The Impact of Social Policies on Health Inequalities in Europe

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1 Introduction and societal context

Health is generally considered to be the most valuable asset we have. It is not surprising that people all over the world agree with the statement that access to health care should be equal. In the survey of the International Social Survey Program (ISSP) in 2011, nearly 60% of respondents answered "*somewhat unfair"* or "*very unfair"* to the question "*Is it fair or unfair that people with higher incomes can afford better health care than people with lower incomes?"* (ISSP Research Group, 2015). Despite the support for equal access to health services and despite generally improving health indicators, such as the steady increase in life expectancy or decline in infant mortality (see Figure 1), the persistence of socioeconomic health inequalities is remarkable. Almost everywhere, health status is related to socioeconomic status (Beckfield et al., 2013). Health inequalities appear to be a permanent challenge for modern societies, regardless of economic prosperity or of overall improvements in population health (Wilkinson & Pickett, 2009).

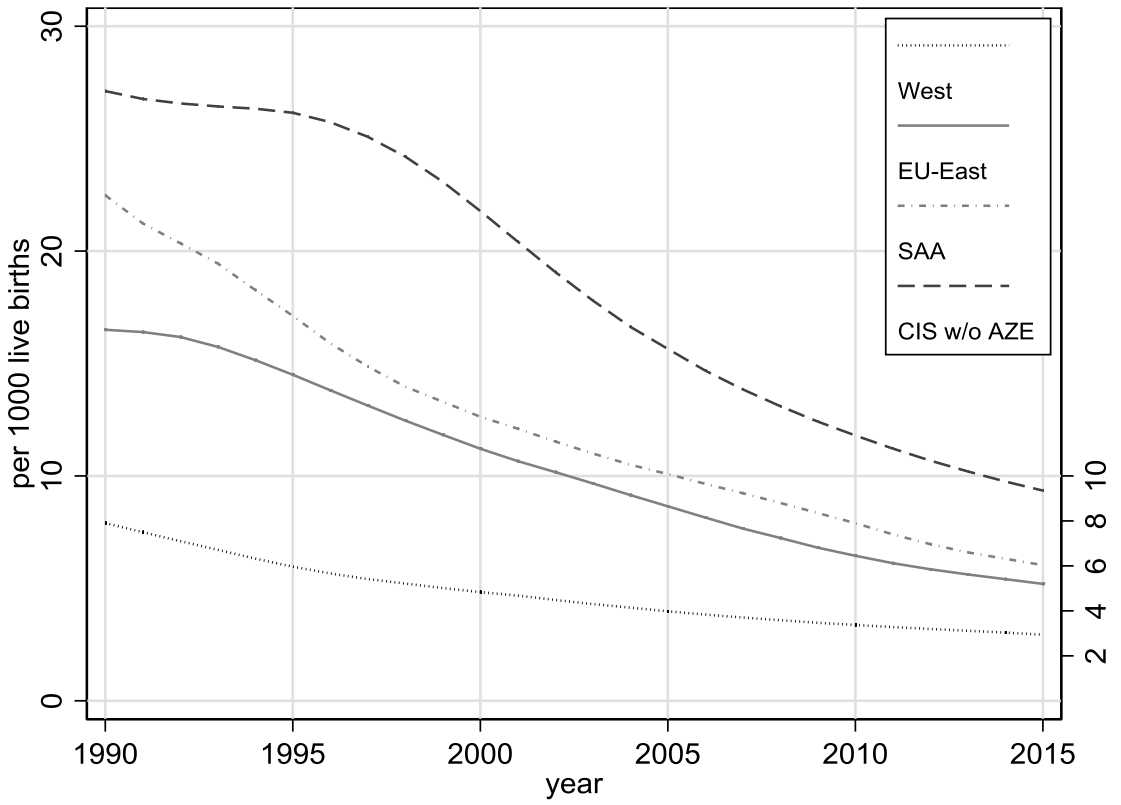

Figure 1: *Infant mortality, WHO estimated, 1990 to 2015. Source: WHO European Health for all Database (HFA-DB).*

Figure 1 documents the decline in infant mortality rate (IMR) in Europe over the last 25 years. I chose the IMR as it is a very sensitive health indicator, which is strongly related to social and economic contexts (Conley & Springer, 2001). Trends in life expectancy are very similar and life expectancy as such has been increasing continuously and consistently across all the regions of Europe since around the year 2000. Despite absolute improvements, Figure 1 shows that relative differences still exist between regions: in 1990 and 2015, the IMR in eastern European Union (EU) member states was twice that of western member states—at very different absolute levels between the two points of time.

Aside from the cross-national differences, there are differences in mortality, life expectancy, and morbidity *within* countries. Figure 2 shows the differences in further life expectancy at the age of 30 across levels of education. The upper row shows the gap in years for men, the lower row for women; the differences in life expectancy according to level of education are lower for women. Slovakian men at the age of 30 with higher education have on average a life expectancy of 14 years longer than their fellow countrymen with primary or lower secondary education.

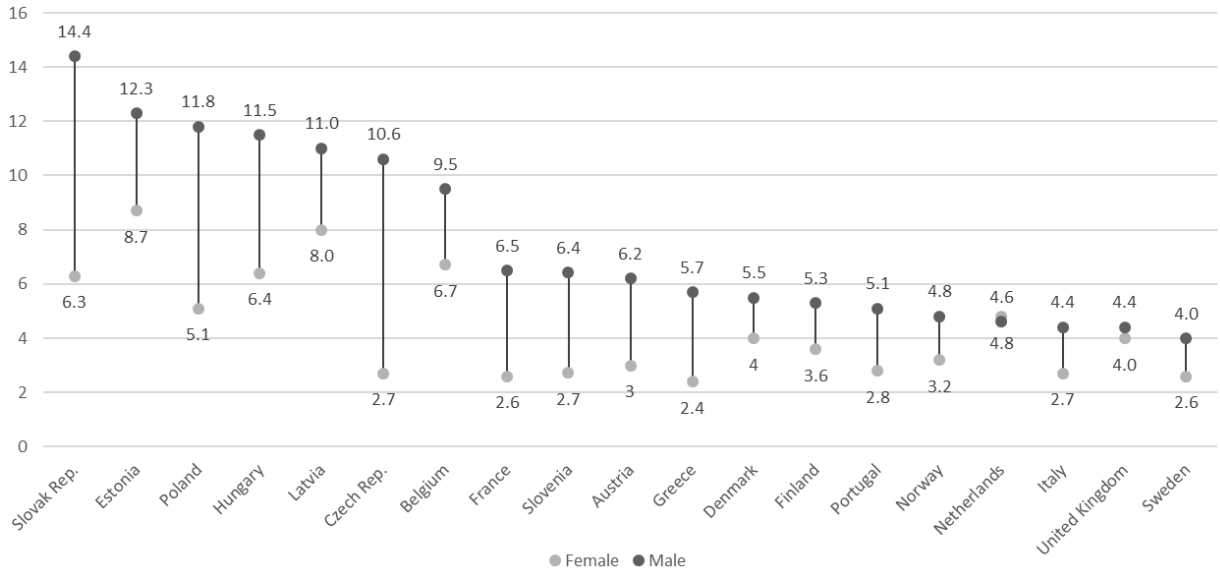

Figure 2: *Gap in life expectancy at age 30 between the highest (tertiary education) and the lowest (below upper secondary education) educational level, by sex, 2015. Source: Eurostat database complemented with OECD Statistics Directorate data and national data for the Netherlands. https://doi.org/10.1787/health_glance-2017-graph10-en.*

Looking at Figure 1, the question arises as to why health inequalities should be addressed when the average level of population health is constantly improving? In addition to the benefits of a just and therefore more stable society, general population health increases as

health inequalities decline. Initiatives to reduce health inequalities usually focus on lower socioeconomic status groups and, if successful, lead to improved health within these target groups. At the same time, stable or improving health of higher socioeconomic status groups leads to a further improvement in general population health. Of course, no one expects that the upper socioeconomic strata should compromise their good health in order to obtain health equity. However, this shows the limits of the compatibility between improving overall population health and reducing health inequalities.

