness via an effect on inequality (indirect effect -.007, SE: .004) but had a strong and statistically significant total effect (-.078, SE: .011, standardized effect: -.72), mainly driven by its direct effect on our well-being measure.

6.5. Conclusion and discussion

The present study was developed as an effort to advance the understanding of the relationship between inequality and well-being. We argued that the current research on this topic is too much focused on establishing whether inequality has or has not an effect on well-being and too little attention was given to understanding specific mechanisms that would make this effect possible. In addition, we briefly presented research that explored potential mechanisms and that did not provide conclusive evidence so far. Subsequently, our strategy to contribute to the literature and to advance the understanding of the relationship between inequality and well-being was to focus on developing and testing a new mechanism in which the societal corruption is the key factor linking inequality to well-being. We conceptualized well-being via the self-reported happiness of individuals and we took advantage of two large scale surveys that allowed

us to put together a sample of 77 countries. Based on our analyses we derive three main conclusions.

First, our analyses supported the mechanism that we proposed, i.e., we found that inequality had an indirect effect on societal happiness via its aggravating effect on the level of societal corruption. In line with the sociological literature that focused on the relationship between inequality and corruption, our results endorsed the argument that inequality works as a cause of corruption (You & Khagram, 2005). Regarding a potential reciprocal relationship between inequality and corruption, the effect of corruption on inequality was positive, however it was not statistically significant. Turning to the findings regarding the effect of corruption on well-being we observed a strong negative relationship between the level of societal corruption and societal happiness. Furthermore, the indirect effect of inequality on happiness via increasing the level of societal corruption was quite strong: for every standard deviation increase in inequality the societal happiness was almost half standard deviations lower.

All in all, our findings showed that even if at first sight the uncontrolled effect of inequality on societal happiness was statistically not-significant (as shown by the bivariate correlation between the two measures), this does not mean that a causal mechanism is out of the question (Wu & Zumbo, 2008). This observation is especially relevant when dealing with a relationship such as the one between inequality and well-being because of the multitude of causal mechanism that could possibly be at work. Potential mediating paths could neutralize each other or could work only under certain conditions and this could result in a not-significant relationship between the original exogenous and endogenous variables. Our findings provide an additional argument for our reasoning that the way to expand our understanding of the relationship between income inequality and well-being is by focusing more on specifying and testing potential causal mechanisms at work.

Second, we argued that high societal corruption could influence well-being via several pathways, i.e., by acting like a type of societal stressor, by triggering feelings of anger and frustration due to the unfairness of the social system, by increasing mistrust, by decreasing optimism, personal efficacy / locus of control or increasing feelings of powerlessness. Our results suggest that at least some of these mechanisms are at work. However, the dataset that we used does not have the necessary measures that would allow us to test these pathways, thus our arguments remain at this point speculative. In addition, some of the mechanisms, if not all, were also proposed to explain the relationship between income inequality and well-being. For instance, according to the psychosocial mechanism

proposed by Wilkinson and Pickett (Wilkinson & Pickett, 2009a), income inequality acts as a type of contextual stressor. In addition, Ross and Mirowsky (2006b) argued that inequality could negatively impact mental well-being because the unfairness of the unequal distribution of resources within society could elevate feelings of anger and frustration, or because environments with high levels of inequality could amplify mistrust and feelings of powerlessness. We encourage future empirical tests of these mechanisms that could very well be linked to both high levels of inequality and of corruption, as a strategy to better understand how characteristics of the living environment can influence the well-being of individuals.

Third, our results clearly showed that corruption had a stronger total effect on well-being than inequality. In addition, the total effect of inequality on happiness, although being negative, was statistically not significant. If we accept the argument that inequality or corruption act like contextual stressors, we need to keep in mind that the stress process is not a mechanical one, i.e., previous research is in agreement that individuals are not passively reacting to events or situations that were appraised to be stressful, but they try to identify ways to cope (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986). The possibility to find coping strategies that could counter the unpleasant situation of living in an environment with a high level of inequality or of corruption could buffer the stressor effect of the two societal characteristics. It is possible that individuals have more possibilities to cope with the situation of living in an environment characterized by high levels of inequality than with living in an environment with high levels of corruption. For instance, individuals can compare also downwards not only upwards, as the psychosocial mechanism implies (Wilkinson, 1999), or they can engage on trajectories of social mobility and get to a better income position. Downward comparisons have positive outcomes in terms of feelings of pride and accomplishment (Wood, 1989), while social mobility was shown to be positively associated with life satisfaction (Schneider, 2012). However, effectively dealing with the consequences of living in a highly corrupt society is a harder task. Individuals could also try to turn to petty corruption but this would come with a price: individuals could get caught, face the shame of being uncovered, or they could suffer even more severe punishments like facing jail or financial penalties. Furthermore, even the fact that someone would need to lend oneself to such dishonest practices would go against values such as honesty, fairness and respect of the law and in turn, could become a negative influence on well-being. The difference in the possible coping strategies could explain why the total effect of inequality on happiness was weaker than that of corruption.

Our study has a number of limitations. A first limitation is that we could only put together a sample of 77 countries and we defined well-being via the level of happiness reported by individuals. Although our sample is larger than the samples usually utilized in the literature investigating the relationship between inequality and well-being, future research should strive to extend the sample of countries and to utilize also other measures that tap into the emotional dimension of well-being, e.g., depression symptoms or anxiety. Furthermore, our data was cross-sectional and we were limited by the availability of adequate instrumental variables. Future research should focus on utilizing longitudinal data in order to provide additional robustness tests for our findings.

Although a measure of the wealth of the society is routinely used as a control variable in studies investigating the link between inequality and well-being, we were not able to control for the level of wealth of the countries because the measure of GDP per capita that we extracted from the World Development Indicators (WorldBank, 2011) was very strongly correlated with the measure of corruption (-.82, $p<.00$). However, beside this empirical consideration, we note that using a measure of societal wealth as a control variable is not necessarily desirable in the light of the economic literature that convincingly showed that higher inequality relates to higher sociopolitical instability, lower investments in education or lower redistribution and via these mechanisms it retards economic growth (Perotti, 1996; Saint Paul & Verdier, 1996) and subsequently, it negatively impacts the wealth of the population (Kwasi Fosu, 2010). Furthermore, other studies showed that corruption is also detrimental to investment, growth or societal wealth (Lambsdorff, 1999; H. Li, Xu, & Zou, 2000). This said, the wealth of a nation could be mediating the relationships between inequality and corruption with well-being, and thus it would not make sense to add it as a control variable.

As a last remark, our study shows that corruption is a relevant factor that needs to be taken into account when examining the relationship between income inequality and population well-being. We found strong evidence for our arguments that income inequality impacts well-being because it worsens the level of societal corruption. Our study shows that reducing corruption could have a stronger impact on the level of the population well-being than reducing inequality, but the most efficient way would be to address both these societal characteristics simultaneously.

CHAPTER 7.

CONCLUSIONS AND DISCUSSION

7.1. Introduction

In this chapter I will evaluate to what extent the empirical studies conducted were successful in answering the main research questions that constitute the basis of this dissertation, i.e:

(1) *what is the empirical relationship between inequality and different dimensions of well-being?*
(2) *what is the empirical relationship between inequality and well-being across countries with various levels of economic development*
(3) *how can the relationship between inequality and well-being be explained*?
(4) *is the relationship between inequality and well-being the same for individuals with different characteristics, e.g., different income or coping resources?*

I will reflect on the results and the conclusions derived from the four empirical studies, I will discuss some limitations and I will sketch directions for future research. But before that, I will briefly look back and summarize the structure of this dissertation and pinpoint the place and role of each of the empirical studies conducted.

The focus of all four empirical studies was the relationship between income (or wealth) inequality and well-being. Well-being was defined mostly by the health status of individuals or of societies. The two parts of this dissertation place their emphasis on two dimensions of well-being: physical health in Part 1 and mental health and well-being in Part 2. The first study of Part 1 looked at the relationship between income inequality and life expectancy, while the second study of Part 1 evaluated the relationship between wealth inequality and the anemia status of women and their children and the women' experience with child mortality. The first study in Part 2 investigated the relationship between income inequality and symptoms of depression while the second study in Part 2 focused on the relationship between income inequality and happiness.

Another characteristic of the empirical studies in this dissertation is the focus on countries with different level of economic development. In this respect I distance myself from authors such as Wilkinson and Pickett (2009b) who argued that income inequality is relevant to health among high-income countries where economic growth has ceased to add substantially to the societal well-being. Against this assumption, I presented theoretical and policy relevant reasons explaining why it makes sense to examine the "income inequality thesis" in global samples of countries. For

instance in Chapter 3 we elaborated on the reasons why the relationship between inequality and life expectancy should be found among all countries, regardless of their level of economic development, but we also argued that this relationship would have different strength in low- to middle- and high-income countries. In Chapter 4 we discussed the interest generated by the "income inequality thesis" among prominent international organisations who elaborate strategies to improve the health and health equity in LMICs but make reference to evidence found in samples of HICs. Our argument was that, in the light of the profound cultural, economic and institutional differences between HICs and LMICs, it is questionable whether such findings can be transferred to fundament policies targeted at improving population health in the LMICs.

The empirical studies in this dissertation not only aimed to answer the question whether inequality relates to well-being, but also to shed light on the mechanisms behind this relationship. Regarding the "statistical artefact" criticism, i.e., the idea that the relationship between inequality and health is due to the unequal distribution of material resources in the population, three of the empirical studies were able to account for or explicitly estimate the genuine contextual effect of inequality on health and well-being measures net of compositional effects. In chapter 4, 5 and 6 we used nested data, where information was collected from individuals living in various countries. This specific type of data allowed us to employ multi-level modelling techniques and thus, it was possible to disentangle the contextual from the compositional effects.

Beside the above mentioned pathway, we also tested several other mechanisms. In Chapter 4 we tested whether the effect of inequality on health was mediated by the level and quality of health services available for the population. In Chapter 5 we tested two mechanisms: the idea that inequality relates to health via increasing the involvement in social comparisons and / or by decreasing the level of non-material coping resources. In Chapter 6 we developed and tested a new mechanisms that was not yet proposed in the literature, i.e., we argued that income inequality could be detrimental to well-being via its aggravating effect on the level of societal corruption.

In addition to the above, we also evaluated whether the effect of inequality was identical for different social groups. In Chapter 5 we looked at the effect of inequality for different income groups and for individuals with different levels of non-material coping resources. In Chapter 4 we evaluated the effect of wealth inequality for the physical health of women and children with different levels of household wealth.

I will now proceed to elaborate on the implications of the empirical findings for the "income inequality thesis" and I will structure my discussion following the research questions that were at the basis of this dissertation. Next, I will discuss the policy implications and the limitations of the empirical work in this dissertation and I will derive some brief recommendations and suggestions for future research.

7.2. Implications

7.2.1. What is the empirical relationship between inequality and different dimensions of well-being?

The majority of the literature that examined the relationship between inequality and well-being did not pay a lot of attention to the potential different effects of inequality on different types of well-being measures. Even the literature that looked more specifically at health as a dimension of well-being lacks a detailed evaluation of the relevance of specific pathways for the relationship between inequality and physical or mental health. I maintain that this distinction should be made because a closer look at some mechanisms suggests a differential strength of the relationship between inequality with mental and physical well-being and because some mechanisms could be more relevant for the relationship between inequality and one or the other dimension of well-being.

As arguments for the above, I first refer to the psychosocial pathway as advocated by Wilkinson and Pickett (2009b) and maintain that, following the logic behind it, one should expect inequality to have a stronger relationship to mental well-being than to physical well-being. According to this mechanism, income inequality would act as a type of contextual stressor who ultimately would trigger the stress response of the body. In addition, as individuals do not have the ability to turn off their exposure to inequality, they will experience this stressor effect for a long period of time and this would result in a generalised physiological deregulation that is known in the medical literature under the name of "allostatic load" (B. McEwen, 1998).

"Allostatic load" was described as a process that works in several steps that correspond to the physiological responses under chronic stress conditions (Sapolsky, 2004) and it was already found to relate to the worsening and the onset of various illnesses (Juster, McEwen, & Lupien, 2010; Stewart, 2006). Several bodily systems are most affected by the chronic stress exposure, e.g., the metabolic system, the cardiovascular and respiratory systems or the immune system. There is already a good deal of

research that linked the social-economic status of individuals and of the neighbourhoods to measures of "allostatic load"(e.g.,Gustafsson, Janlert, Theorell, Westerlund, & Hammarström, 2011). By the time when this section was written I am not aware of any studies linking the level of income inequality to this measure of chronic stress. In this respect it is unknown if the idea of inequality as a chronic stressor is actually backed up by empirical evidence.

However, even if we miss solid empirical evidence for a relationship between income inequality and the "allostatic load" measure, it is reasonable to assume that the stressor effect of inequality does not have the same magnitude as the stressor effect of negative life events such as unemployment, death of a relative, etc. The reason for a weak stressor effect of inequality lays in the coping mechanisms available for individuals. Inequality is argued to work as an insidious force subjecting individuals to threats to their social image and their self-worth by increasing the visibility of social status differences and amplifying the tendency to engage in upward comparisons. However, individuals can also compare downwards and the positive outcomes of these comparisons, e.g., feelings of pride and accomplishment, could compensate the negative outcomes of upward comparisons. Then, not all the outcomes of upward social comparisons are negative but also positive, e.g., motivation or inspiration to achieve something. In addition, individuals that experience negative outcomes due to unflattering social comparisons with the better off can attempt to engage in upward social mobility (Alesina et al., 2004). Especially in the HICs, where in principle everyone has the possibility to pursue a higher education that would result in a better position on the labor market and thus higher prestige and income, this coping strategy seems to be pertinent. In addition, previous research has shown that even the perception of a higher possibility to go ahead in life was beneficial for well-being (Schneider, 2012). This finding is especially relevant for societies like the US where individuals largely share the "American dream" ideal.

If the above arguments hold, it is unlikely that living in an environment with high level of inequality will result in a very strong stress reaction of the body and most likely will not aggravate physical health significantly. However, living in societies with high income inequalities could intensify status anxiety (Layte & Whelan, 2014), anger and frustration (Wilkinson, 1999; Wilkinson & Pickett, 2009b), decrease locus of control, increase powerlessness and elevate symptoms of depression (Ross & Mirowsky, 2006b). Thus, it is more likely that inequality would have a stronger relationship with mental well-being measures than with physical well-being measures.

The empirical studies that examined the relationship between inequality and the physical and mental health of individuals were supportive for this view. In Chapter 4 the genuine effect of inequality on physical health measures was very weak and for one sample it was statistically not significant. In Chapter 5, the effect of inequality on the depressive symptoms of the population owed very little to compositional effects, thus the differences between societies in the average depressive symptoms of the individuals owed more to differences in inequality.

The second reason why I maintain that the distinction between mental and physical health is relevant is that some mechanisms could be more or less pertinent when explaining the relationship between inequality with the two dimensions of well-being. For instance, referring to the institutional mechanism, it is reasonable to assume that the level and quality of the health services and infrastructure are most important for physical well-being than for mental well-being. The presence of hospitals, of medicines or vaccination programs have had a strong impact on improving physical health of the population. If high levels of inequality translate in lower levels of investments in public goods such as the health services and infrastructure, the most visible effects should be seen in the physical health indicators, as people will miss medicine and adequate access to medical treatment.

However, mental health problems are still surrounded by stigma in many countries, including HICs, and it is very likely that individuals will be hesitant to access medical treatment at the first signs of distress. In addition, even if inequality aggravates mental well-being but, as I argued before, its stressor effect is not strong enough to lead to a depression episode, it is very unlikely that individuals will search specialised treatment. Afterwards, everyone has a bad day from time to time but feeling unhappy and blue does not immediately leads to a visit to a mental health practitioner. However, symptoms of cardiovascular diseases or a broken leg are almost always followed by a visit to a doctor. Subsequently, the quality or the accessibility of services and infrastructure could have a weaker relationship with the mental well-being of the population than with the physical well-being. Thus, if we follow the argument that inequality relates to health via its effect on the level and quality of the health services and infrastructure it results that this mechanism should be much more relevant in relation to physical health than mental health.