In Europe, England was the first country in which a systematic approach to tackling health inequalities was taken (Mackenbach, 2010). During the Labour government between 1997 and 2010, strategies to tackle health inequalities were even complemented by general programs to combat child poverty (Whitehead & Popay, 2010). The end of the Labour government in 2010 also marked the end of the prioritization of the combat against health inequalities. Recapitulating, scholars find that only some of the strategies and interventions have been successful in reducing health inequalities during this period, e.g., in child poverty and flu vaccinations, while other inequalities, such as the access to primary care, have even increased (Bambra et al., 2010; Mackenbach, 2010).

While the endeavors to tackle health inequalities ended in the United Kingdom when the Labour government was replaced by David Cameron's Conservative Party, in many other European countries efforts to tackle health inequalities were not on the agenda. It is difficult to set an agenda which focuses on the reduction of health inequalities in countries whose welfare states are experiencing austerity or even retrenchment.

Although Kuhlmann et al. (2016: 3) acknowledge that the welfare state is under strain from "multiple challenges" which are forcing countries to change their social policies, the effects of the financial crisis have contributed greatly to welfare retrenchment. Van Mechelen and Marchal (2013) also found retrenchment in means-tested social schemes, such as minimum income protection, taking the form of restricted access to or reductions in benefit levels. However, this effect was not due specifically to the financial crisis as Nelson (2013a) had already observed a continuous decline in generous social assistance benefits as adequate poverty protection in the two decades prior to the financial crisis. Despite the general pressure to reduce social spending, "automatic expansion" takes place in health expenditures, due to the growing needs of ageing societies and increased treatment costs and medical technology (Häusermann et al., 2019: 39). Even though public health is the core of the welfare state, alongside old-age provision—and was promoted by government measures long before the

establishment of the welfare state (Obinger & Petersen, 2019)—the issue of health inequality is not on the political agenda. With the emergence of the social investment state and its emphasis on human capital, a strong focus is placed on prevention and activation (Borosch et al., 2016). In the context of health, this focus runs the risk of victim-blaming and of considering health behavior as the exclusive cause of health inequalities (see Chapter 2.1.3). It is therefore even more important to keep in mind that being active (as the outcome of activation) requires resources. The welfare state is still obliged to provide these resources.

In his keynote speech on the current state of research on health inequalities delivered at the conference of the European Society for Health and Medical Sociology (ESHMS) in Lisbon, Portugal in 2018, Johannes Siegrist took the opportunity to promote and advance new ideas in the field of research on health inequalities. Although evaluation studies show that interventions have mostly failed to date, health inequality as a research topic should not be abandoned or left to economists: the pursuit of new approaches is a must. In his speech, Siegrist encourages researchers to examine the influence of national policies on the relationship between socioeconomic conditions and health.

My dissertation project *The impact of social policies on health inequalities in Europe* deals with the significance of social policies, in particular minimum income protection schemes, as explanations for varying health inequalities across European societies. Do health inequalities differ between countries because social policies vary between countries? Do social policies moderate the effect of social determinants on health?

The framework paper places the three studies of this dissertation into a common context. It consists of five chapters. In Chapter 2, I present theories on the production and persistence of socioeconomic health inequalities as additional background information that was not provided in each study individually. I conclude this chapter with the assumption that social policies have a moderating effect on the relation between socioeconomic status and health and can interrupt the persistence of health inequalities. Chapter 3 provides an overview of the three approaches discussed in research on social policies and health inequalities. After the general presentation of these approaches, I concisely describe my studies in relation to the three research approaches in Chapter 4. Chapter 5 concludes the framework paper. The framework paper is followed by the submitted or published manuscripts of the three studies of this dissertation.

2 Theoretical background

In this chapter I will present theories on the production (Chapter 2.1) and persistence (Chapter 2.2) of socioeconomic health inequalities. These theories are located at the individual level and constitute an essential basis for research on health inequalities. They help in understanding how health inequalities arise in the first place and why they persist. Chapter 2.3 addresses theoretical aspects which are relevant to my specific research question: Why do health inequalities vary between countries, and how important is it to take aspects of social policy into account?

2.1 Production of health inequalities

This section deals with the mechanisms through which socioeconomic status affects health. Figure 3 shows how socioeconomic status (here: education, occupation, and income) affects health through mechanisms which are driven by material, psychosocial, and behavioral factors. In addition to the direct effects of these factors on health, they correlate with each other and have indirect effects on health.

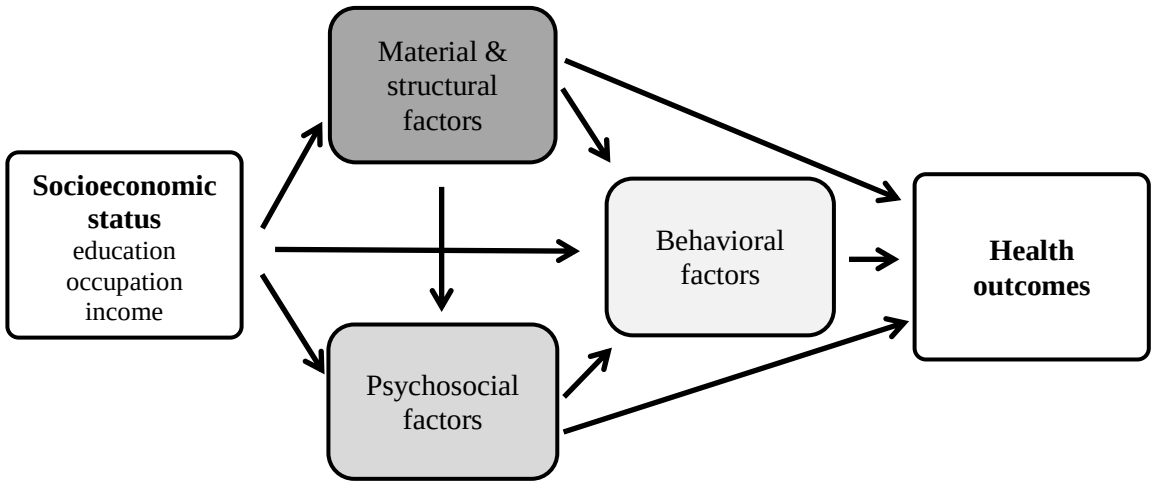

Figure 3: *Simple explanatory model of health inequalities. Source: Mackenbach (2006: 32).*

2.1.1 Material factors

People in lower socioeconomic status groups are more likely to experience a lack of material resources, which has both direct and indirect effects on their health (see Figure 3), e.g., through living and housing conditions and the working environment. Typical effects of a lack of material resources are overcrowded or unhygienic housing. Lack of money leads to fuel

poverty and lack of heating, which have negative effects on mental and physical health (Reibling & Jutz, 2017). The structural conditions to which socioeconomically disadvantaged people are subject often include physically demanding work, which is associated with a higher risk of accidents and occupational diseases. Lack of access to a healthy diet or health promotion measures (sports, preventive medical check-ups, recreational opportunities) is influenced by material factors, but overlaps with behavioral factors (Bartley, 2004). Furthermore, material factors influence health indirectly through psychosocial factors: precarious working conditions, such as fixed-term contracts or low wages, increase anxiety and the likelihood of chronic stress. A tight monthly budget causes anxiety if defective equipment cannot be replaced or modernized—a continuous stress situation detrimental to health is a likely result.

In high-income western European countries, scholars have debated the relevance of these material and structural factors to health, bearing in mind that absolute poverty is at a very low level and most health care systems offer primary health care. Wilkinson and colleagues (Marmot & Wilkinson, 2001; Wilkinson, 1996, 1997) argue that relative material conditions affect health more than absolute material conditions (see Figure 3 for the relation between material and psychosocial factors). In contrast, Bartley (2004) shows how material conditions also matter in higher income groups (with regard to workplace conditions) and lead to differences in health according to socioeconomic status—no matter how small they might seem.

2.1.2 Psychosocial factors

The so-called *social gradient in health* is the main reason why a purely material explanation for health inequalities is insufficient. It is plain wrong to assume that one group of very poor people at the lower end of the income distribution has catastrophic health, while everyone else is doing considerably better. Instead, every study finds a steady increase in health improvement from bottom to top—the social gradient. The social health gradient is often used as evidence of a psychosocial mechanism, whereby social comparisons are made across all levels and are not restricted to lower status groups. Social comparisons with higher status groups cause stress and, in this regard, are detrimental to health. In unequal societies, social comparisons tend to lead to feelings of deprivation that can result in chronic stress over a long period of time (Elstad, 1998). Chronic stress leads to increased cortisol levels, has a negative effect on well-being and mental health, and, in the long term, may lead to physical problems (Lupien et al., 2009; Schwartz, 2017; Thoits, 2010).

Workplace environments provide further examples of psychosocial factors. Marmot et al. (1991) in a seminal study of British civil servants from 1985 to 1988 (Whitehall II) found that lower status jobs are related to perceived lower control over working activities and dissatisfaction with work. This low control was the largest factor contributing to the socioeconomic gradient in coronary heart diseases (Marmot et al., 1997). Further theoretical concepts such as the demand-control model of Karasek and Theorell (1990) and Siegrist's (1996) effort-reward imbalance have described and empirically proved the negative health effects of stressful working conditions. High-strain jobs, which Karasek (1979) defined as having high psychological demands and, at the same time, low decision control, are associated with a high risk for mental and physical health. These examples of workplace environments can also be transferred to domestic and social environments. The combination of high demands and low control leads to chronic stress and other health burdens as a result of daily "hassles" (Mackenbach, 2006). The quality of social relationships plays a role in buffering situations that lead to stress. The quality of social relationships suffers in societies with higher social inequalities, e.g., power or status inequalities. The lack of social support reinforces the effects of negative life events but also of daily problems (Elstad, 1998). Social networks and participation are health-beneficial when they help to build resilience and create supportive social surroundings (Stansfield & Bell, 2019).

Psychosocial factors also have an indirect influence on health: stress increases the probability of health-damaging behavior. Many people respond to stress with supposedly alleviating methods (e.g., substance abuse) and display—consciously or not—self-destructive actions (Elstad, 1998; Krueger & Chang, 2008; Stansfield & Bell, 2019).

2.1.3 Behavioral factors

Health-related behavioral factors such as physical activity, diet, smoking or alcohol consumption, and the take-up of preventive medical care are not only relevant for preventable deaths, i.e., deaths that could have been avoided by public health interventions, but also for subjective health status. Smoking, in particular, plays an important role in health inequalities as the prevalence of smoking is higher in lower socioeconomic status groups (Mackenbach, 2006).

Figure 3 shows that health-related behavior is directly and indirectly influenced by socioeconomic status. Certain health risks, such as an unbalanced diet, can be explained directly by socioeconomic status, i.e., lack of education in adequate and healthy eating. A

direct effect is also presented by Jungbauer-Gans and Gross (2006) who found that groups with a lower socioeconomic status use preventive medical care to a lesser extent even without any financial barriers such as co-payments or practice fees.

More important, however, is the role of behavioral factors as indirect mechanisms of material and psychosocial factors. Health behavior is shaped by material and structural circumstances: access to fresh fruit and vegetables, for example, is strongly dependent on whether there are grocery stores for these products in peoples' immediate neighborhood. The same applies to recreational activities and the presence of green spaces and parks in the residential environment.

2.1.4 Evaluation of the three types of factors

In a recent review that included studies on health inequalities from 1996 to 2016, Moor et al. (2016) found that the contribution of behavioral factors to explaining socioeconomic health inequalities is often overestimated. Such explanations are preferred by the broad public as well as policy makers (Bambra et al., 2010). However, the same holds true for the scientific community, as many sociological and epidemiological studies focus mainly or exclusively on behavioral factors (e.g., Eikemo et al., 2014). Baum and Fisher (2014) note that a focus on changing and improving health behavior is not conducive to reducing health inequalities; interventions must address the factors that influence health behavior. Figure 3 depicts how health behavior is influenced directly by socioeconomic status and indirectly by material, structural, and psychosocial mechanisms. Health promotion ignores the fact that health behavior is embedded in social and economic environments which are not amenable to change by means of anti-tobacco campaigns. Universal health promotion usually only reaches groups with a higher socioeconomic status. Targeted health promotion requires more resources and has very little impact on the overall objectives that are measured, as the target group is too small to have a numerical influence. Although all three mechanisms contribute to explaining health inequalities, material/structural factors are most important because they have a strong direct effect and, in addition, indirect effects through psychosocial and behavioral factors. Focusing only on educational health inequalities, Giesecke and Müters (2006) found that structural factors, such as housing quality, were better explanations than health behavior. The importance of material/structural factors for health inequalities is confirmed for both adults and adolescents (Richter et al., 2011) as well as for several health outcomes such as subjective health (Moor et al., 2016) and mortality (van Oort et al., 2005).

2.2 Persistence of health inequalities

Decades of research on health inequalities show that health inequalities are persistent (Black et al., 1988 [1982]; Davey Smith et al., 1990; Mackenbach et al., 2008a; Mackenbach et al., 2018). The theory of fundamental causes of diseases (Link & Phelan, 1995) endeavors to explain why health inequalities continue to exist—despite advances in health care technology, prevention, and the decline of infectious diseases. In doing so, they refer to fundamental causes which are difficult to eliminate, and which will always lead to health inequalities in one aspect or another. In their theory, fundamental causes are social support or socioeconomic status, as they provide resources such as knowledge, money, power, and prestige that help to avoid (e.g., via non-smoking) or at least minimize (e.g., via using preventive check-ups) the risk of diseases (Link & Phelan, 1995). High incomes enable people to benefit from the best treatment options available, occupation is a proxy for power and prestige, and education is a resource for knowledge. It provides the cognitive ability to translate knowledge about health issues into health-beneficial actions (Geyer, 2008; Lynch & Kaplan, 2000; Mirowsky & Ross, 1998).

These resources (money, knowledge, power, prestige), to which privileged socioeconomic groups have easier access, result in a persistent health advantage. These groups benefit from medical innovations in disease control and faster adoption of disease prevention measures and health technology. For example, Korda et al. (2011) find socioeconomic inequalities in the diffusion of new technology (here: bypass surgery) for patients hospitalized with acute myocardial infarction. Over several years, the proportion of patients who have undergone bypass surgery is higher for patients with higher socioeconomic status than for those with lower socioeconomic status. As these advantages tend to be reproduced across different places and at different times, socioeconomic status was labeled as a *fundamental cause* (Link & Phelan, 1995). Sometimes the advantages of the privileged group are short-lived, as shown by the introduction of polio vaccination, which was adopted by the entire population very quickly after its discovery; sometimes the advantages last for decades, such as the use of the Pap test for cervical cancer screening (Phelan & Link, 2013).