Our empirical analyses and results from previous research provide support for this argument. In a previous study that explored the role of the health services and infrastructure for the relationship between inequality and mental well-being, the author found no evidence for a mediating path

(Layte, 2012), while in our analyses presented in Chapter 4 we found evidence for the role of the health services and infrastructure for the relationship between inequality and physical health measures.

7.2.2. What is the empirical relationship between inequality and well-being across countries with various levels of economic development

Previous research has made the point that the detrimental effect of inequality on health should be stronger in those countries where the limits of economic growth are reached (Wilkinson & Pickett, 2009b). In other words, researchers have argued that the effects of inequality on health should be most visible in HICs, and a large part of the literature has followed this lead and tested the "income inequality thesis" in samples made of wealthy countries. Against this idea, in Chapter 3 we argued that the mechanisms that were advanced in the literature to explain why higher inequality should relate to worse health and well-being are formulated in general terms and could very well apply everywhere in the world. Furthermore, some of them could even be more relevant for the LMICs.

For instance, the material pathway could be most relevant for the LMICs, as a large part of the population in these countries is living in poverty and poverty means bad health. The larger the share of the population who is poor, the higher the level of inequality and the lower the aggregated population health will be. In the HICs, the poor people benefit from social security coverage and in addition, the absolute income of the poorest persons is far from being comparable with the income / wealth of the poor in the LMICs. Therefore, being poor in a rich country should not translate into the same level of material deprivation and subsequently, into the same level of bad health. Our arguments were supported by the results of our empirical studies. In the LMICs, and especially in the poorest countries that are located in Africa, the distribution of wealth in the population explained most of the observed relationship between inequality and health measures (see Chapter 4). Contrary to these findings, in the HICs that were the focus of our analyses in Chapter 5, we found that the distribution of material resources in the population explained only to a small degree the observed relationship between inequality and the health measure.

It is important to keep in mind that the measures of health that we employed in Chapter 4 and Chapter 5 are different, and material circumstances could also be more relevant for some health measures than others. However, the pattern that is suggested by our analyses – that an observed effect of inequality on health is most likely due to the distribution of material circumstances of the population in the LMICs and less in the

HICs, has important policy implications. Our analyses show that, in general, an effective approach to improve population health in the LMICs is to improve the wealth *among the poor households*, which will result in better living conditions, better nutrition and more resources for accessing medical services and as result, overall better health. Of course, reducing poverty among the poor households would also result in a decrease in inequality, but this does not mean that the decrease in inequality would be a genuine cause of the improved population health.

The institutional mechanism could also be most relevant for the LMICs. The health of the population is strongly related to the access, availability and development of health services and infrastructure. In the HICs the health services and infrastructure have a good coverage, almost everywhere the governments ensure that the population benefits from basic health provision and there are specific measures in place to protect people with less material possibilities in case of illness. These institutional arrangements are functioning for a long time and the population health is already at high levels, thus, it is fair to argue that further improvements of the health infrastructure and services will have diminished returns in terms of further health returns. In the LMICs, the situation is far from the situation in the HICs. Most of the hospitals are concentrated in the urban areas, leaving the rural areas without access to good medical facilities, the population is generally not covered by a universal basic health provision plan, the level of out-of-pocket payments is high and there are no universal social protection programs for the poor. It is thus reasonable to conclude that any developments in the level, coverage and quality of the health services and infrastructure will strongly impact the health of the population in the LMICs. Subsequently, if inequality is detrimental for the development of public goods such as the health services, then this mechanisms would be stronger in the LMICs than in the HICs.

All in all, the above arguments point toward a stronger empirical relationship between inequality and health in the LMICs than in the HICs. In Chapter 3 we tested whether the relationship between inequality and the same measure of well-being, i.e., life expectancy, is weaker in the HICs than in the LMICs. As a result of our analyses, both cross-sectional and longitudinal, we concluded that indeed, the relationship between inequality and life expectancy was stronger in countries with lower level of economic development, and as the level of wealth increased, this relationship was weaker to the point of becoming statistically not significant in the HICs.

Although in our analyses from Chapter 3 we were able to control for the unmeasured non-varying characteristics of the countries, there is always the possibility that we missed out important time varying characteristics.

Inequality is strongly intertwined with other societal characteristics some of whom are influenced by the developments in the level of inequality and some of whom are developing in parallel. An example of such societal characteristic is corruption, as we discussed in Chapter 6. Some of these related societal characteristics can have their own independent effects on health. Consequently, the fact that the observed relationship between inequality and well-being was found to be statistically not-significant in some sample of countries or periods does not automatically imply that there are no causal mechanisms at work. It does, however, signals toward the need to give more attention to the interplay between societal characteristics and how they can impact the well-being of the population.

7.2.3. How can the relationship between inequality and well-being be explained?

One of the general aims of this dissertation was to explore and test (some of) the mechanisms behind the empirical observation that in some samples and periods higher inequality was found to relate to worse well-being. Three of the empirical studies explicitly tested some potential mechanisms, i.e., the "statistical artefact" criticism, the institutional pathway, the psychosocial pathway, the potential detrimental effect on the population's levels of social support and psychological coping resources and the aggravating effect on the level of societal corruption.

Regarding the "statistical artefact" criticism we found that the composition of the countries' samples and especially the distribution of the material resources of the population (e.g., income, wealth) did not fully explain why in some cases higher inequality related to worse well-being. However, our analyses suggested that the distribution of the material circumstances in the population was more important for explaining the observed relationship between inequality and well-being among poor countries. The reason for this findings could be the stronger impact that the material circumstances have on well-being when the absolute wealth is low. When the absolute poverty is high, any addition in material resources strongly counts toward better shelter, nutrition or medicines. However, being poor in a poor country and being poor in a wealthy country implies a completely different level of material wealth. Thus, an increase in material resources will impact to a lesser degree the well-being of the poor in a wealthy country than the well-being of the poor in a poor country. In other words, the non-linear relationship between the income (wealth) and well-being at individual level is weaker in HICs than in LMICs and most likely this is the reason why the effect of inequality on well-being was found to be

less a “statistical artefact” in the former than in the latter category of countries.

Regarding the mediation via the institutional pathway our analyses provided some support for this mechanism. We note that the mediation was found to be stronger for those countries that were mostly in the category of middle income countries, while for the mostly low income countries the material wealth of the individuals was the driver behind the observed relationship between inequality and physical health. Furthermore, previous research has showed that the level and development of the health services and infrastructure did not mediate the relationship between inequality and health measures in the HICs (Layte, 2012). These pieces of evidence together with the conclusions regarding the “statistical artefact” criticism suggest the following picture: for the countries with the lowest average wealth, the distribution of the material circumstances in the population weighs heavily for explaining the relationship between inequality and well-being. As the average wealth of the population increases the role of the institutional factors becomes more important and inequality could genuinely impact well-being via its corrosive effects on the development and quality of the health services and infrastructure. However, for wealthy countries this mechanism loses strength for reasons I have already discussed in section 7.2.2.

Regarding the psychosocial pathway, our analyses presented in Chapter 5 did not support the argument that in countries with higher inequality individuals get more involved in social comparisons. In addition to these findings, a recent study showed that social comparison tendencies also did not moderate the relationship between inequality and well-being (Prag et al., 2014). In conclusion, the empirical evidence points out that, at least in Europe, the tendency to engage in social comparisons of income was not elevated when inequality was higher and the individuals who had a higher tendency to engage in comparisons of their income were not affected more by inequality than the individuals who engaged less in comparisons.

The measure of social comparisons used in Chapter 5 to test the psychosocial mechanism was quite crude and only referred to income comparisons. However, income is only one aspect of the social status. Following Weber (1991), a more general approach to social status would have to pay attention to the difference between material and symbolic aspects. The material aspects of social status reflect differences in the available income for consumption, a measure of the capacity to purchase goods. However, currently the type of goods that one purchases is also important because they are a reflection of the life-style and of the values of a person (Bourdieu, 1984). Thus, the capacity to purchase goods and the types

of goods that one selects are both fundamental aspects of individuals' social identity. On this basis, I argue that social comparisons may regard not only differences in income but also the symbolic aspects related to the type of cultural goods and practices one prefers. It is very possible that the invidious comparisons that Wilkinson and Pickett (2009b) posit as central elements of the psychosocial mechanisms linking inequality to well-being could, in fact, be triggered by the symbolic aspects of the social status and not so much by the material aspects.

Regarding the potential detrimental effect of inequality to the population's levels of social support and psychological coping resources, we were not able to find supportive evidence for this mechanism. Neither the level of social support nor of psychological coping resources were lower in those European countries that had higher levels of income inequality. Our conclusions are to some extent in disagreement with other recent studies, e.g., Ellwardt et al. (2014), who found that older Europeans report to have less close relationships in those countries with higher income inequality. It is thus possible that the detrimental effect of inequality on social support to be specific to some categories of people and not to the general population. The same observation could be valid for the potential effect of inequality on well-being via decreasing the level of self-esteem. If in environments with higher inequality individuals tend to compare more and the negative outcomes of these comparisons are detrimental for their self-esteem, this could be most relevant for vulnerable and disadvantaged social groups. The individuals that have a privileged social position are more likely to experience positive outcomes of their social comparisons, and this would boost their self-esteem.

Last but not least, we proposed and tested a new alternative mechanism that linked inequality to well-being via its aggravating effect on the level of societal corruption. In line with the sociological literature that argued for inequality as a potential aggravating factor for corruption (You & Khagram, 2005), we maintained that inequality could shape the structure of opportunities and motivations of the population, which ultimately could facilitate higher involvement in corrupt acts. Our analyses presented in Chapter 6 provided empirical evidence for the proposed mechanism, i.e., we found that inequality had a strong indirect effect on societal happiness via increasing the level of societal corruption.

7.2.4. Is the relationship between inequality and well-being the same for individuals with different income or coping resources?

Another aim of this dissertation was to shed more light on the issue of the differential effects of inequality for different groups of individuals. In Chapter 4 and 5 we tested whether inequality had the same effect on well-being for groups with various levels of income or wealth. We derived theoretical expectations regarding potential differential effects from both the psychosocial and the institutional mechanism.

Starting from the psychosocial mechanism we argued that the social group that is most likely to suffer from a detrimental effect of inequality on well-being are the individuals in the middle of the income hierarchy. These individuals could be the ones that try to "keep up with the Joneses" and more likely would engage in social comparisons of social status attributes, especially if they recognize and internalize such a model of success that place more value on characteristics of the high socio-economic group (Demo & Savin-Williams, 1983). An argument supporting this idea comes from the literature on "new consumerism", e.g., Schor (2000) who argues that our present lifestyle aspirations are driven by the media and particularly by advertising which has an important role in stretching our reference groups for comparisons upward, and thus our satisfaction as consumers would depend less on our objective material conditions and more on socially formed expectations on what one needs to have.

Next, we argued that the individuals on top of the income hierarchy can easily compare downwards and experience more positive outcomes as a result of the comparisons, e.g., feelings of pride and accomplishments. Regarding the individuals on the bottom of the income hierarchy, we argued that they might be less prone to engage in social comparisons, because they have other priorities, i.e., dealing with the chronic economic strain of their day to day live (Pearlin, 1989). Furthermore, ethnographic literature suggested that working class individuals tend to adopt protective strategies for their self-image by avoiding upward comparisons, rejecting the consumerist life-style of the middle and upper classes or by embracing values such as a strong work-ethos (Yodanis, 2006).

Expectations regarding a differential effect of inequality on the well-being of individuals with different material standing could also be derived from the institutional mechanism. In countries where the quality and the level of the health services and infrastructure are less developed the wealthy can still benefit from good health care because they can buy only the best treatments available or they can search for better health care outside the country. The poor, due to their low level of material resources, have to settle

with the treatment and infrastructure available. If inequality impacts well-being via negatively affecting the level and quality of the health infrastructure and services, it follows that its effect would be stronger for the poor than for the rich.

In general our analyses presented in Chapter 5 provided support for a differential effect of inequality for individuals with different relative income position. Most clearly we found that high income groups have more self-esteem and optimism and this is most likely the reason why they were less affected by living in countries with high levels of inequality. However, the results were less clear when we examined the effect of inequality on well-being for the individuals in the middle and bottom of the income hierarchy of a country. The most important obstacle was the conceptualization and the measurement of what is the middle position and the bottom position. By approaching this problem empirically and testing different cut-points we found a pattern that tentatively provided support for the idea that inequality could be more detrimental for the mental well-being of those individuals situated in the middle of the country's income hierarchy. However, the results from Chapter 4 showed that the well-being gap between the rich and the poor was not wider under conditions of higher wealth-inequality. Theoretically this is a puzzle that still needs to solved, but practically this is certainly good news.

From the same conceptualization of inequality as a type of contextual stressor we also argued that individuals with more non-material coping resources would deal better with living in environments with high income disparities. Supportive social contacts and an optimistic personality are among the non-material coping resources that were shown to mitigate the stress reaction when confronted with negative life events. It was only logical to extend this buffering effect to the potential stressor effect of inequality. Based on our results from Chapter 5 we concluded that especially those individuals with close supportive relations and those who are optimist and have more self-esteem suffer less from living in countries with high levels of inequality.

All in all, these conclusions point out toward the need to a more careful consideration of the conditions that moderate the effect of inequality on well-being. In particular, our analyses raise doubts on arguments such those advanced by Wilkinson and Pickett (2009b), authors who maintained that inequality is bad for everyone.

7.2.5. Policy implications

During the last years, the "income inequality" thesis has received lot of attention from the policy makers and politicians. For instance, organizations such as United Nations (UN), Save the Children and the World Health Organization (WHO) emphasize that tackling inequalities, income inequality included, is a priority that needs to accompany the efforts to alleviate absolute poverty in the LMICs in order to improve population health (Save The Children, 2012; UN, 2012; WHO, 2008). Furthermore, lobby organizations such as The Equality Trust estimated that reducing inequality in Britain at the level of the average inequality in the OECD countries would reduce costs associated with mental and physical health, imprisonments and violence amounting to 39 billion pounds per year (The Equality Trust, 2014). That is, if the relationship between inequality and well-being is indeed causal in nature.

It is thus clear that the "income inequality thesis" has important policy implications. If the relationship between inequality and well-being is causal in nature, addressing the level of income disparities in the society could very well be the key to creating better and healthier societies. In light of the above I discuss below three policy relevant conclusions that are derived from our empirical analyses.

The first policy relevant conclusion regards the idea that reducing inequality would benefit the health and the gap in health between the rich and the poor in the LMICs. In this respect we were not able to find support for this idea that was present in several recent policy documents (WHO, 2008, p. 120). Instead, a more effective approach that was suggested by our empirical work would be to improve the wealth *among the poor households*, which would result in better living conditions, better nutrition and more resources for accessing medical services and as result, overall better health. Targeted policies aimed at improving literacy, developing community infrastructure and increasing the connections between rural and urban areas have the long term potential of sustainable improvement of the wealth of the poor in the LMICs. Of course, alleviating poverty among the poor will also lead to the reduction of overall inequality with potential spill over effects on economic growth and investments in public health infrastructure and services, which in turn could have a positive impact on health.

The second policy relevant conclusion regards our findings presented in Chapter 6, i.e., 1) inequality had a weaker total effect on well-being than corruption and 2) inequality was related to well-being via aggravating effect on the level of societal corruption. Our findings suggest that addressing corruption could be more beneficial to the well-being of

population than addressing inequality, however the best manner would be to address both these societal characteristics simultaneously.

The third policy relevant conclusion regards the need to explicitly take into consideration the type of well-being dimension and the geographical region. Both results from previous literature and our own findings suggest that inequality could be most detrimental for mental well-being than for physical well-being and in addition, it could have a stronger detrimental effect in Europe than elsewhere.

In support for this claim that inequality could damage more the well-being of Europeans than of individuals living in other parts if the world, I make first reference to results of previous research. For instance, Layte (2012) and Prag et al. (2014) both found a statistically significant relationship between inequality and different measures of mental well-being in different samples of European countries, while the relationship between income inequality of the US states and mental well-being was found to be not significant (Henderson, Liu, Diez Roux, Link, & Hasin, 2004), or this this relationship was statistically significant but only for women (Kawachi & Gilman, 2014). Second, recent research showed that attitudes toward fair inequality are different between different societies. For instance, Osberg and Smeeding (2006) found that majority of Europeans are adepts of egalitarianism while in the US a large masa accepts the status quo, i.e., the high level of income inequality, and believe it is fair. I argue that inequality is not likely to negatively influence the well-being of individuals if they consider it fair and just. All in all, there are more reasons and evidence for a stronger effect of inequality on well-being in Europe than elsewhere.

Another point that policy makers should keep in mind is that not everywhere citizens support the involvement of the state in equalizing incomes. Recent data (ISSP, 2009) shows that there is a strong variation in the opinions of people regarding the role of government to reduce income disparities, ranging from only 32,6% of respondents in the US, 42.4% in New Zealand or 51.3% in Australia that agree and strongly agree with this statement to 92% in Portugal, 88.6% in Russia or 88% in Croatia (own calculations). In conclusion, policy makers interested in the effects of inequality on well-being could be more successful in developing efficient public policies if they would take into account how the specific institutional and cultural context shapes the potential detrimental effect of inequality on well-being.

7.3. Limitations and suggestions for future research

In this section I will comment on some limitations of the empirical studies that are part of this dissertation and I will make some suggestions for future research that has the potential to extend the knowledge on the relationship between inequality and well-being.

The main limitation that affects the results of our empirical work is the fact that we cannot derive strong causal claims. We were able to incorporate some elements that strengthened the validity of our conclusions, e.g., measures of well-being with high equivalence and comparability between societies or controls for the composition of the population, however, the data that we used in 3 of the 4 studies was cross-sectional in nature. Even though we allowed time lags between the moment when inequality and well-being were measured, the observed relationship between the two could still be due to some unmeasured contextual characteristics. In the analyses presented in Chapter 3 we used longitudinal data, we employed fixed effects models and we could control for unobserved time non-varying characteristics. Therefore, our results regarding the relationship between changes in income inequality and changes in life expectancy are less affected by this problem. However, it is important to keep in mind that the fixed effects model does not eliminate the problem of unmeasured time-varying characteristics that could still confound the relationship between inequality and well-being.

A possibility to come closer to establishing a causal relationship between inequality and well-being could be to follow immigrants moving to different host countries and measuring their well-being before and after moving. This information could be afterwards coupled to data regarding the societal inequality of the host and origin countries. Subsequently, researchers could evaluate whether moving between contexts with different levels of inequality relates to changes in well-being. A stronger design would randomize the chance to win a visa to a specific country. An example of such already existing immigration scheme is the Visa lottery organized by the USA. Of course, one could argue that the individuals who migrate are systematically different than the individuals that do not migrate. Also, the practical issues implied by collecting before and after data would require much more resources and logistics than the ones available to one isolated researcher. However, even with these additional problems, such design that takes advantage of an already occurring event would be non-intrusive and presumably the closest to an experimental design that could assess the causal effect of changes in societal inequality on well-being.

While the above research design would be valuable for obtaining a clearer answer to the question "is inequality causally related to well-being?", it is also very difficult to be implemented. Alternatively, another method that could provide more insight in the nature of the relationship between inequality and well-being would be to focus on the potential underlying mechanisms. For instance, the psychosocial mechanism that advocates that inequality acts like a contextual stressor (Wilkinson & Pickett, 2009b), triggers the stress reaction of the body and via prolonged exposure (but how long?) leads to the wear and tear of the body, i.e., high levels of "allostatic load" (B. McEwen, 1998), was not yet empirically tested. Future research could search evidence for this mechanism by taking advantage of the several cohort and longitudinal datasets available during recent years that also collected relevant biomarker data for measuring "allostatic load". Among these datasets we mention The AdHealth Study in the US (Mullan Harris, 2013), the English Longitudinal Study of Ageing in the UK (Scholes, Taylor, Cheshire, Cox, & Lessof, 2008) or the Copenhagen Aging and Midlife Biobank in Denmark (Avlund et al., 2014).

Other mechanisms that were not discussed or tested within the space of this dissertation argue that inequality could be related to heath through damaging effects on social trust, cohesion and solidarity (Kawachi & Kennedy, 1997a; Paskov & Dewilde, 2012) or through increasing the level of interpersonal aggression (Wilkinson & Pickett, 2009b) and ultimately crime (Fajnzylber, Lederman, & N., 2002; Morgan, 2000). Future research exploring these mechanisms can make a valuable contribution to the theoretical and conceptual development of the "income inequality thesis" for instance by providing clearer definitions as well as coherent measurements for the concepts of social capital, social cohesion, trust or solidarity. In addition, the level where these concepts should be measured, i.e., country level or small community level is an aspect that would benefit from more theoretical reasoning. Future explorations can also contribute to the research that explored the links between social capital and violence in small communities such as neighbourhoods (Morenoff, Sampson, & Raudenbush, 2001) through an integrative approach that would simultaneously take into account both dimensions and would seek to explore their role in explaining the empirical relationship between income inequality and the health status of individuals.

Another possibility to advance the "income inequality thesis" would be to focus more on the differential effect of inequality for different social groups. We already explored this possibility in relation to groups defined by income or wealth. However, gender could be another relevant characteristic, especially if researchers would examine more thoroughly the mechanisms

linking inequality to well-being proposed by Ross and Mirowsky (2002). The two authors proposed that environments with high levels of inequality would be detrimental for the level of personal control of individuals, and especially women would be affected by this mechanism. Furthermore, personal control was found to be linked to the level of depressive symptoms. If the above hold, it implies that via this mechanism inequality would be most detrimental for the mental well-being of women. In addition, Ross and Mirowsky (2006b) argued that not only the personal control of women could be stronger affected by inequality, but this mechanism could be especially relevant for vulnerable groups in society. Future research is thus warranted in order to better understand under what conditions and for whom inequality is most detrimental.

Another direction that could prove fruitful in better understanding the relationship between inequality and well-being is to carefully articulate the mechanisms linking this societal characteristic to different types of health measures and in different geographical areas. I argued that some mechanisms could be more relevant in explaining the relationship between inequality and physical or mental well-being, and we tested these relationships in different samples because we missed similar health measurements collected both in LMICs and HICs. If such data would become available, a more thorough test of this hypothesis could be performed. In addition, inequality could have a differential effect on different types of illness. For instance, following the argument that inequality could work as a type of chronic stressor, then the most likely influence could be felt on cardiovascular disease (Logan & Barksdale, 2008), mood disorders (B. S. McEwen, 2003) or cognitive performance (Juster et al., 2010). Specifying and testing the pathways linking inequality to physical and mental well-being via aggravating the “allostatic load” would require an interdisciplinary approach with a close collaboration between medical practitioners and sociologists.

Future research could also explore more in detail the cultural differences that inhibit or aggravate a potential detrimental effect of inequality on well-being. For instance, the attitudes about fair inequality are very different between countries (Osberg & Smeeding, 2006) – while in some countries the majority of the population is in agreement that high levels of inequality are unwanted, in other contexts the opinions on the matter are strongly polarised. In addition, perceptions of social mobility or real social mobility patterns were also proposed as moderating factors of the effect of inequality on well-being (Alesina et al., 2004). Future research is necessary following these directions.

To sum up, this dissertation provided some valuable insights that point toward the need for a more nuanced framing of the relationship between inequality and well-being. Future research is needed in order to better understand how inequality could “get under the skin” and make people sick, with greater emphasis on elaborating and testing the mechanisms that could be at work. In addition, more work is needed in order to clarify the complex relationship between inequality and other societal characteristics and their effects on well-being.

SUMMARY IN ENGLISH

Background and research questions

The topic of the present dissertation is the relationship between income inequality and well-being and has as starting point the so called "income inequality thesis". Briefly, the "income inequality thesis" argues that there is a "threshold of material living standards after which the benefits of further economic growth are less substantial" (Wilkinson & Pickett, 2009b, p. 10). Instead, it is the level of income inequality that makes a difference in the well-being of the population, with more equal societies having better "performance" on a wide range of social problems such as physical and mental health, educational performance, violence, imprisonment or social mobility (Wilkinson, 2006; Wilkinson & Pickett, 2009b).

Despite a rich body of research on the topic, a closer look at the studies published over the last 30 years shows that the evidence is far from being definitive, i.e., results have been contradictory and inconsistent. In addition, the research testing the "income inequality thesis" varies greatly in terms of the country selection, choice of well-being measures, choice of explanatory variables, years when data were collected and operationalization of the theoretical concepts.

The contribution of this dissertation toward advancing the "income inequality thesis" is fourth-fold. First, I will evaluate and test some of the mechanisms that were proposed in the literature to explain the empirical relationship between higher inequality and worse well-being, i.e., the material pathway, the psychosocial pathway and the institutional pathway. In addition, I will also develop and test an additional mechanism not previously presented in the literature, i.e., a path through the level of societal corruption.

Second, I make the observation that the majority of the previous literature did not pay attention to the potentially different effects of inequality on various types of well-being measures. In the present dissertation I maintain that this distinction should be made and I choose the well-being measures in such a way to allow an evaluation of the differential effects of inequality on two dimensions of well-being, i.e., 1) physical health and 2) mental health and well-being.

Third, I note the point made by previous research that the detrimental effect of inequality on health should be stronger in those countries where the limits of economic growth are reached (Wilkinson & Pickett, 2009b). Against this idea I maintain that the mechanisms that were advanced in the literature to explain why higher inequality should relate to worse health and well-being are formulated in general terms and could very well apply everywhere in the world. Furthermore, some of them should even

be more relevant for the low and middle income countries (LMICs). Therefore, I purposively choose samples of countries with different levels of economic development in order to be able to derive conclusions on the role of the sample composition for the relationship between inequality and well-being.

Fourth, the majority of previous research has paid little attention to the potential differential effect of inequality for individuals with different characteristics. I will argue that some mechanisms could work differently for individuals with different socio-economic characteristics and in addition, some individual characteristics could act as protective factors against the potential detrimental effect of inequality on well-being. Subsequently, when the design of the studies allows it, I evaluate both theoretically and empirically the differential effect of inequality on well-being for different social categories.

To sum up the above, in this dissertation I focus on the relationship between inequality and well-being. The general research questions that are at the basis of the dissertation are the following:

(5) what is the empirical relationship between inequality and different dimensions of well-being?

(6) what is the empirical relationship between inequality and well-being across countries with various levels of economic development?

(7) how can the relationship between inequality and well-being be explained?

(8) is the relationship between inequality and well-being the same for individuals with different characteristics, e.g., different income or coping resources?

Throughout this dissertation well-being will be measured mostly via some kind of health measure.

Four empirical chapters

Chapter 3. Income inequality, wealth and life expectancy

The research questions addressed in this chapter were: 1) *to what extent the levels of and the changes in income inequality and wealth relate to population health?* and 2) *whether the strength of these relationships are different for countries with various levels of economic development?*. Furthermore, from a methodological point of view we inquired 3) *whether the use of dynamic or static models testing the relationship between income inequality, wealth and population health leads to divergent conclusions?*.

We derived the following scenario from the literature. On the one hand, levels and changes in wealth should be positively related to life

expectancy, but the strength of the relationship should be weak or non-existent among high-income countries. On the other hand, levels and changes in income inequality would be negatively related to life expectancy, the relationship would be weaker with higher levels of economic development but it would remain significant in the group of high-income countries. Subsequently, this scenario accommodates the claim that in the high-income countries further economic development does not significantly add to the health of the population, but the key to further improve the health of these societies is to diminish the inequality in income (Wilkinson & Pickett, 2009b).

Based on the results of our cross-sectional and longitudinal estimations, we concluded that this scenario generally does not hold. The most striking finding was that income inequality was not found to be related to life expectancy among the high-income countries. Furthermore, the finding that inequality was not related to life expectancy among high-income countries resulted both from cross-sectional analyses and from the longitudinal models. In addition, the relationship under scrutiny proved to be driven by the composition of the samples of countries.

Another finding regards the differences in the effect of inequality on life expectancy between countries with different level of economic development. The effect of the average income inequality on life expectancy was negative and stronger in the low income countries than in the middle income countries or the high income countries. The effect of the changes in income inequality within countries was only statistically significant in the low income countries, but not in the middle and high income ones. In addition, this effect was positive and not negative, as expected.

In conclusion, income inequality seems to have a much stronger relationship with the population health in the low and middle income countries than in the high income countries. This findings could owe to certain characteristics of the high income countries that counter the (potential) negative effect of income inequality on health, i.e., a floor / ceiling effect affecting life expectancy and high quality health services available for the majority of the population. These two characteristics could lead to a low elasticity of life expectancy in the high income countries under the influence of potentially detrimental contextual influences such as income inequality. Also, note that the not significant relationship between inequality and life expectancy among high income countries was found with and without controlling for the average wealth or for the changes in wealth.

Chapter 4. Wealth inequality, anemia status and experience with child mortality in LMICs

The specific research questions that guided the empirical work summarised in this chapter were: (1) *to what extent is inequality associated with the health of individuals living in LMICs?*; (2) *is there evidence for a genuine contextual effect of inequality on health, independent of composition effects due to the population's structure?*; (3) *to what extent is a potential contextual effect of inequality on health mediated by the country's resources relevant to health?*

The most important result of the analyses conducted was the finding that wealth inequality was significantly related to the two physical health measures, i.e., anemia status of mothers and their children and the experience with child mortality. However, this contextual initial effect was significantly reduced when the material circumstances of the individuals were taken into account. The reduction was so great that the effect of inequality turned to be statistically not significant in the sample of mothers that had their anemia status assessed.

The next important finding regards the role played by the characteristics of the health system for explaining the relationship between inequality and the physical health measures. We found that higher wealth inequality related to lower extension and quality of the health services in the LMICs, as measured by 2 out of three variables (note here that we used GDP per capita in our analyses instead of a measure of government expenditures for health because the two variables were very strongly correlated). Furthermore, the effect of wealth inequality was reduced when the characteristics of the health system were taken into account. Thus, we concluded that these findings provide some support for the idea that inequality impacts health indirectly, via its detrimental effect for the provision of public goods to the public. It is however important to keep in mind that the health system characteristics had a weak relationship with the health of the women and children in the LMICs

Finally, the prominent policy idea that higher inequality is associated with a wider health gap between rich and poor was not fully supported by our results.

We conclude that in the LMICs, reducing the level of wealth inequalities could be beneficial to women's and children health via the structural effects on the public goods provision. However, our results most strongly suggest that a more efficient way to improve health in the LMICs is by improving the material circumstances among the poor. As the poverty is rampant in the LMICs, increasing the wealth of the poor will result in better health for a large part of the population, and via aggregation, will result in

better societal health. Of course, if all else is equal, improving the wealth of the poor automatically results in lower wealth inequality, and this in turn could further improve population health via its effects on the development and quality of health services and infrastructure.

Chapter 5. Income inequality and depressive symptoms

The specific research questions at the core of this chapter were: 1) *to what extent do country differences in income inequality relate to individuals' depressive symptoms?*; 2) *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?;* 3) *do individuals with more non-material coping resources experience a weaker effect of inequality than individual with fewer coping resources?*; and 4) *does the relationship between inequality and depression differ for individuals with different relative SES positions?*.

The main result of this chapter is that income inequality was found to have a genuine contextual effect on the depressive symptoms of Europeans and this effect was not explained either by composition effects, higher involvement in social comparisons or lower levels of non-material coping resources. In other words, while in countries with higher inequality individuals reported more depressive symptoms, the mechanisms tested were not able to fully explain why this was the case.

Another important result refers to the role of the non-material coping resources such as social support and psychological coping resources for the relationship between income inequality and symptoms of depression. We reasoned that, if income inequality acts like a type of social stressor then these two types of non-material coping resources could buffer against the detrimental effect of inequality. Our findings provided support for this moderating role and especially the presence of intimate friends seemed to be most helpful against the detrimental effect of inequality on mental health.