Since its first presentation, several studies have tested the assumptions underlying the theory of fundamental causes (Lutfey & Freese, 2005; Polonijo & Carpiano, 2013; Rubin et al., 2014). Phelan and Link (2013) describe the relationship between increasing socioeconomic inequalities in smoking behavior and the slow but steady spread of awareness that smoking is harmful. While there were no educational differences among cigarette

smokers before the 1950s, this has changed over time. The first studies on the causal relationship between cigarette smoking and lung cancer were published in the mid-1950s. Over the following decades, as people were increasingly confronted with the fact that cigarette smoking caused lung cancer, the educational gradient in smoking behavior became apparent (Phelan & Link, 2013). By comparing mortality from lung cancer, which can be efficiently reduced by non-smoking, and mortality from pancreatic cancer, where there is no prevention and no specific treatment, Rubin et al. (2014) show the consistency of the fundamental cause theory. While there is no socioeconomic inequality in mortality from pancreatic cancer, there are large differences in mortality from lung cancer due to the knowledge that smoking is harmful to health. In this case, social conditions have clearly affected access to certain resources, especially knowledge.

According to Link and Phelan (1995), interventions play an important role; a good example is the campaign against smoking with its ban on tobacco advertising, higher cigarette prices, and consequent youth protection as successful, broad-based public interventions. In Germany, there has been a marked decline in the number of smokers among young people (Orth & Töppich, 2015), which could be attributable to the expansion of education (knowledge as a resource available to a larger group) and to successful interventions. Nevertheless, Link and Phelan (1995) placed more importance on looking at the broader picture. In their view, the fundamental causes of diseases could only be tackled through massive societal interventions and a focus on policies relevant to the causes—only these would be effective in creating better health for *all*.

Similarly, Mackenbach (2017a: 14) described the persistence of health inequalities as "one of the great disappointments of public health". Although the welfare state and redistributive social policies reduce income inequalities and improve structural health determinants, such as appropriate housing or access to health care, these policies have not brought about significant reductions in health inequalities. According to Mackenbach (2017a), however, persistent health inequalities do not call into question the effectiveness of social policy as a moderator, but are rather a sign of the persistence of social inequalities as causes of health inequalities. He urges continuing research on specific policies which can contribute effectively to reducing health inequalities.

2.3 The moderating role of social policies on health inequalities

The narrow focus on health behavior mentioned above does not help to reduce health inequalities (Baum & Fisher, 2014). The focus on health behavior even distracts from the actual causes at a higher level, which is depicted impressively by McKinlay (1979: 9) in the following parable about a physician:

> *"You know", he said, "sometimes it feels like this. There I am standing by the shore of a swiftly flowing river and I hear the cry of a drowning man. So I jump into the river, put my arms around him, pull him to shore and apply artificial respiration. Just when he begins to breathe, there is another cry for help. So I jump into the river, reach him, pull him to shore, apply artificial respiration, and hen just as he begins to breathe, another cry for help. So back in the river again, reaching, pulling, applying, breathing and then another yell. Again and again, without end, goes the sequence. You know, I am so busy jumping in, pulling them to shore, applying artificial respiration, that I have* no *time to see who the hell is upstream pushing them all in".*[1]

This position is taken up by Carey and Crammond (2015) and Zajacova and colleagues (Zajacova & Lawrence, 2018; Zajacova & Montez, 2017). They describe so-called upstream change (changes in government structures and social policy) as a more effective intervention strategy against health inequalities than downstream change (changes in individuals or target groups caused by changes in health behavior). The important effect of material or structural factors leads to a higher emphasis on upstream interventions, as interventions by governmental institutions can influence those factors directly. The finding that behavioral factors are not decisive in reducing health inequalities leads to the rejection of downstream interventions while upstream interventions are recommended by health reports. These might, however, differ from the interventions actually carried out (Carey & Crammond, 2015). The call for upstream interventions is not limited to government recommendations in health reports, it is also addressed in academic research. Since downstream processes have shown that they cannot explain the persistence of health inequalities, the study of upstream factors is generally conceived to be more relevant (Ng & Muntaner, 2014). According to Nelson and Fritzell (2014: 64), "[t]heories about processes affecting health at individual level cannot straightforwardly be deducted to circumstances affecting health at population level". This

[1] McKinlay quotes this parable from a talk of his friend and medical sociologist Irving Zola in 1970.

statement leads us to the effects of social policy (upstream interventions) on health inequalities.

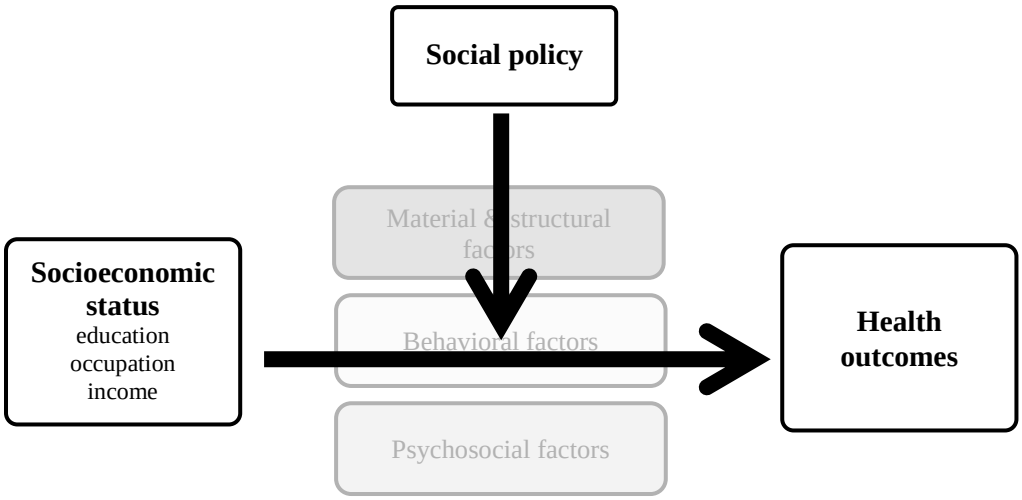

Figure 4: *Simple explanatory model of health inequalities with the extension of the macro level.*

Figure 4 illustrates the role of social policies as a macro-level intervention for the relation between socioeconomic status and individual health. I expect a moderation of social policies to impact health inequalities. Since socioeconomic status is linked to health through the three mechanisms (material/structural, psychosocial, behavioral), they are presented in the background. I concentrate on the question of whether social policies moderate the direct link between socioeconomic status and health; I will address the possible effect of social policies on the particular mechanisms in the outlook in Chapter 5.

3 Research strategy

When research on health inequalities and social policies was still in its infancy, welfare state regimes were the predominant moderating variable. Of a total of 54 studies on welfare state characteristics and health, Bergqvist et al. (2013) attribute 34 studies to the subgroup of studies of welfare regimes; some of them dating back to 2006.