Next, we also found that the relationship between inequality and the mental health of individuals is not the same across all social strata. We particularly found evidence for the concentration of protective non-material coping resources among individuals with high relative SES positions, which could explain why we found a pattern suggesting that inequality is least detrimental for this social category. We also reasoned that individuals in the middle of the income hierarchy are most likely to get involved in social comparisons of social status attributes and as a result, they would experience a stronger detrimental effect of income inequality on their mental health. Indeed we found a pattern in our data suggesting that the middle positions were most affected by inequality, however this effect was not explained by a higher tendency to involve in comparisons of income.

In conclusion, this chapter showed that the mental health of Europeans was negatively affected in contexts with higher income inequality. We explored two potential mechanisms that were proposed to be at work behind this relationship but we found no evidence supporting any of them. Even though we were not successful in explaining why high inequality was detrimental to mental health, there is good news as we found that 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.

Chapter 6. Inequality, corruption and happiness

The research question of this chapter was: 1) *can we find evidence for a causal mechanism linking inequality to population well-being via an effect on corruption?*

The answer to this question was affirmative, i.e., we found evidence showing that inequality related to happiness (our measure of well-being) via aggravating the level of societal corruption. However, we did not find evidence for a reciprocal relationship between inequality and corruption, as the economic or the political science literature have argued. Furthermore, the indirect effect of inequality on happiness via increasing the level of societal corruption was quite strong: for every standard deviation increase in inequality the societal happiness was almost half standard deviations lower.

We argued that high societal corruption could influence well-being via several pathways, i.e., by acting like a type of societal stressor, by triggering feelings of anger and frustration due to the unfairness of the social system, by increasing mistrust or by decreasing optimism, personal efficacy / locus of control or increasing feelings of powerlessness. Our results suggest that at least some of these mechanisms are at work as we found that corruption had a strong negative relationship with the level of societal happiness. In addition, when we compared the total effects of inequality and of corruption on happiness we found a weak and statistically not significant effect of inequality while the total effect of corruption was strong and statistically significant.

Our approach in this chapter supports the argument that an effective way to advance the understanding of the relationship between inequality and well-being is not by focusing on finding evidence for a direct effect but by focusing on specifying and testing mechanisms that could be at work. This observation is especially relevant when dealing with a relationship such as the one between inequality and well-being because of the multitude of causal mechanism that could possibly be at work. Potential mediating paths could neutralize each other or could work only under certain conditions and

this could result in a not-significant relationship between the original exogenous and endogenous variables.

Conclusions

Each of the empirical chapters have answered (some) of the research questions that guided the work summarized in this dissertation. The first question regarded the empirical relationship between inequality and different dimensions of well-being, i.e., physical or mental health. I maintained that this distinction should be made because a closer look at some mechanisms suggests a differential strength of the relationship between inequality with mental and physical well-being and because some mechanisms could be more relevant for the relationship between inequality and one or the other dimension of well-being. The empirical studies that examined the relationship between inequality and the physical and mental health of individuals were supportive for this view. In Chapter 4 the genuine effect of inequality on physical health measures was very weak and for one sample it was statistically not significant. In Chapter 5, the effect of inequality on the depressive symptoms of the population owed very little to compositional effects, thus the differences between societies in the average depressive symptoms of the individuals owed more to differences in inequality.

The second research questioned inquired what is the empirical relationship between inequality and well-being across countries with various levels of economic development? All in all, the results of our analyses pointed toward a stronger empirical relationship between inequality and health in the LMICs than in the HICs. In Chapter 3 we tested whether the relationship between inequality and the same measure of well-being, i.e., life expectancy, is weaker in the HICs than in the LMICs. As a result of our analyses, both cross-sectional and longitudinal, we concluded that indeed, the relationship between inequality and life expectancy was stronger in countries with lower level of economic development, and as the level of wealth increased, this relationship was weaker to the point of becoming statistically not significant in the HICs.

However, as I found in Chapter 6, the fact that the observed relationship between inequality and well-being was found to be statistically not-significant in some sample of countries or periods does not automatically imply that there are no causal mechanisms at work. It does, however, signals toward the need to give more attention to the interplay between societal characteristics such as corruption, wealth, inequality and how they can impact the well-being of the population.

The third research question focused on underlying possible explanations the relationship between inequality and well-being. Three of the empirical studies explicitly tested some potential mechanisms, i.e., the "statistical artefact" criticism, the institutional pathway, the psychosocial pathway, the potential detrimental effect on the population's levels of social support and psychological coping resources and the aggravating effect on the level of societal corruption.

Regarding the "statistical artefact" criticism we found that the composition of the countries' samples and especially the distribution of the material resources of the population (e.g., income, wealth) did not fully explain why in some cases higher inequality related to worse well-being. However, our analyses suggested that the distribution of the material circumstances in the population was more important for explaining the observed relationship between inequality and well-being among poor countries.

Regarding the mediation via the institutional pathway our analyses provided some support for this mechanism. We note that the mediation was found to be stronger for those countries that were mostly in the category of middle income countries, while for the mostly low income countries the material wealth of the individuals was the driver behind the observed relationship between inequality and physical health. Furthermore, previous research has showed that the level and development of the health services and infrastructure did not mediate the relationship between inequality and health measures in the HICs (Layte, 2012). These pieces of evidence together with the conclusions regarding the "statistical artefact" criticism suggest the following picture: for the countries with the lowest average wealth, the distribution of the material circumstances in the population weighs heavily for explaining the relationship between inequality and well-being. As the average wealth of the population increases the role of the institutional factors becomes more important and inequality could genuinely impact well-being via its corrosive effects on the development and quality of the health services and infrastructure. However, for wealthy countries this mechanism loses strength

Regarding the psychosocial pathway, our analyses presented in Chapter 5 did not support the argument that in countries with higher inequality individuals get more involved in social comparisons. Regarding the potential detrimental effect of inequality to the population's levels of social support and psychological coping resources, we were not able to find supportive evidence for this mechanism. Neither the level of social support nor of psychological coping resources were lower in those European countries that had higher levels of income inequality.

Last but not least, we proposed and tested a new alternative mechanism that linked inequality to well-being via its aggravating effect on the level of societal corruption. we maintained that inequality could shape the structure of opportunities and motivations of the population, which ultimately could facilitate higher involvement in corrupt acts. Our analyses presented in Chapter 6 provided empirical evidence for the proposed mechanism, i.e., we found that inequality had a strong indirect effect on societal happiness via increasing the level of societal corruption.

The fourth research question inquired whether the relationship between inequality and well-being is the same for individuals with different characteristics, e.g., different income or coping resources? In general our analyses presented in Chapter 5 provided support for a differential effect of inequality for individuals with different relative income position. Most clearly we found that high income groups have more self-esteem and optimism and this is most likely the reason why they were less affected by living in countries with high levels of inequality. However, the results were less clear when we examined the effect of inequality on well-being for the individuals in the middle and bottom of the income hierarchy of a country. All in all, these conclusions point out toward the need to a more careful consideration of the conditions that moderate the effect of inequality on well-being. In particular, our analyses raise doubts on arguments such those advanced by Wilkinson and Pickett (2009b), authors who maintained that inequality is bad for everyone.

To sum up, this dissertation provided some valuable insights that point toward the need for a more nuanced framing of the relationship between inequality and well-being. Future research is needed in order to better understand how inequality could “get under the skin” and make people sick, with greater emphasis on elaborating and testing the mechanisms that could be at work. In addition, more work is needed in order to clarify the complex relationship between inequality and other societal characteristics and their effects on well-being.

APPENDICES

Appendix 3.1

Descriptive information on the dependent and independent variables

	Min	Max	Mean	Std.	Nr. Valid.
Life expectancy	38.19	82.41	67.52	9.76	2360
SWIID Gini Index	18.48	70.83	38.33	9.80	2360
GDP per capita [b]	0.002	887.75	92.48	107.23	2360

Note: [b] Figures correspond to the GDP per capita divided by 100

List of countries included in the analyses

High-income countries	Australia, Austria, Belgium, Canada, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Korea, Republic of, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States
Middle-income countries	Albania, Algeria, Argentina, Belarus, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Cape Verde, Chile, Colombia, Costa Rica, Croatia, Czech Republic, Djibouti, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Fiji, Gabon, Georgia, Guatemala, Honduras, Hungary, Indonesia, Iran, Iraq, Jamaica, Jordan, Kazakhstan, Latvia, Lebanon, Lithuania, Macedonia, FYR, Malaysia, Mauritius, Mexico, Morocco, Namibia, Paraguay, Peru, Philippines, Poland, Romania, Russian Federation, Serbia, South Africa, Suriname, Swaziland, Thailand, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Ukraine, Uruguay, Uzbekistan, Venezuela
Low–income countries	Angola, Armenia, Azerbaijan, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Cameroon, Central African Republic, Chad, China, Comoros, Cote d`Ivoire, Ethiopia, Gambia, Ghana, Guinea, Guyana, Haiti, India, Kenya, Kyrgyz Republic, Lao, Lesotho, Madagascar, Malawi, Mali, Mauritania, Moldova, Mongolia, Mozambique, Nepal, Nicaragua, Niger, Nigeria, Pakistan, Papua New Guinea, Rwanda, Senegal, Sierra Leone, Sri Lanka, Tajikistan, Tanzania, Togo, Uganda, Viet Nam, Zambia, Zimbabwe

Appendix 3.2. The R syntax for conducting a test of the role played by sample composition for the relationship between income inequality and life expectancy and the results of the simulation for subsamples of 23 out of 30 countries.

***Dataset*:** 30 HICs with corresponding information about the level of Gini Index of Income extracted from the SWIID dataset (Solt, 2009), corresponding to the years 2002-2003; life expectancy at birth from the UN Population prospects (United Nations, 2008), corresponding to year 2002; and GDP per capita from the World Development Indicators (WorldBank, 2011), corresponding to year 2002.

The R code uses the following names for the dataset / variables:

HD: the name of the dataset
HD$GiniSwid0203: the variable storing the measure of Gini Index of Income
HD$LE02: the variable storing the measure of life expectancy at birth
HD$GDPpC: the variable storing the measure of GDP per capita
HD$Country: the variable storing the names of the countries

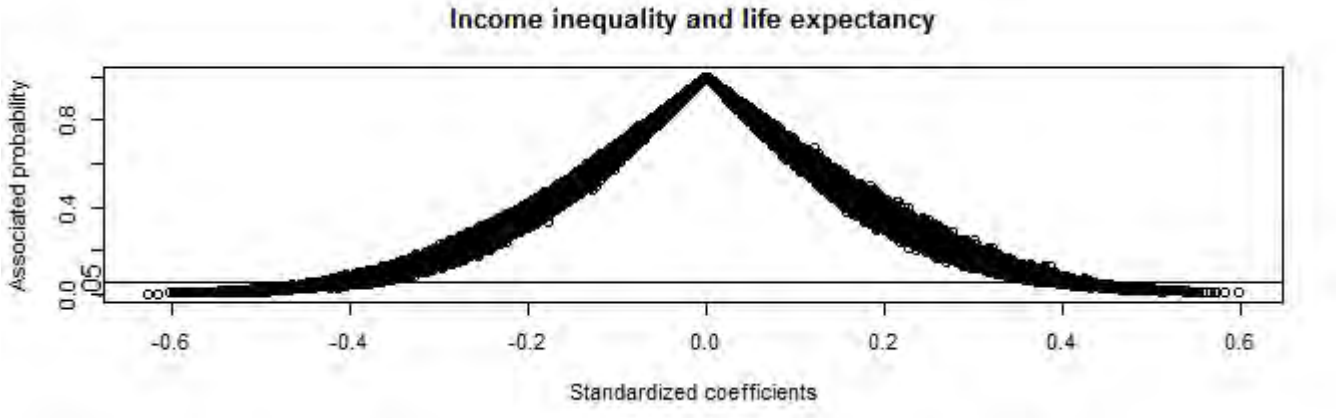
```
# R code
# Simulation: the role of the sample composition

# extract in a vector the countries in the dataset
f<-levels(droplevels(HD$Country))

library(gregmisc)
## load this package for computing the combinations of 23 out of 30 countries
# store in the a matrix the combinations of 23 out of 30 countries
a<-combinations(30, 23, f)
dim(a)  # 2035800 combinations of 23 countries out of the sample of 30 countries

#this function returns the standardised regression coefficient for the first predictor
# in the regression equation
ii.beta<- function(MOD) {
b<-summary(MOD)$coef[-1,1][[1]]   # this is the coefficient of the first x
sx<-sd(MOD$model[-1][[1]])          # this is the standard deviation of the x
sy<-sd(MOD$model[1][[1]])           # this is the standard deviation of the y
beta_ii<- b*sx/sy                   # calculate the standardised coefficient
return(beta_ii)}
```

```
# create a matrix where the beta coefficients of the regression are stored
# on each row for 1 of the 2035800 unique combinations
results.a<-matrix(NA,2035800, 2)
colnames(results.a)<-c("betaLE", "sigLE")

# this function takes subsamples corresponding to each combination of 23 countries
# estimates a regression for dependent variable life expectancy
# calculates the beta
# stores the betas and the significance levels in the results matrix

for (i in 1:2035800) {
#extract a subsample based on the combinations stored in matrix a
        subsample.data<-HD[HD$Country %in% a[i,],]
#extract the Gini measure for the subsample
        x<-subsample.data$GiniSwid0203
#extract the life expectancy measure for the subsample
        y1<-subsample.data$LE02
#extract the GDP measure for the subsample
        z<-subsample.data$GDPpC
#Estimate the regression of Gini and GDP on life expectancy
        rez1<-lm(y1~x + z)
        results.a[i,1]<-ii.beta(rez1)                    # this is the beta coefficient of Gini
        results.a[i,2]<-summary(rez1)$coef[-1,4][[1]]    # this is the p value of the coefficient
        }

# select the p values that are lower than .05 and report
# in how many sample of 23 countries the coefficients were significant

GiniLE <- results.a[,2][results.a[,2]<0.05]
length(GiniLE)  # 3016 out of the 2035800 samples of 23 countries
                # 3016/2035800*100= .15%

# the mean beta coefficients with corresponding p values that are lower than .05
GiniLEsign <- results.a[results.a[,2]<0.05,]
mean(GiniLEsign[,1])  # -.146
```

Results of the simulation for subsamples of 23 to 29 countries out of 30:

	2035800 samples of 23 out of 30 countries
Percentage significant coefficients	0.15
Mean significant betas	-0.15
	593775 samples of 24 out of 30 countries
Percentage significant coefficients	0.06
Mean significant betas	-0.2
	142506 samples of 25 out of 30 countries
Percentage significant coefficients	0.02
Mean significant betas	-0.29
	27405 samples of 26 out of 30 countries
Percentage significant coefficients	0.004
Mean significant betas	0.026
	4060 samples of 27 out of 30 countries
Percentage significant coefficients	0
Mean significant betas	-
	435 samples of 28 out of 30 countries
Percentage significant coefficients	0
Mean significant betas	
	30 samples of 29 out of 30 countries
Percentage significant coefficients	0
Mean significant betas	-

The standardised coefficients in all subsamples based on combinations from 29 to 23 out of 30 countries and their associated p values



The above figure shows that the coefficients of Gini Index of income on life expectancy were not negative in all subsamples, but there were also positive and significant coefficients

Appendix 4.1

Descriptive statistics of the variables in the analyses

	Women anemia sample [a]		Children anemia sample [b]		Experience of child mortality [c]	
	Mean / Proportion	Min / Max	Mean / Proportion	Min / Max	Mean / Proportion	Min / Max
Anemia status (yes = 1)	40.2%	0/1	58.7%	0/1		
Experience of child mortality (yes =1)					8.6%	0/1
Household wealth	42.3 (28.6)	0/100	33.8 (27.3)	0/100	35.2 (27.9)	0/100
Primary education (of the mother)	27.5%	0/1	32.7%	0/1	33.7%	0/1
Secondary education (of the mother)	37%	0/1	28.2%	0/1	27.1%	0/1
Tertiary education (of the mother)	10.2%	0/1	6.8%	0/1	7.1%	0/1
Age 20-24	17.6%	0/1	24.5%	0/1	24.6%	0/1
Age 25-29	16.2%	0/1	29.3%	0/1	27%	0/1
Age 30-34	13.9%	0/1	20.7%	0/1	19.4%	0/1
Age 35-39	12.7%	0/1	12.7%	0/1	12.9%	0/1
Age 40-44	11%	0/1	6%	0/1	6.4%	0/1
Age 45-49	9%	0/1	1.8%	0/1	2.2%	0/1
Residence: rural	55.5%	0/1	64.8%	0/1	63.1%	0/1
Marital status: married	67.7%	0/1	92.2%	0/1	88.8%	0/1
Marital status: was married	7.4%	0/1	5.2%	0/1	7.1%	0/1
Number household members	6 (3.3)	1/74	6.7 (3.5)	2/74	6.6 (3.6)	1/74
Breastfeeding	20.5%	0/1				
Pregnant	6.4%	0/1				
Mother is anemic			42.9%	0/1		
No. children born last 5 years					1.4 (.6)	1/8
Gini Index of household wealth	34.9 (12.3)	7 / 53	35 (12.5)	7/53	33.1 (12.6)	7 / 53
Private financing of health	58.3 (15.3)	34.6 / 86.3	57.8 (15.2)	34.6 / 86.3	55.8 (15.6)	28.2 / 86.3
Measles vaccination	78.8 (14.8)	48.2 / 97.4	79.2 (14.9)	48.2 / 97.4	81.9 (13.8)	36.8 / 97.8
GDP per capita	2091.3(1796.6)	275 / 7510.3	2100.9(1822.5)	275 / 7510.3	2800.8 (2820.8)	130.2 / 14603.1

Notes: continuous variables in their original metric, before transformations. SD in parenthesis when applicable.