The focus on welfare regimes is understandable given the availability of macro data; I also use welfare clusters in my dissertation project for the analyses of post-communist countries, as in this case comprehensive data is not available for all countries. When studying welfare systems as moderator, the assumption is that the generosity of a welfare state and the structure

of social policies reduce health inequalities. The Nordic countries, as generous and universal welfare states of the social democratic regime type (Esping-Andersen, 1990), were expected to perform better in reducing health inequalities compared to liberal or conservative-corporatist welfare systems. The systems in place in the Nordic countries do indeed perform better on absolute health measures, such as life expectancy indicators, but not on relative health inequalities (Lundberg et al., 2008; Mackenbach et al., 1997; Muntaner et al., 2011). The actual results and findings departed so far from expectations that some authors spoke of the Nordic public health *puzzle* (Bambra, 2011; Lahelma & Lundberg, 2009) or Nordic *paradox* (Huijts & Eikemo, 2009; Mackenbach, 2017a, b). Attempts to solve this puzzle led to increased efforts to look behind the black box of welfare regimes. Welfare regimes were quantified and broken down into their components; welfare generosity was measured by public social spending (Castles, 2009; Dahl & van der Wel, 2013; Lundberg et al., 2008) and specific social policy programs were considered as moderators (Högberg et al., 2018; Lundberg et al., 2015; Lundberg et al., 2008).

3.1 Overview

These different perspectives for measuring the impact of social policies on health inequalities are the basis for the three approaches derived: the regime approach, the expenditure approach, and the institutional approach (Bergqvist et al., 2013; Lundberg et al., 2015). Each of the three studies I did follows a different one of these three approaches. Even though recommendations from the research literature go in a certain direction, each approach has its distinct advantages and disadvantages, which validates the necessity to consider all three approaches.

In the following, I introduce the macro variables of social policy that are used in the three papers. Each paper represents one approach to studying social policy and health inequalities. To the best of my knowledge, Dahl and van der Wel (2013) were the first authors to link and compare the three different approaches referred to by them as the regime approach, the expenses approach, and the institutional approach (also called variable approach in van der Wel et al., 2011). The review of Bergqvist et al. (2013), which classified studies according to these three approaches for the first time, then established the distinction of the regime approach, the expenditure approach, and the institutional approach. I also use these terms in my work.

The *regime approach* takes a holistic view by assuming that the welfare state as a whole has a moderating effect on social inequalities in health. The welfare regime in general

determines the conditions for society through the dynamics of family, market and state, and significantly impacts inequalities, which individual social policy programs do not (Dahl et al., 2006). To this end, the regime approach uses welfare regime types. Based on common social policy characteristics, countries are grouped into families or regimes that are often described in the literature as *ideal types*. The existence of several typologies of welfare regimes reflects the diversity of the underlying concepts and dimensions of welfare states (for a discussion on welfare state typologies see Bambra, 2005). Nevertheless, a certain stability in country clusters is visible (Bambra, 2007).

The *expenditure approach* measures the generosity, endeavors, and protection of the welfare state by the level of public social spending (e.g., Alvarez-Galvez & Jaime-Castillo, 2018; Dahl & van der Wel, 2013; Gilbert, 2009). Higher expenditure is associated with improved population health and a reduction in health inequalities. Dahl and van der Wel (2013) and Gesthuizen et al. (2012) show that public expenditures (no matter whether social spending or health spending) primarily benefit the health of disadvantaged socioeconomic groups in society and reduce health inequalities through this mechanism.

The *institutional approach* focuses on how the design of welfare state institutions and characteristics of policy programs affect health inequalities. There are international comparative databases that provide characteristics of policies and protection schemes related to unemployment, pension, family or social assistance. Indicators of welfare generosity are benefit levels, coverage rates, duration of benefits or replacement rates (Lundberg et al., 2015). Similar to the institutional approach, Pega et al. (2013) described an individual policy approach, by which the authors understand natural experiments, such as the introduction or increase of minimum wages. Many authors advocate the institutional approach because it solves some of the weaknesses of the two approaches presented so far (Lundberg et al., 2015; Lundberg et al., 2008; Pega et al., 2013). The institutional approach opens the black box of welfare regimes and provides insights on a specific quantifiable policy indicator. When we find out which characteristic of which social protection scheme reduces health inequalities, we can derive concrete measures and policy recommendations—in sharp contrast to the simple recognition that one welfare state produces higher inequalities than the other.

As stated above, many authors recommend the use of the institutional approach (Bergqvist et al., 2013; Brennenstuhl et al., 2012; Lundberg et al., 2015; Pega et al., 2013). Nonetheless, the other approaches still have merits of their own: the regime approach considers the interconnectedness of actors and institutions in the welfare sector holistically; the expenditure

approach allows a quantitative comparison of readily available social expenditure measures in different countries. All three approaches are used in this dissertation, which lends the work a comprehensive view of the research field of social policies and health inequalities.

The data from the European Values Study (EVS) play an important role for this project because the survey covers an unprecedented diversity of European countries, particularly the eastern parts of Europe. However, the high number of countries is accompanied by restrictions on the availability of institutional data. The EVS includes many post-communist countries and countries with a rather low gross domestic product (GDP), which often do not—or cannot—provide (institutional) social policy data to the same extent as western countries or EU member states. There are too many missing values for the macro variable of interest and the institutional approach cannot be used. For this reason, studies using EVS data adopted the regime approach (Study I) and expenditure approach (Study II) respectively, while Study II also required a reduction in the number of countries. Study III uses several rounds of the ESS and applies the institutional approach. Details on each contextual indicator for welfare state and social policy can be found in the studies following this framework paper.

3.2 Regime approach

In the first study, I examine how health inequalities vary across welfare systems. The regime approach uses welfare regimes or other ways of clustering countries as explanations for variations in health inequalities. I assume that citizens appreciate the idea of the welfare state as a last resort of security and do not (always) differentiate between the different social policies of, e.g., pension, health, and minimum income benefits.

In his famous work *The three worlds of welfare capitalism* Esping-Andersen (1990) suggested studying welfare state generosity by using welfare state regimes rather than specific characteristics of social policy programs. He claimed that regime types can help us to understand the *big picture* (Esping-Andersen, 1990: 2). Esping-Andersen (1990) developed his regime typology as a way of overcoming the disadvantages of various analyses with social policy characteristics and social expenditures, as well as the methodological challenges of dealing with many countries to overcome single case studies. He considered that regime types could solve these issues. Esping-Andersen's (1990) welfare regime typology for 18 OECD countries is based on the main elements of decommodification, social stratification, and the private-public mix which led to three welfare regime types: liberal, conservative, and social democratic. However, due to his concentration on the expenditures involved in the social

transfers of social policy programs to classify the countries, he was criticized for missing the big picture in his typology. Services in the area of education or health care were disregarded in creating the ideal types (Bambra, 2007).

In response to the criticisms of Esping-Andersen's typology, many authors in the field of health inequalities used the typology of Ferrera (1996). He analyzed the welfare states of Italy, Spain, Portugal, and Greece by looking at the beneficiaries of social benefits according to principles of coverage and replacement rates. According to Ferrera, the southern European countries form a welfare type of their own, next to regional clusters of the Bismarckian regime type with continental European countries, the Anglo-Saxon and the Scandinavian regime types. The regional categorization of welfare states in Ferrera's typology makes it easy to add an 'Eastern' regime type for eastern European to the other welfare regimes; in particular Bambra, Eikemo, and colleagues often applied the Eastern welfare regime (Eikemo et al., 2008a; Eikemo et al., 2008b; Eikemo et al., 2008c).