[a]: women anemia sample, 373735 women in 33 countries. [b]: children anemia sample, 152485 children with age less than 71 months in 30 countries. [c]: experience of child mortality sample, 455692 women in 52 countries

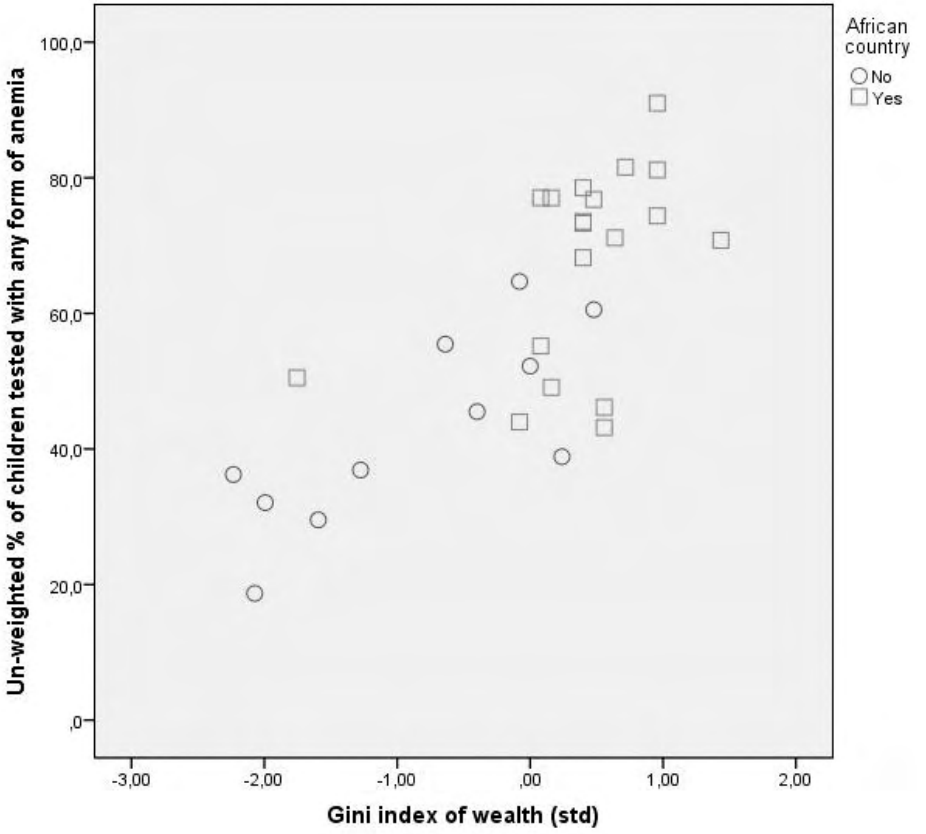
Appendix 4.2. List of countries in the analyses

The countries in the women anemia sample were: Albania, Armenia, Azerbaijan, Bangladesh, Burkina Faso, Benin, Bolivia, Burundi, DR Congo, Cameroon, Egypt, Ethiopia, Ghana, Guinea, Honduras, Haiti, India, Jordan, Cambodia, Lesotho, Moldova, Madagascar, Mali, Malawi, Nepal, Peru, Rwanda, Sierra Leone, Senegal, Swaziland, Tanzania, Uganda, and Niger.
The countries in the children anemia sample were: Albania, Armenia, Azerbaijan, Bangladesh, Burkina Faso, Benin, Bolivia, Burundi, DR Congo, Cameroon, Egypt, Ghana, Guinea, Honduras, Haiti, India, Jordan, Lesotho, Moldova, Madagascar, Mali, Malawi, Niger, Peru, Rwanda, Sierra Leone, Senegal, Swaziland, Tanzania, Uganda.

The countries in the child mortality sample were: the countries the women anemia sample plus Colombia, Dominican Republic, Gabon, Kenya, Liberia, Morocco, Maldives, Mozambique, Nicaragua, Nigeria, Namibia, Philippines, Pakistan, Sao Tome and Principe, Chad, Turkey, Ukraine, Vietnam, and Zambia.

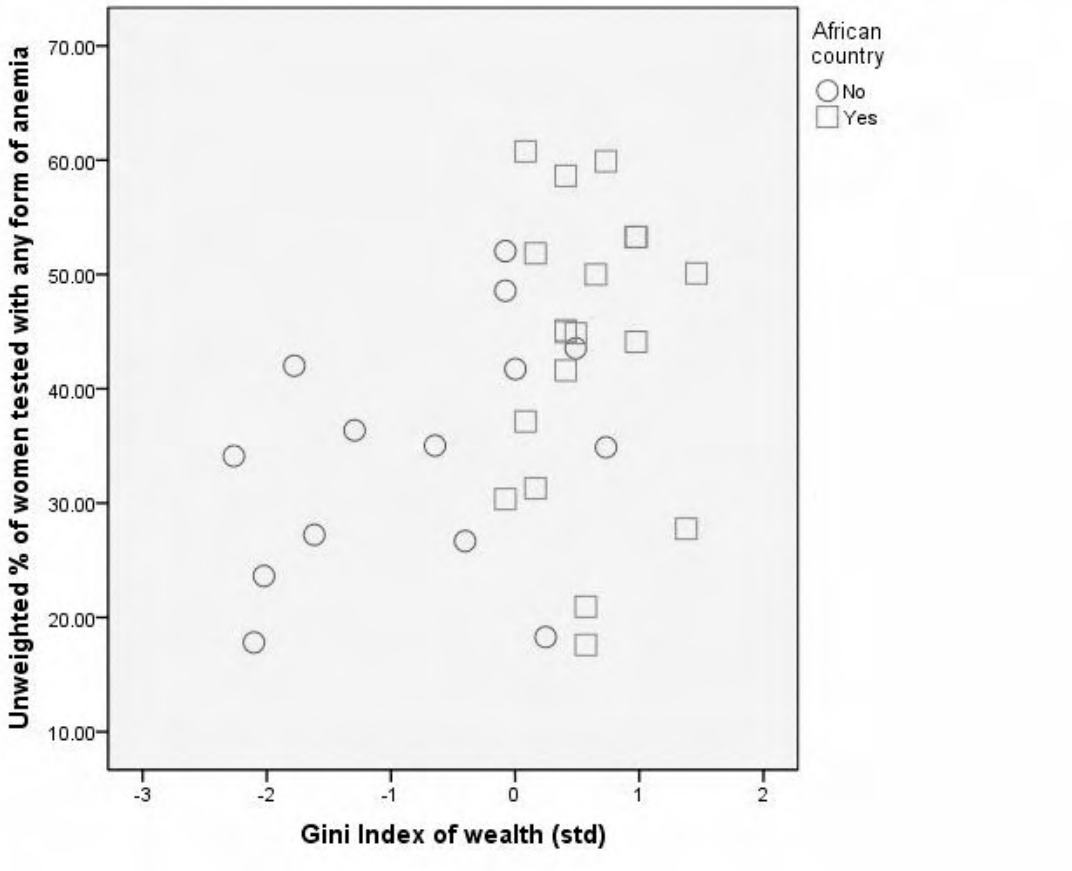
Appendix 4.3.

Gini Index of household wealth and anemia status of children in African and non-African countries



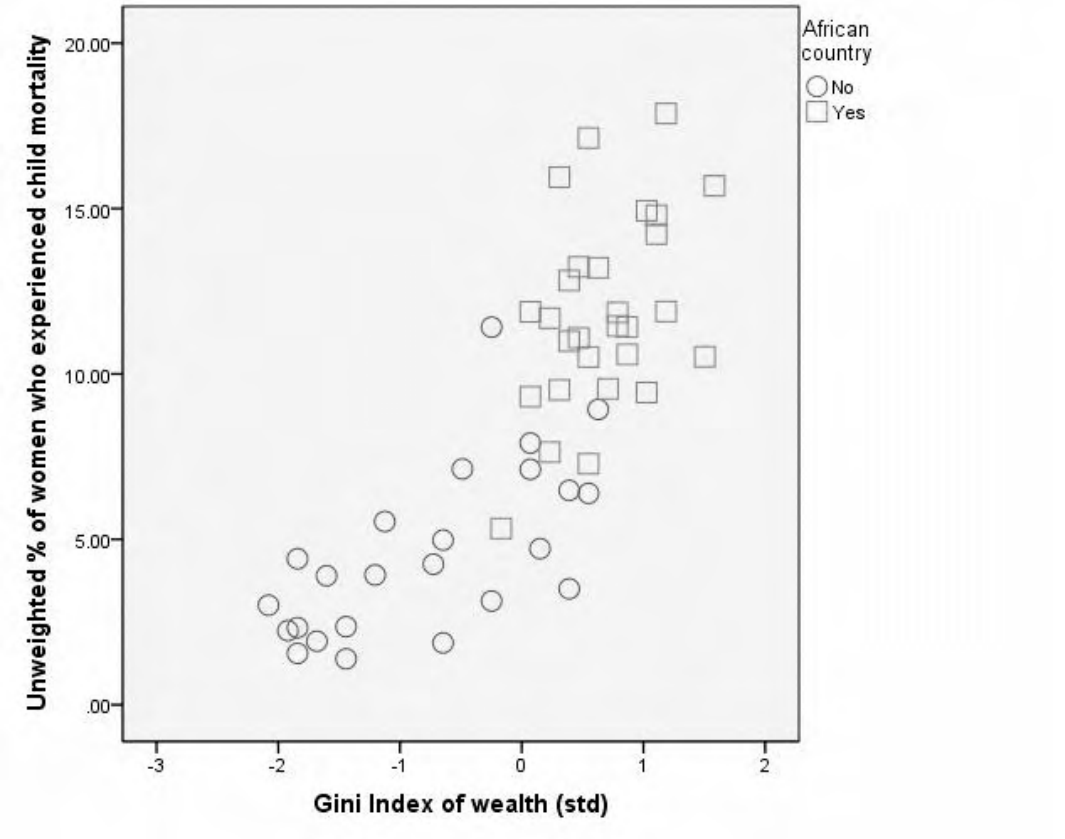
Appendix 4.4.

Gini Index of household wealth and anemia status of women in African and non-African countries



Appendix 4.5.

Gini Index of household wealth and the chance to experience child mortality in African and non-African countries



Appendix 5.1

Table 1 Descriptive statistics

Variable	Min.	Max.	Perc. / Mean	SD	N
Center for Epidemiologic Studies Depression Scale (CESD-8)	0	24	6.17	4.24	43824
PPP equalized per person income (per month)	38.38	22661.01	1432.09	1407.99	34426
Important to compare income with others	0	6	2.28	1.86	22904
Respondent presently in paid employment	0	1	53.66%		43648
Psychological coping resources	0	4	2.59	.67	43824
There are people who care	0	4	3.33	.74	43824
Someone with whom intimate and personal matters can be discussed	0	1	89.86%		43824
Education level: primary	0	1	13.28%		43658
Education level: secondary	0	1	60.33%		43658
Education level: tertiary	0	1	26.38%		43658
Occupational status: working	0	1	50.04%		43597
Occupational status: in education	0	1	8.48%		43597
Occupational status: unemployed	0	1	4.42%		43597
Occupational status: retired or disabled	0	1	26.38%		43597
Occupational status: other	0	1	10.69%		43597
Male	0	1	45.57%		43734
Female	0	1	54.43%		43734
Age: 14-24	0	1	13.58%		43824
Age: 25-34	0	1	15.13%		43824
Age: 35-44	0	1	17.50%		43824
Age: 45-54	0	1	16.98%		43824
Age: 55-64	0	1	15.56%		43824
Age: 65-75	0	1	12.17%		43824
Age: 75 plus	0	1	9.08%		43824
Residence: big city	0	1	19.58%		43703
Residence: small town / suburbia	0	1	42.83%		43703
Residence: farm / countryside	0	1	37.59%		43703
Gini Index income	24	45	29.65	5.10	23

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

Appendix 5.2

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	Gini Index income	Sample size
Denmark	4.75 (3.30)	2.24 (1.46)	2.76 (.63)	3.66 (.55)	92.5%	24	1484
Sweden	4.98 (3.83)	2.36 (1.85)	2.59 (.57)	3.44 (.56)	92.9%	24	1921
Slovak Republic	7.38 (3.90)	2.80 (1.91)	2.32 (.60)	3.06 (.73)	86.4%	24	1756
Norway	4.26 (3.12)	2.31 (1.75)	2.61 (.61)	3.43 (.56)	92.7%	25	1748
Slovenia	5.77 (3.81)	2.49 (1.99)	2.61 (.60)	3.13 (.74)	91.4%	25	1471
Belgium	5.45 (4.13)	2.10 (1.85)	2.56 (.68)	3.32 (.78)	89.4%	26	1797
Finland	4.96 (3.32)	2.00 (1.49)	2.47 (.58)	3.44 (.64)	91.4%	26	1891
Austria	5.46 (3.93)	2.06 (1.81)	2.75 (.65)	3.44 (.71)	89.2%	27	2373
Netherlands	5.33 (3.77)	1.93 (1.76)	2.60 (.60)	3.37 (.64)	93.1%	27	1887
Bulgaria	7.70 (4.70)	2.35 (2.00)	2.44 (.82)	3.40 (.94)	84.7%	28	1361
Germany	6.05 (3.70)	2.09 (1.83)	2.76 (.61)	3.35 (.66)	94.9%	28	2906
France	5.61 (4.29)	2.35 (1.96)	2.55 (.73)	3.01 (.99)	88.0%	28	1986
Hungary	8.63 (5.11)	2.33 (2.13)	2.42 (.79)	3.27 (.86)	90.0%	28	1512
Switzerland	4.75 (3.36)	1.97 (1.80)	2.78 (.58)	3.37 (.67)	96.6%	31	1803
Ireland	4.89 (3.64)	2.15 (1.89)	2.70 (.63)	3.46 (.64)	91.9%	31	1789
Poland	6.59 (4.84)	2.58 (1.96)	2.53 (.65)	3.22 (.70)	89.5%	31	1710
Romania	7.26 (3.92)	2.45 (1.99)	2.62 (.64)	3.25 (.77)	71.0%	31	2091
Spain	5.61 (4.25)	2.65 (1.99)	2.70 (.60)	3.51 (.60)	93.7%	32	1874
Estonia	6.66 (3.93)	2.50 (1.88)	2.44 (.62)	3.36 (.66)	87.2%	33	1511
United Kingdom	5.83 (4.19)	2.14 (1.77)	2.55 (.68)	3.52 (.61)	91.8%	35	2394

Country	CES-D8	Social comparisons	Psychological coping resources	There are people who care	Someone for intimate discussions	Gini Index income	Sample size
Ukraine	8.36 (4.78)	2.67 (2.02)	2.42 (.72)	3.22 (.92)	85.1%	36	1957
Portugal	7.73 (4.52)	2.15 (1.79)	2.56 (.67)	3.26 (.77)	89.7%	37	2219
Russian Federation	7.83 (4.45)	2.50 (1.98)	2.43 (.64)	3.13 (.81)	88.7%	45	2383

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

Appendix 5.3

Overview of the respondents from samples with and without valid values for income

Characteristic	Sample A	Sample B
Center for Epidemiologic Studies Depression Scale (CESD-8) (Mean/se)	6.18	6.12
Important to compare income with others (Mean/se)	2.31	2.19
Respondent presently in paid employment (Perc.)	55.3	47.5
Psychological coping resources (Mean/se)	2.57	2.61
There are people who care (Mean/se)	3.33	3.33
Someone with whom intimate and personal matters can be discussed (Perc.)	89.5	90.8
Education level: primary (Perc.)	12.3	16.8
Education level: secondary (Perc.)	59.9	61.9
Education level: tertiary (Perc.)	27.8	21.3
Occupational status: working (Perc.)	51.5	44.6
Occupational status: in education (Perc.)	6.5	15.9
Occupational status: unemployed (Perc.)	4.3	4.9
Occupational status: retired or disabled (Perc.)	27.6	22.1
Occupational status: other (Perc.)	10.2	12.5
Male (Perc.)	46.0	44.1
Female (Perc.)	54.0	55.9
Age: 14-24 (Perc.)	10.9	24.1
Age: 25-34 (Perc.)	15.5	14.2
Age: 35-44 (Perc.)	18.4	14.8
Age: 45-54 (Perc.)	17.7	15.0
Age: 55-64 (Perc.)	16.3	13.2
Age: 65-75 (Perc.)	12.7	10.1
Age: 75 plus (Perc.)	8.5	8.1
Residence: big city (Perc.)	19.5	19.9
Residence: small town / suburbia (Perc.)	42.9	42.5
Residence: farm / countryside (Perc.)	37.6	37.6

Note: Sample A refers to those respondents ***with valid response*** for the income variable. Sample B refers to those respondents ***without a valid response*** for the income variable.

Appendix 5.4

The differential distribution of psychological coping resources and social comparisons across relative income groups

SES groups	Social comparisons	Psychological coping resources
Highest SES position (5th income quintile)	2.25 (.02)	2.69 (.01)
Middle - high SES position (4th income quintile)	2.27 (.03)	2.67 (.01)
Middle SES position (3th income quintile)	2.27 (.03)	2.56 (.01)
Middle - low SES position (2nd income quintile)	2.33 (.03)	2.52 (.01)
Lowest SES position (1st income quintile)	2.39 (.04)	2.44 (.01)

Notes. Figures derived from 20 alternative datasets with imputed values for missing cases and ulterior combined following Rubin (1987). Exception are the figures for social comparisons, which were estimated in the same way but only for those individuals that received the question.

Appendix 6.1.

Descriptive information of the individual level variables

	Min	Max	Mean / %	SD	N valid
Happiness	0	3	2.05	.72	148535
Gender: female	0	1	53.6		150148
Age: less than 25	0	1	17.5		149698
Age: 26-35	0	1	20.00		149698
Age: 36-45	0	1	19.1		149698
Age: 46-55	0	1	16.8		149698
Age: 56-65	0	1	13.2		149698
Age: older than 66	0	1	13.5		149698
Employment status: employed	0	1	42.3		147205
Employment status: self employed	0	1	9.4		147205
Employment status: retired	0	1	17.1		147205
Employment status: unemployed	0	1	9.9		147205
Employment status: other	0	1	14.2		147205
Education: primary	0	1	22.9		149082
Education: secondary	0	1	55.2		149082
Education: tertiary	0	1	21.9		149082
European Values Study sample	0	1	44.1		150256
Year data collection: 2004	0	1	1.3		150256
Year data collection: 2005	0	1	13.1		150256
Year data collection: 2006	0	1	22.8		150256
Year data collection: 2007	0	1	15.0		150256
Year data collection: 2008	0	1	38.4		150256
Year data collection: 2009	0	1	9.4		150256

Appendix 6.2.

Country level scores for the contextual variables in our analyses

Country	Societal happiness score	Gini Income Inequality	Societal corruption	Mature cohort size	Freedom of the press
Iceland	2.97	26.27	1.3	0.38	9
Belgium	2.9	25.5	2.9	0.41	9.67
Mexico	2.88	46.41	6.5	0.26	41.67
Great Britain	2.85	35.48	2.3	0.38	18.17
Netherlands	2.76	27.01	1.1	0.41	13.17
Canada	2.74	31.59	1.5	0.41	16.33
Colombia	2.74	50.55	6	0.27	61.67
Denmark	2.73	23.27	0.7	0.4	9.5
Thailand	2.71	51.93	6.7	0.35	37.67
Ireland	2.71	30.51	2.3	0.34	16
Trinidad and Tobago	2.69	36.46	6.8	0.34	26.33
Switzerland	2.67	28.16	1	0.4	9.5
Ghana	2.61	40.2	6.3	0.23	32.33
US	2.6	37.07	2.7	0.39	15.67
New Zealand	2.48	33.42	0.4	0.37	9.83
Brazil	2.59	49.65	6.7	0.31	36
Mali	2.59	36.4	7.3	0.2	23.83
Sweden	2.69	24.89	0.8	0.38	8.83
Australia	2.65	31.47	1.2	0.37	14.17
Norway	2.63	23.77	2.1	0.39	8.67
Luxembourg	2.6	27.28	1.7	0.4	12
Malaysia	2.57	46.07	5	0.29	69.17
SouthAfrica	2.57	56.65	5.4	0.28	24.67
France	2.57	28.08	3.1	0.4	19.17
Malta	2.57	27.06	4.2	0.41	15.17
Japan	2.56	29.46	2.7	0.38	19.17
Finland	2.56	25.85	1.1	0.42	10.17
Macedonia	2.56	39.34	6.2	0.36	48.83
Italy	2.52	32.96	5.7	0.38	30.83
Uruguay	2.51	43.84	3.6	0.34	28
Turkey	2.51	42.61	5.6	0.29	53.17
Argentina	2.49	45.49	7.1	0.31	38.33
Cyprus	2.48	28.7	3.6	0.34	19.33
Spain	2.47	31.22	3.5	0.36	19.17
Vietnam	2.47	41.28	7.4	0.29	81.17
Austria	2.47	27.06	1.9	0.38	21
Indonesia	2.45	49.62	7.6	0.29	54.5
Chile	2.45	49.01	2.7	0.34	24
Poland	2.44	30.49	5.4	0.39	19.17
Montenegro	2.39	30.52	6.6	0.38	43.5
India	2.38	49.38	6.7	0.29	40.83
Morocco	2.38	38.89	6.5	0.28	58.83
Bosnia Herzegovina	2.38	34	6.8	0.37	49

Country	Societal happiness score	Gini Income Inequality	Societal corruption	Mature cohort size	Freedom of the press
Burkina Fasso	2.37	44.56	7.1	0.21	39
Slovenia	2.37	23.16	3.6	0.39	19.67
Taiwan	2.35	30.5	4.1	0.33	21.83
Guatemala	2.34	50.06	7.8	0.23	55.67
South Korea	2.35	31.7	5	0.33	29
Greece	2.32	32.34	5.3	0.37	28.67
Croatia	2.32	29.07	5.6	0.4	38.17
Portugal	2.31	35.45	3.9	0.37	14.83
Hong Kong	2.31	49.34	1.7	0.37	80.83
Rwanda	2.31	46.82	7.2	0.22	81.67
China	2.29	50.16	6.5	0.33	80.83
Germany	2.28	28.23	2.1	0.39	15.17
Iran	2.26	46.57	7.5	0.24	77.67
Czech Republic	2.26	26.27	4.8	0.38	22.83
Hungary	2.25	27.39	4.9	0.37	22.67
Peru	2.24	51.03	6.7	0.27	38.67
Armenia	2.22	32.72	7.1	0.35	62.67
Serbia	2.21	30.67	6.6	0.37	43.5
Belarus	2.21	26.37	8	0.38	83.67
Ethiopia	2.2	29.66	7.6	0.22	66.33
Slovak Republic	2.19	25.79	5	0.37	21.83
Estonia	2.17	33.25	3.4	0.37	17.5
Latvia	2.14	35.84	5	0.37	19
Georgia	2.13	42.93	6.1	0.36	54.5
Zambia	2.11	51.21	7.4	0.19	63.67
Ukraine	2.1	27.64	7.5	0.37	61.17
Albania	2.09	32.36	6.6	0.34	50.67
Egypt	2.07	31.88	7.2	0.29	71.67
Romania	2.06	31.94	6.2	0.34	42.5
Russia	2.06	41.12	7.9	0.38	65.5
Lithuania	2.01	34.27	5.4	0.36	18.5
Bulgaria	2.01	29.35	6.4	0.38	31.5
Moldova	1.93	38.32	7.1	0.37	61.67
Iraq	1.76	37.49	8.1	0.21	83

Notes: countries are presented in the descending order of the societal happiness scores.

REFERENCES

Alesina, A., Di Tella, R., & MacCulloch, R. (2004). Inequality and happiness: are Europeans and Americans different? *Journal of Public Economics, 88*, 2009-2042.

Alesina, A., & Perotti, R. (1996). Income distribution, political instability, and investment. *European Economic Review, 40*, 1203-1228.

Allen, L. (2000). Anemia and iron deficiency: effects on pregnancy outcome. *The American Journal of Clinical Nutrition, Supplement*, 1280S-1284S.

Allison, P. D. (2001). *Missing Data*. Thousand Oaks, CA: Sage Publications.

Allison, P. D. (2009). *Fixed effects regression models*. Los Angeles: Sage.

Allison, P. D. (2009). Missing data. In R. E. Millsap & A. Maydeu-Olivares (Eds.), *The SAGE handbook of Quantitative Methods in Psychology* (pp. 72-89). Thousand Oaks: CA: Sage Publications.

Anand, S., & Ravallion, M. (1993). Human Development in Poor Countries: On the Role of Private Incomes and Public Services. *The Journal of Economic Perspectives, 7*, 133-150.

Andvig, J., Fjeldstad, O., Amundsen, I., Sissener, T., & Soreide, T. (2001). Corruption. A Review of Contemporary Research. In C. M. I. D. S. a. H. Rights (Ed.).

Aneshensel, C. (1992). Social stress: theory and research. *Annual Review of Sociology, 18*, 15-38.

Apergis, N., Dincer, O., & Payne, J. (2010). The relationship between corruption and income inequality in U.S. states: evidence from a panel cointegration and error correction model. *Public Choice, 145*, 125-135.

Ash, M., & Robinson, D. E. (2009). Inequality, race, and mortality in U.S. cities: A political and econometric review of Deaton and Lubotsky (56:6, 1139–1153, 2003). *Social Science & Medicine, 68*, 1909-1913.

Avlund, K., Osler, M., Mortensen, E. L., Christensen, U., Bruunsgaard, H., Holm-Pedersen, P., . . . Lund, R. (2014). Copenhagen Aging and Midlife Biobank (CAMB): an introduction. *Journal of Aging and Health, 26*, 5-20.

Babones, S. J. (2008). Income inequality and population health: Correlation and causality. *Social Science & Medicine, 66*, 1614-1626.

Balarajan, Y., Ramakrishnan, U., Özaltin, E., Shankar, A., & Subramanian, S. (2011). Anaemia in low-income and middle-income countries. *Lancet, 378*, 2123 - 2135.

Bardage, C., Pluijm, S. M. F., Pedersen, N. L., Deeg, D. J. H., Jylha, M., Noale, M., . . . Otero, A. (2005). Self-rated health among older adults: a cross-national comparison. *European Journal of Ageing, 2*, 149-158.

Beckfield, J. (2004). Does Income Inequality Harm Health? New Cross-National Evidence. *Journal of Health and Social Behavior, 45*, 231-248.

Biggs, B., King, L., Basu, S., & Stuckler, D. (2010). Is wealthier always healthier? The impact of national income level, inequality, and poverty on public health in Latin America. *Social Science & Medicine, 71*, 266-273.

Blakely, T. A., Kennedy, B., Glass, R., & Kawachi, I. (2000). What is the lag time between income inequality and health status? *Journal of Epidemiology and Community Health, 54*, 318-319.

Blakely, T. A., Lochner, K., & Kawachi, I. (2002). Metropolitan area income inequality and self-rated health - a multi-level study. *Social Science & Medicine, 54*, 65-77.

Bourdieu, P. (1984). *Distinction: A Social Critique of the Stratification of Taste*. Cambridge: Harvard University Press.

Bourguignon, F., & Verdier, T. (2000). Oligarchy, democracy, inequality and growth. *Journal of Development Economics, 62*, 285-313.

Brabin, B., Hakimi, M., & Pelletier, D. (2001). An Analysis of Anemia and Pregnancy-Related Maternal Mortality. *The journal of Nutrition, 131*, 6045-6155.

Browning, C. R., & Cagney, K. A. (2002). Neighborhood Structural Disadvantage, Collective Efficacy, and Self-Rated Physical Health in an Urban Setting. *Journal of Health and Social Behavior, 43*, 383-399.

Brunetti, A., & Weder, B. (2003). A free press is bad news for corruption. *Journal of Public Economics, 87*, 1801-1824.

Bryan, M., & Jenkins, S. (2013). Regression analysis of country effects using multilevel data: A cautionary tale: Institute for Social & Economic Research.

Cantarero, D., Pascual, M., & Sarabia, J. M. (2005). Effects of income inequality on population health: new evidence from the european community household panel. *Applied Economics, 37*, 87-91.

Carver, C. S., & Connor-Smith, J. (2010). Personality and Coping. *Annual Review of Psychology, 61*, 679-704.

Chong, A., & Gradstein, M. (2004). Inequality and Institutions *Research Department Working Papers*. Washington: Inter-American Development Bank

Chung, H., & Muntaner, C. (2006). Political and welfare state determinants of infant and child health indicators: An analysis of wealthy countries. *Social Science & Medicine, 63*, 829-842.

Cifuentes, M., Sembajwe, G., Tak, S., Gore, R., Kriebel, D., & Punnett, L. (2008). The association of major depressive episodes with income inequality and the human development index. *Social Science & Medicine, 67*, 529-539.

Clark, A., & Senik, C. (2011). Who compares to whom? The anatomy of income comparisons in Europe. *The Economic Journal, 120*, 573-594.

Coburn, D. (2004). Beyond the income inequality hypothesis: class,neo-liberalism, and health inequalities. *Social Science & Medicine, 58*, 41-56.

Cohen, S., Kessler, R. C., & Underwood Gordon, L. (1997). *Measuring stress. A guide for Health and Social Scientists*: Oxford University Press.

Cohen, S., & McKay, G. (1984). Social support, stress and the buffering hypothesis: a theoretical analysis. In A. Baum, S. E. Taylor & J. E. Singer (Eds.), *Handbook of psychology and health*. NJ: Hillsdale.

Cruess, S., Antoni, M., Kilbourn, K., Ironson, G., Klimas, N., Fletcher, M. A., . . . Scheiderman, N. (2000). Optimism, Distress, and Immunologic Status in HIV-Infected Gay Men Following Hurricane Andrew. *International Journal of Behavioral Medicine, 7*, 160-182.

CSDH. (2008). Closing the gap in a generation: health equity through action on the social determinants of health. Final Report of the Commission on Social Determinants of health. Geneva: World Health Organization.

Davidov, E., Schmidt, P., & Billiet, J. (Eds.). (2011). *Cross-Cultural Analysis. Methods and applications*. New York: Routledge.

de Benoist, B., McLean, E., Egli, I., & Cogswell, M. (2008). Worldwide prevalence of anaemia 1993–2005 : WHO global database on anaemia: World Health Organization.

de Melo, L., & Tiongson, E. (2006). Income Inequality and Redistributive Government Spending. *Public Finance Review, 34*, 282-305.