More recently, many authors have considered the regime approach as outdated (Bergqvist et al., 2013; Lundberg et al., 2015; Pega et al., 2013). The provision of an overall picture is criticized as a *black box problem* (Kangas, 2010: S52), because categorization in regimes does not explain the mechanism by which the welfare state affects health inequalities, nor are national social policy programs the same within a specific welfare regime type. Furthermore, in all typologies, welfare regimes are *ideal* types that express certain common features of actual welfare states. As ideal types, the countries of one regime type do not all share common characteristics to the same extent (Kangas, 2010). Health differences between countries of the same regime type could be overlooked by the formation of averages (Lundberg, 2008). There is also a risk in focusing on classical regime typologies such as *The three worlds of welfare capitalism* from 1990 of not taking sufficient account of changes in social policies, since „…the composition of the welfare state regimes is not static" (Bambra, 2007: 1101).

The regime approach assumes that generous and universal regimes, like those of the Scandinavian countries, lead to lower health inequalities. However, empirical studies have shown that the Nordic welfare regime does not generate the lowest health inequalities in intra-European comparison. Expectations of the explanatory power of the regime approach went so far that some studies referred to actual health inequalities in the Scandinavian countries as a puzzle or paradox (Bambra, 2011; Huijts & Eikemo, 2009; Lahelma & Lundberg, 2009; Mackenbach, 2017a, b).

Some of the reasons given by Esping-Andersen in 1990 for his typology of welfare regimes no longer apply: the availability of many different databases for social policy programs (e.g., ESSPROS, CSB-MIPI, SaMip, SPIN, CWED2)[2]—at least for western industrialized countries—enables more differentiated approaches to be pursued rather than drawing on country clusters. Furthermore, analysis methods to incorporate indicators of the country level, such as multilevel analyses, have reached mainstream social sciences. Despite the many demands to move beyond the regime approach, it is now the most frequently used approach to research on contextual effects on health inequalities (Bergqvist et al., 2013; Pega et al., 2013).

> *"When we compare clusters of nations with common political backgrounds, democratic systems, or welfare regimes, we gain insights into why some countries are more successful than others at improving their countries' population health or reducing health inequities."* (Muntaner et al., 2011: 948).

The aim of Study I was to gain insights for eastern and western European countries into why some countries are more successful in reducing health inequalities than others. Even though Pega et al. (2013: 178) argue in the context of the regime approach that "…the low-hanging fruit has been picked with respect to running country-level ecological regression analyses.", this alleged overuse of the regime approach does not apply to post-communist countries. To gain further insights, I use a broad range of eastern European countries—including those that are not members of the EU—and compare them with western European countries. Previous studies that did include eastern European countries usually used the typology of Ferrera (1996), with a simple, rather uncritical extension by an *Eastern* regime type. Ferrera's typology dates from 1996 and therefore does not reflect new developments in social systems. Nevertheless, Ferrera considers quantitative indicators such as coverage and replacement rates in his typology. The use of quantitative indicators differs from the application of qualitative indicators in *The three worlds of welfare capitalism*. Overall, however, none of the previous regime typologies, neither those of Esping-Andersen, nor of Ferrera or their modifications by Eikemo and colleagues (Bambra & Eikemo, 2009; Eikemo et al., 2008a; Eikemo et al., 2008c) covered the wide range of countries that I wanted to study

[2] European System of integrated social protection statistics (ESSPROS) provided by Eurostat; CSB Minimum Income Protection Indicators database (CSB-MIPI) provided by Van Mechelen and colleagues from Herman Deleeck Centre for Social Policy; Social Assistance and Minimum Income Protection Interim Dataset (SaMip) provided by Nelson and colleagues from the Swedish Institute for Social Research (SOFI); Social Policy Indicators database (SPIN) also provided by SOFI; Comparative Welfare Entitlements Dataset (CWED2) provided by Scruggs, Jahn, and Kuitto.

and that were available in the EVS 2008/2009. Based on previous studies (Fenger, 2007; Saint-Arnaud & Bernard, 2003), I have chosen quantitative indicators for a cluster analysis to develop my own welfare regime clusters for the eastern European region. The description of the selected indicators and the results of the cluster analysis can be found in the chapter on Study I.

3.3 Expenditure approach

The expenditure approach examines social spending or health spending, usually as a percentage of national income, in relation to health inequalities. The presentation of social expenditure as a percentage of gross domestic product (GDP) ensures that the measure is comparable for all countries, regardless of the size of the state. The underlying assumption is that higher social expenditures will reduce health inequalities. Between 2005 and 2013, Bergqvist et al. (2013) identified eight studies qualifying for the expenditure approach, only two of which, however, looked at how social spending or health spending affect health inequalities: Dahl and van der Wel (2013) studied 18 countries using data from the EU-SILC and found that social expenditures are associated with lower educational health inequalities. The lowest educational group (i.e., those with primary education) experiences a reduced health disadvantage due to high social expenditures compared to those with tertiary education. Gesthuizen et al. (2012) looked at governmental health spending and found that the relative risk of having poor health is smaller for the lower educated group in countries with a higher level of health spending. In a very recent publication, Alvarez-Galvez and Jaime-Castillo (2018) were able to confirm previous results on the effect social expenditures have on reducing educational inequalities in health.

One critique of the expenditure approach is somewhat related to the regime approach: measuring generosity of welfare states in social spending does not take into account social rights and social citizenship, which are the core values of the welfare state (Esping-Andersen, 1990; Marshall, 1965). Welfare states also offer their citizens protection through non-financial programs—e.g., fostering female labor force participation can reduce poverty of women in old age over the long term. As a quantitative approach, social expenditures do not consider this kind of social policies.

The idea of *the bigger the better* behind the expenditure approach is also controversial (Dahl & van der Wel, 2013; Gilbert, 2009). The assumption that higher social spending is an expression of generosity neglects the aspect that more spending could just as well be an

indicator of more demand, as is the case in times of recession and increased unemployment (Esping-Andersen, 1990; Lundberg et al., 2008). In those cases, high spending is likely to be a sign of failure of social policy in the first place rather than an indicator of a generous and functioning welfare state (Castles, 2009). Esping-Andersen (1990) and Castles (2009) recommend disaggregating social expenditures. High social spending does not always indicate a level of generosity from which the entire population benefits. For example, social expenditure in Kosovo is dominated by war veterans' pensions, and is therefore an impractical indicator for comparative analyses (Feher et al., 2016).

To take account of *the indifference of need* (Gilbert, 2009: 361), Dahl and van der Wel (2013) calculate a dependency ratio for their measures of social expenditures that takes into account the proportion of the unemployed population which does not receive a wage but which has to be provided for by the state. However, the authors note that the results did not differ significantly between indicators that were adjusted for need and those that were not.

Furthermore, Gilbert (2009) criticizes *the assumption of proportionality*: the common use of gross domestic product (GDP) in the denominator assumes that, regardless of the degree of economic prosperity, an equal share of social expenditure implies an equal degree of generosity. Equally large values of social spending in percentage of GDP would be interpreted in such a way that these countries assign the same importance to social welfare, even if population size and absolute economic prosperity differ and would lead to very different assessments regarding welfare generosity. Here too, Dahl and van der Wel (2013) have taken these concerns into account and tested both social spending as a percentage of GDP and per capita. However, they did not find significantly different results for the various indicators of social expenditure.

Another shortcoming is that the expenditure approach ignores the distribution of wealth within a society. To overcome this criticism, I controlled for income inequality in my analyses. In addition to social spending, I included income inequality before taxes and transfers (Gini Index on market income) to have a measure of the need for redistribution.