De Swaan, A. (1998). *In care of the state; health care, education and welfare in Europe and the USA in the Modern Era*. New York/Cambridge: Oxford University Press/Polity Press.

Deaton, A., & Lubotsky, D. (2003). Mortality, inequality and race in American cities and states. *Social Science & Medicine, 56*, 1139-1153.

Deaton, A., & Lubotsky, D. (2009). Income inequality and mortality in U.S. cities: Weighing the evidence. A response to Ash. *Social Science & Medicine, 68*, 1914-1917.

Deininger, K., & Olinto, P. (2000). Asset distribution, Inequality, and Growth: The World Bank.

Delhey, J., & Dragolov, G. (2014). Why Inequality Makes Europeans Less Happy: The Role of Distrust, Status Anxiety, and Perceived Conflict. *European Sociological Review, 30*, 151-165.

Demo, D., & Savin-Williams, R. (1983). Early adolescent self-esteem as a fucntion of social class: Rosenberg and Perlin revisited. *American Journal of Sociology, 88*, 763-774.

DHS, M. (2013). *Demographic and Health Survey (DHS)*.

Docquier, F., & Tabbalouti, E. (2001). Bribing votes: A new explanation to the "inequality-redistribution" puzzle in LDC's. *Public Choice, 108*, 259-272.

Duncan, C., Jones, K., & Moon, G. (1998). Context, composition and heterogeneity: using multilevel models in health research. *Social Science & Medicine, 46*, 97-117.

Easterly, W. (2006). Inequality does cause underdevelopment: Insights from a new instrument. *Journal of Development Economics, 84*, 755-776.

Ellison, G. T. H. (2002). Letting the Gini out of the bottle? Challenges facing the relative income hypothesis. *Social Science & Medicine, 54*, 561-576.

Ellwardt, L., Peter, S., Prag, P., & Steverink, N. (2014). Social Contacts of Older People in 27 European Countries: The Role of Welfare Spending and Economic Inequality. *European Sociological Review, 30*, 413-430. doi: 10.1093/esr/jcu046

Elo, I. (2009). Social class differentials in health and mortality: patterns and explanations in comparative perspective. *Annual Review of Sociology, 35*, 553-572.

EUROSTAT. (2010b). Europe in figures. Eurostat yearbook 2010: European Union.

Eurostat. (2011). Glossary:Equivalised disposable income. from http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:Equivalised_disposable_income

EVS. (2011). *European Values Study 2008: Integrated Dataset (EVS 2008)*.

Fajnzylber, P., Lederman, D., & N., L. (2002). Inequality and violent crime. *Journal of Law and Economics*.

Fay, M., Leipziger, D., Wodon, Q., & Yepes, T. (2005). Achieving Child-Health-Related Millennium Development Goals: The Role of Infrastructure. *World Development, 33*, 1267-1284.

FH. (2014). *Freedom of the press: scores and status 1980-2014*.

Finseraas, H. (2009). Redistribution: A Multilevel Analysis of European Public Opinion. *Scandinavian Political Studies, 32*, 94-119.

Folkman, S., Lazarus, R. S., Dunkel-Schetter, C., DeLongis, A., & Gruen, R. J. (1986). Dynamics of a Stressful Encounter: Cognitive Appraisal, Coping, and Encounter Outcomes. *Journal of Personality and Social Psychology, 50*, 992-1003.

Fox, A. (2012). The HIV-Poverty thesis re-examined: poverty, wealth or inequality as a social determinant of HIV infection in Sub-Saharan Africa. *Journal of Biosocial Science, 44*, 459-480.

Galor, O., & Zeira, J. (1993). Income distribution and macroeconomics. *The review of economic studies, 1*, 35-52.

Gillanders, R. (2011). The mental health cost of corruption: Evidence from Sub-Saharan Africa: UCD Centre for Economic Research.

Gilman, S. E., Kawachi, I., Fitzmaurice, G. M., & Buka, L. (2003). Socio-economic status, family disruption and residential stability in childhood: relation to onset, recurrence and remission of major depression. *Psychological Medicine, 33*, 1341-1355.

Goldthorpe, J. H. (2010). Analysing Social Inequality: A Critique of Two Recent Contributions from Economics and Epidemiology. *European Sociological Review, 26*, 731-744.

Graham, C., & Chattopadhyay, S. (2009). Well-being and Public Attitudes in Afghanistan: Some Insights from the Economics of Happiness *Foreign Policy at Brookings*.

Graham, J. W. (2009). Missing Data Analysis: making it work in the real world. *Annual Review of Psychology, 60*, 549-576.

Grantham-McGregor, S., & Ani, C. (2001). A Review of Studies on the Effect of Iron Deficiency on Cognitive Development in Children. *The journal of Nutrition, supplement*.

Gravelle, H. (1998). How much of the relation between population mortality and unequal distribution of income is a statistical artefact? . *BMJ, 316*, 382-385.

Gupta, S., Davoodi, H., & Alonso-Terme, R. (2002). Does corruption affect income inequality and poverty? *Economics of Governance, 3*, 23-45.

Gustafsson, P., Janlert, U., Theorell, T., Westerlund, H., & Hammarström, A. (2011). Socioeconomic status over the life course and allostatic load in adulthood: results from the Northern Swedish Cohort. *Journal of Epidemiology and Community Health, 65*, 989-992.

Hardoon, D., & Heinrich, F. (2013). Global Corruption Barometer 2013: Transparency International. .

Headey, B. (2008). Life goals matter to happiness: a revision of set-point theory. *Social Indicators Research, 86*, 213-231.

Heinonen, K., Raikkonen, K., Matthews, K. A., Scheier, M. F., Raitakari, O. T., Pulkki, L., & Keltikangas-Jarvinen, L. (2006). Socioeconomic status in childhood and adulthood: associations with dispositional optimism and pessimism over a 21-year follow-up. *Journal of Personality, 74*, 1111-1126.

Helliwell, J., & Huang, H. (2008). How's Your Government? International Evidence Linking Good Government and Well-Being. *British Journal of Political Science, 38*, 595-619.

Henderson, C., Liu, X., Diez Roux, A., Link, B., & 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.

Higgings, M., & Williamson, J. (1999). Explaining inequality the world round: cohort size, Kuznets curves, and openess. *NBER Working Papers Series.* Retrieved 23 February, 2015

Hildebrand, V., & van Kerm, P. (2009). Income inequality and self-rated health status: evidence from the European Community Household Panel. *Demography*, *46*(4), 805-825.

Holt, D. B. (1997). Poststructuralist Lifestyle Analysis: Conceptualizing the Social Patterning of Consumption in Postmodernity. *Journal of Consumer Research, 23*, 326-350.

House, J. S., Umberson, D., & Landis, K. R. (1988). Structures and processes of social support. *Annual Review of Sociology, 14*, 293-318.

Huppert, F., & So, T. (2013). Flourishing Across Europe: Application of a New Conceptual Framework for Defining Well-Being. *Social Indicators Research*, 837-861. doi: DOI 10.1007/s11205-011-9966-7

Huynh, M., Parker, J., Harper, S., Pamuk, E., & Schoendorf, K. (2005). Contextual effect of income inequality on birth outcomes. *International Journal of Epidemiology, 34*, 888–895.

Idler, E. L., & Benyamini, Y. (1997). Self-rated health and mortality: a review of twenty-seven community studies. *Journal of Health and Social Behavior, 38*, 21-37.

ISSP. (2009). *International Social Survey Programme: Social Inequality IV*.

Jen, M. H., Jones, K., & Johnston, R. (2009). Global variations in health: Evaluating Wilkinson's income inequality hypothesis using the World Values Survey. *Social Science & Medicine, 68*, 643-653.

Jowell, R., & Team, C. C.-o. (2007). European Social Survey 2006/2007: Technical Report. London: Centre for Comparative Social Surveys: City University.

Judge, K., Mulligan, J., & Benzeval, M. (1998). Income inequality and population health. *Social Science & Medicine, 46*, 567-579.

Jurges, H. (2007). True health vs response styles: exploring cross-country differences in self reported health. *Health Economics, 16*, 163-178.

Juster, R.-P., McEwen, B., & Lupien, S. (2010). Allostatic load biomarkers of chronic stress and impact on health and cognition. *Neuroscience and Biobehavioral Reviews, 35*, 2-16.

Jylha, M. (2009). What is self-rated health and why does it predicts mortality? Towards a unified conceptual model. *Social Science & Medicine, 69*, 307-316.

Jylha, M., Guralnik, J. M., Ferrucci, L., Jokela, J., & Heikkinen, E. (1998). Is self rated health comparable across cultures and genders? *Journal of Gerontology, 53B*, S 144-S152.

Kaltenthaler, K., Ceccoli, S., & Gelleny, R. (2008). Attitudes toward eliminating income inequality in Europe. *European Union Politics, 9*, 217-241.

Kane, P., & Garber, J. (2004). The relations among depression in fathers, children's psychopathology, and father–child conflict: A meta-analysis. *Clinical Psychology Review, 24*, 339-360.

Karlsson, M., Nilsson, T., Lyttkens, C. H., & Leeson, G. (2010). Income inequality and health: Importance of cross-country perspective. *Social Science & Medicine, 70*, 875-885.

Kawachi, I., & Gilman, S. E. (2014). Income inequality among American states and the incidence of major depression. *Journal of Epidemiology and Community Health, 68*, 110-105.

Kawachi, I., & Kennedy, B. (1999). Income Inequality and Health: Pathways and Mechanisms. *Health Services Research, 34*, 215-227.

Kawachi, I., & Kennedy, B. P. (1997a). Health and social cohesion: why care about income inequality? *BJM, 314*, 1037-1040.

Kawachi, I., & Kennedy, B. P. (1997b). The relationship of income inequality to mortality: does the choince of indicator matter? *Social Science & Medicine, 45*(7), 1121-1127.

Kennedy, B. P., Kawachi, I., Glass, R., & Prothrow Stith, D. (1998). Income distribution, socioeconomic status, and self rated health in the United States: multilevel analysis. *BMJ, 317*, 917–921.

Kondo, N., Sembajwe, G., Kawachi, I., van Dam, R. M., Subramanian, S. V., & Z., Y. (2009). Income inequality, mortality, and self rated health: meta-analysis of multilevel studies. *BMJ*. doi: 10.1136/bmj.b4471

Kruk, M., Prescott, M., & Galea, S. (2008). Equity of Skilled Birth Attendant Utilization in Developing Countries: Financing and policy determinants. *American Journal of Public Health, 98*, 142-147.

Kwasi Fosu, A. (2010). Inequality, Income, and Poverty: Comparative Global Evidence. *Social Science Quarterly, 91*.

La Ferrara, E. (2002). Inequality and group participation: theory and evidence from rural Tanzania. *Journal of Public Economics, 85*, 235-273.

Lambsdorff, J. (1999). *Corruption in Empirical Research — A Review*. Paper presented at the 9th International Anti-Corruption Conference, Durban, South Africa. http://www1.worldbank.org/publicsector/anticorrupt/d2ws1_jglambsdorff.pdf

Larrea, C., & Kawachi, I. (2005). Does economic inequality affect child malnutrition? The case of Ecuador. *Social Science & Medicine, 60*, 165-178.

Layte, R. (2012). The association between income inequality and mental health: testing status anxiety, social capital and neo-materialist explanations. *European Sociological Review, 28*, 498-511. doi: 10.1093/esr/jcr012

Layte, R., & Whelan, C. (2014). Who Feels Inferior? A Test of the Status Anxiety Hypothesis of Social Inequalities in Health. *European Sociological Review, 30*, 525-535. doi: 10.1093/esr/jcu057

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal and coping*. New Yourk: Springer.

Leigh, A., Jencks, C., & Smeeding, T. (2009). Health and income inequality. In W. Salverda, B. Nolan & T. Smeeding (Eds.), *The Oxford handbook of economic inequality*. Oxford: Oxford University Press.

Li, H., Xu, L. C., & Zou, H. (2000). Corruption, Income Distribution, and Growth. *Economics and Politics, 12*, 155-181.

Li, S., Foley, R., & Collins, A. (2004). Anemia, hospitalization, and mortality in patients receiving peritoneal dialysis in the United States. *Kidney International, 65*, 1864-1869.

Logan, J., & Barksdale, D. (2008). Allostasis and allostatic load: expanding the discourse on stress and cardiovascular disease. *Journal of Nursing and Healthcare of Chronic Illness*.

Lopez, R. (2004). Income inequality and self-rated health in US metropolitan areas: A multi-level analysis. *Social Science & Medicine, 59*, 2409-2419.

Lorant, V., Deliege, D., Eaton, W., Philippot, P., & Ansseau, M. (2003). Socioeconomic inequalities in depression: a meta-analysis. *American Journal of Epidemiology, 157*, 98-112.

Lynch, J. (2000). Income inequality and health: expanding the debate. *Social Science & Medicine, 51*, 1001-1005.

Lynch, J., Smith, G. D., Harper, S., Hillemeier, M., Roos, N., Kaplan, G. A., & Wolfson, M. (2004). Is Income Inequality a Determinant of Population Health? Part 1. A Systematic Review. *The Milbank Quarterly, 82*, 5–99.

Macinko, J. A., Shi, L., Starfield, B., & Wulu, J. T. (2003). Income Inequality and Health: A Critical Review of the Literature. *Medical Care Research and Review, 60*, 406-452.

Mackenbach, J. P., Stirbu, I., Roskam, A. J. R., Schaap, M., Menvielle, G., Leinsalu, M., & Kunst, A. E. (2008). Socioeconomic Inequalities in Health in 22 European Countries. *The new england journal o f medicine, 358*, 2468-2481.

Makikangas, A., Kinnunen, U., & Feldt, T. (2004). Self-esteem, dispozitional optimism and health: evidence from a cross-lagged data on employees. *Journal of Research in Personality, 38*, 556-575.

Marmot, M. (1998). Contribution of psychosocial factors to socioeconomic differences in health. *Milbank Quarterly, 76*, 403-448.

Marmot, M. (2005). Social determinants of health inequalities. *Lancet, 365:*, 1099–1104.

McEwen, B. (1998). Stress, Adaptation and Disease. Asslostatis and Allostatic Load. *Annals of the New York Academy of Sciences*, 33-44.

McEwen, B. S. (2003). Mood disorders and allostatic load. *Biological Psychiatry, 54*, 200-207.

McGuire, J. W. (2005). Basic Health Care Provision and Under-5 Mortality: A Cross-National Study of Developing Countries. *World Development, 34*, 405-425.

McIntyre, D., Thiede, M., Dahlgren, G., & Whitehead, M. (2006). What are the economic consequences for households of illness and of paying for health care in low- and middle-income country contexts? *Social Science & Medicine, 62*, 858-865.

McKenzie, D. (2005). Measuring inequality with asset indicators. *Journal of Population Economy*(18), 229-260.

Mellor, J. M., & Milyo, J. (2001). Reexamining the Evidence of an Ecological Association between Income Inequality and Health. *Journal of Health Politics, Policy and Law, 26*, 487-522.

Mellor, J. M., & Milyo, J. (2003). Is exposure to income inequality a public health concern? Lagged effects of income inequality on individual and population health. *Health Services Research, 38*, 137-151.

Meltzer, A., & Richard, S. (1981). A rational theory of the size of government. *The Journal of Political Economy, 89*(5), 914-927.

Mirowsky, J., & Ross, C. (1986). Social patterns of distress. *American Review of Sociology, 12*, 23-45.

Mishra, P., & Newhouse, D. (2009). Does health aid matter? *Journal of Health Economics, 28*, 855-872.

Moran, T. P. (2003). On the methodological context of cross-national inequality data. *International Sociology, 18*, 351-378.

Morenoff, J., Sampson, R., & Raudenbush, S. (2001). Neighborhood inequality, collective efficacy, and the spatial dynamics of urban violence. *Criminology, 39*.