Castles (2009) found different patterns of priorities in social spending; many countries with high spending in one policy area have a low spending level in another area. Few countries in his study showed a consistent pattern of low or high spending across different policy areas. Obviously, expenditure levels in one policy area of a welfare state (e.g., age-related cash) are not necessarily related to expenditure levels in other dimensions (e.g., health

or services). To acknowledge the overall generosity of the welfare state towards those most in need, it is important to look at the aggregate of expenditure on old-age and survivors, families, and unemployment. I examine the extent to which social spending moderates (and reduces) the relationship between income and health; I expect a reduction in the health disadvantages in the lower income groups and thus lower health inequalities in the population. The analysis of this assumption is ensured by studying total social protection expenditures which covers transfers in cash or in kind, i.e., services, and the associated administrative costs. Social expenditure is therefore a valid indicator of the overall social responsibility of a welfare state (Lundberg et al., 2008). Another drawback of using disaggregated social spending would have been the availability of data. Disaggregated social spending data are available for EU member states, but not for the range of countries available in the EVS.

3.4 Institutional approach

The institutional approach usually refers to a single social program or a specific target group of social policy, e.g., pensions, unemployment benefit, family policies or social assistance to single mothers (e.g., Burstrom et al., 2010). In the institutional approach, social policy is analyzed in terms of programmatic effects and the policies responsible for health inequalities can be precisely defined and eventually modified. The approach allows a quantitative analysis of the core dimensions of social rights (e.g., coverage) to derive recommendations for policy impact (Ferrarini et al., 2014b). It remains to be seen, however, how the results can be transferred from specific target groups to health inequalities at a societal level. On the one hand, a change in numerically small target groups seems unlikely to affect health inequalities on a large scale. On the other hand, Bergqvist et al. (2013) found that most studies of the institutional approach assume that generous policies are not only positive for the health of the directly affected target group, but also for general population health.

Most reviews of studies on health inequalities and welfare states find that the measurement of policy instruments or programmatic effects is more promising for public health research than the use of typologies alone (Bergqvist et al., 2013; Brennenstuhl et al., 2012; Pega et al., 2013). Brennenstuhl et al. (2012: 407) recommended that "when available, measures of actual policies and policy outputs should be used instead of welfare regime typologies". This statement itself indicates the limitations of the institutional approach: the availability of data and measurement options.

The institutional approach has rarely been used to date (e.g., in Lundberg, 2008; van der Wel et al., 2011); most likely because the approach requires much more detailed comparative knowledge about welfare state institutions than has been gathered so far. Collecting data on statutory rights to social policy programs in all countries involves a great deal of work (Alvarez-Galvez & Jaime-Castillo, 2018). In the case of Europe, many post-communist countries do not yet provide reliable sources for describing and identifying specific policy programs, such as replacement rates of unemployment benefits and pensions, or minimum income benefit levels (Alvarez-Galvez & Jaime-Castillo, 2018; Bergqvist et al., 2013; Kuitto, 2016). To date it is mainly formerly communist EU member states which are able to provide the necessary statistics and research (Bradshaw et al., 2013; WHO, 2018). This lack of information leads to a persistent under-representation of the eastern European non-EU countries in comparative collections of social policy indicators (e.g., SCIP, CWED2).

In addition to the feasibility or practicability of the approach, there are other points of critique. First, the generalizability of the results for specific (target) groups to the population. As described above, there is a general expectation that social policy will have an impact on the population as a whole. This competes with the possibility that the programmatic effects will be limited to the recipients or beneficiaries of a particular social policy. This means that it is often difficult to interpret the results, especially when a social policy has a rather small target group, such as single mothers or, in my case, minimum income protection. Interventions then may not lead to a reduction of health inequalities simply because the target group is too small to influence overall societal phenomena.

A second problem is the so-called *standard(ized) worker* as the basis for the calculation of values. Many social policy programs only provide access to benefits when their target groups fulfil certain qualifying conditions; benefit levels often depend on several beneficiary characteristics (Lundberg et al., 2008). For example, the duration of unemployment insurance depends on age and length of previous payments; the level of social assistance benefits depends, inter alia, on the household composition. To map relevant program characteristics, the databases use several assumptions on age, number of children, and working hours to build a so-called "standard(ized) worker". This is also called the type-case or model family approach, e.g., with three model families in the case of the SaMip data: a single adult person, a one-parent family with two children, and a two-parent family with two children (Nelson, 2013b). The "standard worker" or the "model family" represents—at best—only a fraction of actual lifestyles. The definition of many assumptions increases comparability between the

national schemes; however, the more precisely the models are described, the less representative they are of the total population (Eardley et al., 1996). Expressing this complexity of conditions in a single number might be a problem for the generalization of results, even more so if the intention is to draw policy conclusions. There is a potential risk that this approach may ignore other important groups and bias results. The larger these groups are the more problematic are misleading conclusions from the results (Bergqvist et al., 2013).

The advantage that several scholars see in the institutional approach, namely breaking up the *black box* of the welfare regime, is perceived as a disadvantage by others: according to Pega et al. (2013) and van der Wel et al. (2011) the approach fails to provide an "overall picture" of why policy is important for health because it does not allow us to examine the effects of the dynamics of social programs and their interaction with institutions and actors.

In the institutional approach, there are many possibilities for the selection of indicators. I have opted for statutory benefit levels of minimum income protection. To the best of my knowledge, no study has explored the impact of minimum income protection on health inequalities. It was important to me to study a social program that serves as a last safety net, open to everyone in need. Although the means-testing of social assistance implies that only a small fraction of the population is a recipient or beneficiary of this benefit (Bahle et al., 2011; Van Mechelen & Marchal, 2013), social assistance is nevertheless anchored in the social consciousness—probably more than schemes that focus on certain subgroups of society (e.g., family policy). In Study III, I explain why I assume that minimum income protection is good for the health of the general population.

I measure the generosity of social policies with my institutional indicator. The national social assistance schemes on which the indicator is based are targeted at adults of working age who are involuntarily unemployed and are no longer entitled to social security benefits, such as unemployment insurance. For this reason, I have deliberately excluded people over the age of 60 from the analyses; there are other programs for this group. For people aged 50 and over, Högberg et al. (2018) studied the moderating effect of minimum pensions on health inequalities by occupational class and found a more even distribution of health where minimum pensions are more generous.

Applying the institutional approach implies restrictions in the variation and number of countries because of limited data availability. To be able to make relevant statements, however, one possibility is to observe countries over several points in time and thus increase

the number of cases. The European Social Survey (ESS) runs biennial surveys and was therefore used as the microdata basis for the institutional approach (Study III). I used the cumulative file of the ESS which included six rounds from 2002 to 2012, which increases the number of cases from 26 countries to over 150 country-years in the sample. The clustered structure of countries and rounds is taken into account by multilevel modelling.

Besides the novelty of measuring welfare generosity with benefit levels for those who have slipped through all prior safety nets, I analyze the effect of income on health as an indicator of socioeconomic inequalities in health. This differs from previous research that has concentrated on educational health inequalities (Ferrarini et al., 2014a; van der Wel et al., 2011). The focus on income-related health inequalities is important, since minimum income protection is a social policy program that offers financial support for those in need.

4 Results

This section provides a summary of the studies, including research questions and results. Table 1 presents an overview of the research design, datasets used, and the country sample on the three studies. For each study, I derive conclusions from the results of the studies, recommendations for further research and outline possible research projects. The studies are not presented in the chronological order, but rather are oriented according to the operationalization of the three approaches. In particular, the second paper (Study II) laid the much needed empirical and methodological groundwork for the other studies.

The overall research question is whether social policies have a moderating impact and, in particular, whether they reduce socioeconomic health inequalities. In each study, one of the three approaches—regime approach, expenditure approach, and institutional approach—is applied. The research question is specified accordingly and directed towards the respective social policy indicator used.