Morgan, K. (2000). Inequality and crime. *Review of Economics and Statistics, 82*, 530-539.

Mullan Harris, K. (2013). The Add Health Study: Design and Accomplishments: Carolina Population Center. University of North Carolina at Chapel Hill.

OECD. (2009). A progress report on the jurisdictions surveyed by the OECD global forum in implementing the internationally agreed tax standard. http://www.oecd.org/dataoecd/38/14/42497950.pdf.

Osberg, L., & Smeeding, T. (2006). "Fair" Inequality? Attitudes toward Pay Differentials: The United States in Comparative Perspective. *American Sociological Review, 71*.

Oshio, T., & Kobayashi, M. (2009). Income inequality, area-level poverty, perceived aversion to inequality, and self-rated health in Japan. *Social Science & Medicine, 69*, 317-326.

OSN. (2015). Occupy Wall Street. Retrieved 25 February, 2015

OXFAM. (2013). The cost of inequality: how wealth and income extremes hurts us all [Press release]. Retrieved from http://www.oxfam.org/sites/www.oxfam.org/files/cost-of-inequality-oxfam-mb180113.pdf

Paskov, M., & Dewilde, C. (2012). Income inequality and solidarity in Europe. *Research in Social Stratification and Mobility, 30*, 415-432.

Patten, S., Williams, V. A., Lavorato, D., & Bulloch, A. (2010). Reciprocal Effects of Social Support in Major Depression Epidemiology *Clinical Practice & Epidemiology in Mental Health, 6*, 126-131.

Paxton, P., Hipp, J., & Marquart-Pyatt, S. (2011). *Nonrecursive Models. Endogeneity, Reciprocal Relationships, and Feedback Loops*.

Pearlin, L. (1989). The sociological study of stress. *Journal of Health and Social Behavior, 30*, 241-256.

Penninx, B., Deeg, D. J. H., van Eijck, J., Beekman, A., & Guralnik, J. (2000). Changes in depression and physical decline in older adults: a longitudinal perspective. *Journal of Affective Disorders, 61*, 1-12.

Perotti, R. (1996). Growth, Income Distribution, and Democracy: What the Data Say. *Journal of Economic Growth, 1*, 149-187.

Pickett, K., & Wilkinson, R. (2007). Child wellbeing and income inequality in rich societies: ecological cross sectional study. *BJM*. doi: doi:10.1136/bmj.39377.580162.55

Pickett, K., & Wilkinson, R. (2015). Income inequality and health: A causal review. *Social Science & Medicine, 128*, 316-326.

Piketty, T. (2014). *Capital in the Twenty-First Century*. Cambridge: Harvard University Press.

Pop, I. (2012). Acceptance of Corrupt Acts: a Comparative Study of Values Regarding Corruption in Europe. *Journal of Social Research & Policy, 3*.

Pop, I., van Ingen, E., & van Oorschot, W. (2013). Inequality, Wealth and Health: Is Decreasing Income Inequality the Key to Create Healthier Societies? *Social Indicators Research, 113*, 1025-1043. doi: 10.1007/s11205-012-0125-6

Prag, P., Mills, M., & Wittek, R. (2014). Income and Income Inequality as Social Determinants of Health: Do Social Comparisons Play a Role? *European Sociological Review, 30*, 218-229.

Preston, S. (1975). The Changing Relation between Mortality and Level of Economic DevelopmentAuthor. *Population Studies, 29*, 231-248.

Pritchett, L., & Summers, L. H. (1996). Wealthier is healthier. *The Journal of Human Resources, 31*, 841-868.

Radloff, L. S. (1977). The CES-D Scale: A Self-Reported Depression Scale for Research in the General Population. *Applied Psychological Measurement, 1*, 385-401.

Rajan, K., Kennedy, J., & King, L. (2013). Is wealthier always healthier in poor countries? The health implications of income, inequality, poverty, and literacy in India. *Social Science & Medicine, 88*, 98-107.

Rajan, R. G. (2010). *Fault Lines: How Hidden Fractures Still Threaten the World Econom*. Princeton.

Ram, R. (2006). Further examination of the cross-country association between income inequality and population health. *Social Science & Medicine, 62*, 779-791.

Ranis, G., & Stewart, F. (2000). Economic growth and human development. *World Development, 28*, 197-219.

Riva, E., Tettamanti, M., Mosconi, P., Apolone, G., Gandini, F., Nobili, A., . . . Lucca, U. (2009). Association of mild anemia with hospitalization and mortality in the elderly: the Health and Anemia population-based study. *The Hematology Journal, 94*, 22-28.

Rodgers, G. B. (1979). Income and inequality as determinants of mortality: an international cross-section analysis. *Population Studies, 33*, 343-351.

Ronsmans, C., Graham, J. W., & group, T. L. M. S. S. s. (2006). Maternal mortality: who, when, where, and why. *Lancet, 368*, 1189–1200.

Rosenberg, M., & Pearlin, L. (1978). Social Class and Self-Esteem Among Children and Adults. *American Journal of Sociology, 84*, 53-77.

Ross, C. (2000). Neighborhood disadvantage and adult depression. *Journal of Health and Social Behavior, 41*, 177-187.

Ross, C., & Mirowsky, J. (1989). Explaining the Social Patterns of Depression: Control and Problem Solving--or Support and Talking? *Journal of Health and Social Behavior, 30*, 206-219.

Ross, C., & Mirowsky, J. (2002). Age and the gender gap in the sense of personal control. *Social Psychology Quarterly, 65*, 125-145.

Ross, C., & Mirowsky, J. (2006a). Sex differences in the effect of education on depression: Resource multiplication or resource substitution? *Social Science & Medicine, 63*, 1400-1413.

Ross, C., & Mirowsky, J. (2006b). Social Structure and Psychological Functioning. In J. Delamater (Ed.), *Handbook of Social Psychology* (pp. 411-447). New York: Kluwer Academic/Plenum Publishers.

Rothstein, B., & Uslaner, E. (2005). All for all: Equality, corruption and social trust. *World Politics, 58*, 41-72.

Royston, P. (2005). Multiple imputation of missing values: update. *The Stata Journal, 5*, 1-14.

Rubin, D. B. (1987). *Multiple imputation for nonresponse in surveys*. New York: Wiley.

Rutstein, S. O., & Rojas, G. (2006). *Guide to DHS Statistics* M. D. I. International (Ed.)

Saint Paul, G., & Verdier, T. (1996). Inequality, redistribution and growth: A challenge to the conventional political economy approach. *European Economic Review, 40*, 719-728.

Sampson, R., Morenoff, J., & Gannon-Rowley, T. (2002a). Assessing "neighborhood effects": Social processes and new directions in research. *Annual Review of Sociology, 28*, 443-478.

Sampson, R., Morenoff, J., & Gannon-Rowley, T. (2002b). Assessing “Neighborhood Effects”: Social Processes and New Directions in Research. *Annual Review of Sociology, 28*, 443-478.

Sapolsky, R. (2004). *Why Zebras Don't Get Ulcers*. New York: Holt Paperbacks.

Save The Children. (2012). Born equal. How reducing inequality could give our children a better future. In S. t. Children (Ed.). London: Save the Children.

Scheier, M. F., & Carver, C. S. (1992). Effects of optimism on psychological and psychical well-being: theoretical overview and empirical update. *Cognitive Therapy and Research, 16*, 201-228.

Schneider, S. (2012). Income Inequality and its Consequences for Life Satisfaction: What Role do Social Cognitions Play? *Social Indicators Research, 106*, 419-438.

Schneider, S., & Schupp, J. (2014). Individual Differences in Social Comparison and its Consequences for Life Satisfaction: Introducing a Short Scale of the Iowa–Netherlands Comparison Orientation Measure. *Social Indicators Research, 115*, 767-789.

Scholes, S., Taylor, R., Cheshire, H., Cox, K., & Lessof, C. (2008). Retirement, health and relationships of the older population in England: The 2004 English Longitudinal Study of Ageing Technical Report: National Centre for Social Research.

Schor, J. (2000). Towards a new politics of consumption. In J. Schor & D. Holt (Eds.), *The consumer society reader* (pp. 446-462). New York: New Press.

Shi, L., Macinko, J. A., Starfield, B., Politzer, R., & Xu, J. (2005). Primary care, race, and mortality in US states. *Social Science & Medicine, 61*, 65-75.

Simms, C., Rowson, M., & Peattie, S. (2007). The bitterest pill of all: The collapse of Africa's health systems. In S. t. children (Ed.).

Simon, G., Barber, C., Frank, R., Greenberg, P., Rose, R., Wang, P., & Kessler, R. C. (2001). Depression and Work Productivity: The Comparative Costs of Treatment Versus Nontreatment. *Journal of Occupational and Environmental Medicine, 43*, 2-9.

Smith, R., Parrott, W., Ozer, D., & Moniz, A. (1994). Subjective Injustice and Inferiority as Predictors of Hostile and Depressive Feelings in Envy. *Personality and Social Psychology Bulletin, 20*.

Smits, J., & Steendijk, R. (2014). The International Wealth Index (IWI). *Social Indicators Research*. doi: DOI 10.1007/s11205-014-0683-x

Snijders, T. A. B., & Bosker, R. J. (1999). *Multilevel analysis. An introduction to basic and advanced multilevel modeling*. London: Sage Publications.

Snowdon, C. (2010). *The Spirit Level Delusion: Fact-Checking the Left's New Theory of Everything*.

Solt, F. (2009). Standardizing the World Income Inequality Database. *Social Science Quarterly, 90*, 231-242.

Sowislo, J. F., & Orth, U. (2013). Does Low Self-Esteem Predict Depression and Anxiety? A Meta-Analysis of Longitudinal Studies. *Psychological Bulletin, 39*, 213-240.

Stacey, M. (1960). *Tradition and change. A study of Branbury*: Oxford University Press.

Stewart, J. (2006). The Detrimental Effects of Allostasis: Allostatic Load as a Measure of Cumulative Stress. *Journal of Physiological Anthropology, 25*, 133-145.

Subramanian, S., & Kawachi, I. (2004). Income Inequality and Health: What Have We Learned So Far? *Epidemiologic Reviews, 26*, 78-91.

Subramanian, S., & Kawachi, I. (2006). Whose health is affected by income inequality? A multilevel interaction analysis of contemporaneous and lagged effects of state income inequality on individual self-rated health in the United States. *Health & Place, 12*, 141–156.

Subramanian, S., Kawachi, I., & Kennedy, B. (2001). Does the state you live in make a difference? Multilevel analysis of self-rated health in the US. *Social Science & Medicine, 53*, 9-19.

Szwarcwald, C., Andrade, C., & Bastos, F. (2002). Income inequality, residential poverty clusteringand infant mortality: a study in Rio de Janeiro, Brazil. *Social Science & Medicine, 55*, 2083-2092.

Tavits, M. (2008). Representation, Corruption, and Subjective Well-Being. *Comparative Political Studies, 41*.

The Equality Trust. (2014). The cost of inequality. http://www.equalitytrust.org.uk.

Thoits, P. A. (1995). Stress, Coping, and Social Support Processes: Where Are We? What Next? *Journal of Health and Social Behavior, 35*(Extra Issue), 53-79.

Thoits, P. A. (2010). Stress and health: major findings and policy implications. *Journal of Health and Social Behavior, 51*, S41-S53.

Torssander, J., & Erikson, R. (2010). Stratification and mortality - a comparsion of education, class, status and income. *European Sociological Review, 26*, 465-474.

Treisman, D. (2007). What havewe learned about the causes of corruption from ten years of cross-national empirical research? *Annual Review of Political Science, 10*, 211-244.

Turner, R., Wheaton, B., & Lloyd, D. (1995). The epidemiology of social stress. *American Sociological Review, 60*, 104-125.

Twenge, J. M., & Campbell, W. K. (2002). Self-Esteem and Socioeconomic Status: A Meta-Analytic Review. *Personality and Social Psychology Review, 6*, 59-71.

UN. (2006). Fast Facts: The Faces of Poverty.

UN. (2010). *UN Summit concludes with adoption of global action plan to achieve development goals by 2015*. UN Department of Public Information.

UN. (2012). UN System Task Team on the Post-2015 UN Development Agenda: United Nations Development Programme.

UNECE. (2015). *Population, 5-year age groups, by sex*.

United Nations, (2008). *World Population prospects: The 2008*.

UNU-WIDER. (2008). *World income inequality database, Version 2.0c*.

Van de Velde, S., Bracke, P., Levecque, K., & Meuleman, B. (2010). Gender differences in depression in 25 European countries after eliminating measurement bias in the CES-D8. *Social Science & Medicine, 39*, 396-404.

Van Deurzen, I., Van Ingen, E., & Van Oorschot, W. (2015). Income Inequality and Depression: The Role of Social Comparisons and Coping Resources. *European Sociological Review*. doi: doi:10.1093/esr/jcv007

Van Deurzen, I., Van Oorschot, W., & Van Ingen, E. (2014). The Link between Inequality and Population Health in Low and Middle Income Countries: Policy Myth or Social Reality? *PloS ONE, 9*. doi: 10.1371/journal.pone.0115109

Wagstaff, A., & van Doorslaer, E. (2000). Income Inequality and Health: What Does the Literature Tell Us? *Annual Review of Public Health, 21*, 543-567.

WDI. (2012). *World Development Indicators*.

Weber, M. (1991). *From Max Weber: Essays in Sociology*. New Work: Oxford University Press.

Wennemo, I. (1993). Infant mortality, public policy and inequality: a comparison of 18 industrialised countries 1950-85. *Sociology of Health and Illness, 15*(4), 429-446.

WHO. (2008). Closing the gap in a generation: health equity through action on the social determinants of health. Final Report of the Commission on Social Determinants of Health. Geneva: World Health Organization.

Wilkinson, R. (1992). Income distribution and life expectancy. *BMJ, 304*, 165-168.

Wilkinson, R. (1999). Health, Hierarchy, and Social Anxiety. *Annals New York Academy of Sciences, 896*, 48-63.

Wilkinson, R. (2006). The Impact of Inequality. *Social Research, 73*(2), 711-732.

Wilkinson, R., & Pickett, K. (2006). Income inequality and population health: A review and explanation of the evidence. *Social Science & Medicine*(62), 1768-1784.

Wilkinson, R., & Pickett, K. (2009a). Income Inequality and Social Dysfunction. *Annual Review of Sociology, 35*, 493-511.

Wilkinson, R., & Pickett, K. (2009b). *The spirit level. Why more equal societies almost always do better*. London: Pinguin Books.

Wong, I. O. L., Cowling, B. J., Lo, S. V., & Leung, G. M. (2009). A multilevel analysis of the effects of neighbourhood income inequality on individual self-rated health in Hong Kong. *Social Science & Medicine, 68*, 124–132.

Wood, J. V. (1989). Theory and research concerning social comparisons of personal attributes. *Psychological Bulletin, 106*, 231-248.

WorldBank. (2010). How we classify countries. 2009, from http://data.worldbank.org/about/country-classifications

WorldBank. (2011). World Development Indicators http://data.worldbank.org/data-catalog/world-development-indicators

Wu, A., & Zumbo, B. (2008). Understanding and Using Mediators and Moderators. *Social Indicators Research, 87*, 367–392.

WVS. (2014). *WORLD VALUES SURVEY Wave 5 2005-2008 OFFICIAL AGGREGATE*

Yodanis, C. (2006). A Place in Town. Doing class in a coffee shop. *Journal of Contemporary Ethnography, 35*, 341-366.

You, J.-S., & Khagram, S. (2005). A Comparative Study of Inequality and Corruption. *American Sociological Review, 70*, 136-157.

CURRICULUM VITAE

Ioana van Deurzen was born on January 25, 1978 in Oradea, Romania. She received her Bachelor's degree in Sociology from Oradea University in 2002. In 2008 she started a Research Master in Social Cultural Studies at Radboud University, The Netherlands and obtained her Master's degree cum laude in 2010. In the same year she started as a PhD candidate at the department of Sociology at Tilburg University, writing this dissertation. She currently works as a post-doctoral researcher at the department of Sociology at Tilburg University, The Netherlands.

In memory of a faithful friend
and companion