Table 1: *Overview of the research design, datasets, and country samples*

Study	Main Research Questions	Hypotheses	Micro data	Macro data	Analysis	Measurement of socioeconomic status	Indicator of social policies	Main Results	Countries
Study I: Regime approach	Are health inequalities larger in post-communist welfare clusters than in Western Europe?	Welfare clusters moderate income-related and educational health inequalities.	EVS 2008/09	Self-compiled regime typology	Cluster analysis, simultaneous multilevel regression models	Education (3 groups based on ISCED) Equalized household net income, presented in deciles	Welfare clusters	In some Eastern welfare clusters, educational health inequalities are higher than in Western Europe. Income-related health inequalities do not differ between the welfare clusters.	43 countries AL, AM, AT, BA, BE, BG, BY, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GE, GR, HR, HU, IE, IS, IT, LT, LU, LV, MD, ME, MK, MT, NL, NO, PL, PT, RO, RS, RU, SE, SK, SL, UA, XK
Study II: Expenditure approach	Does income inequality increase health inequalities? Do higher social expenditures reduce health inequalities?	Income inequality increases health inequalities. Generous social policies reduce health inequalities.	EVS 2008/09	Self-compiled data SWIID, ILO, Eurostat	Country-wise logit models, country-wise OLS models, step-wise multilevel regression models	Equalized household net income, presented in quartiles	Social expenditures in % of GDP	Income inequality is positively related with health inequalities. Social expenditures are not related with health inequalities.	42 countries AL, AM, AT, AZ, BE, BG, BY, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GE, GR, HR, HU, IE, IS, IT, LT, LU, LV, MD, ME, MK, MT, NL, NO, PL, PT, RO, RS, RU, SE, SK, SL, UA
Study III: Institutional approach	Do more generous minimum income protection benefits lead to lower health inequalities?	The more generous the minimum income protection benefits, the smaller the health differences between the income groups.	ESS 2002-2012	SaMip, World Bank-WDI	Simultaneous three-level regression models (individuals, country-years, country)	Equalized household net income, presented in quintiles	Statutory minimum income protection benefit levels	Generous minimum income protection reduces health inequalities between the middle income groups.	26 countries AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, HU, IE, IS, IT, LT, LU, NL, NO, PL, PT, SE, SK, SL

4.1 Study I: The role of welfare regimes

This study brings a much-needed perspective to the health inequalities literature: welfare state regimes and health inequalities in non-western European countries. I was able to draw on the 2008/2009 wave of the European Values Study to investigate 43 countries in total, 23 of which are post-communist countries. With a cluster analysis I find that the welfare systems of post-communist countries are best described by four distinct welfare clusters: EU member countries from Central and Eastern Europe 'CEE EU members', the 'Balkans', countries from the former Soviet Union 'FSU', and 'Hard transition states' (see Figure 5). In this paper, I examined whether welfare regimes relate to health inequalities and whether the type of welfare cluster moderates the relationship between income and education and self-rated health. The value of the study lies in its focus on Eastern Europe with the identification of welfare cluster types.

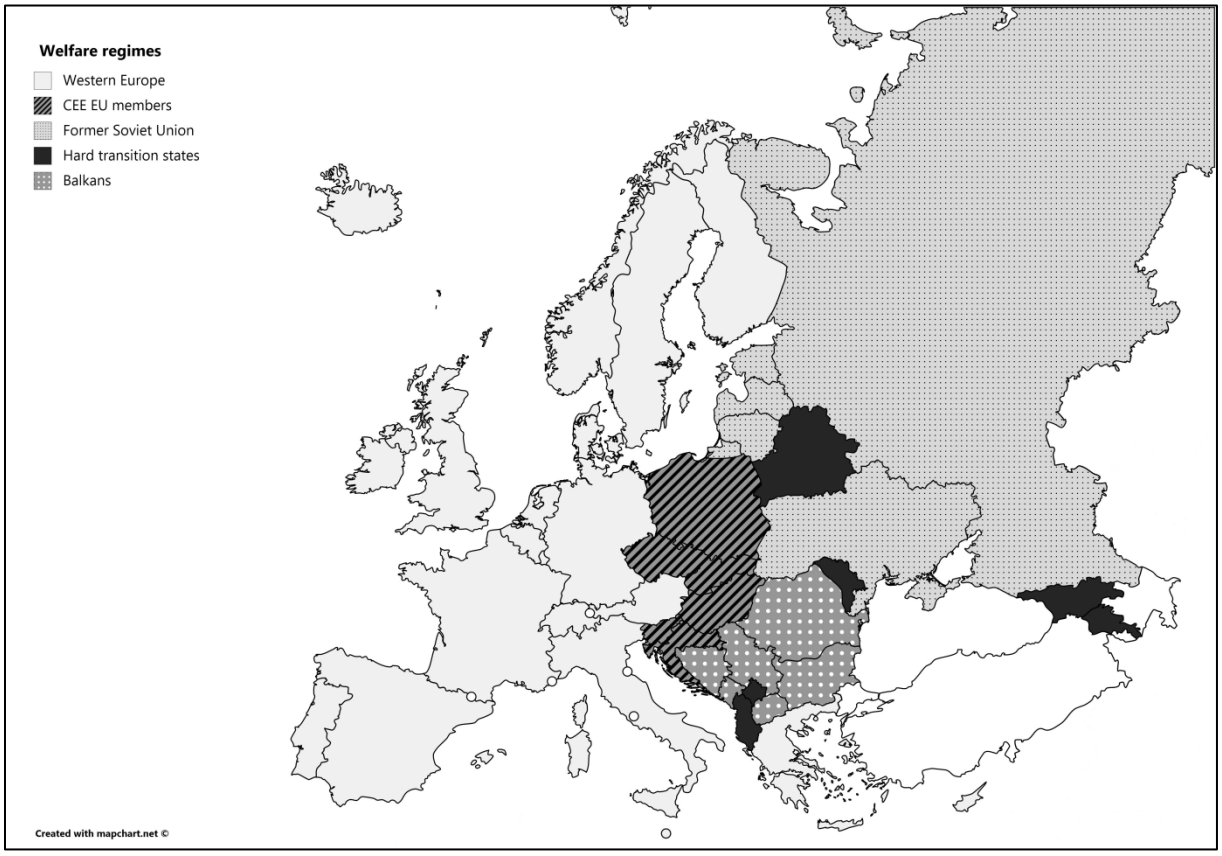

Figure 5: *Post-communist welfare regimes and Western European welfare cluster.*

Therefore, I aim to answer the following research questions:

Do health inequalities differ among welfare clusters?

Do the welfare clusters have a moderating effect on income-related and educational inequalities in health?

I expect both income-related health inequalities and educational health inequalities to be higher in eastern European welfare clusters than in Western Europe. Bearing in mind that half of the European Values Study consists of post-communist countries, where a good part of the adult population was educated during communism and equal access to education was emphasized, educational health inequalities must be considered in detail. In previous research, lower educational health inequalities were found in the Baltic States and in central eastern European countries compared to western countries (Bobak et al., 2000; Eikemo et al., 2008c; Mackenbach et al., 2008b).

I compared the four identified welfare clusters with a reference category for the western European welfare regimes. Even though I could confirm the Ferrera typology of welfare regimes for the western European countries, I have not integrated each of the five Western welfare regime types separately into the analysis. The aim was to keep the model concise, as I did not want to introduce further variables at the second level in addition to the cross-level interactions terms of three educational levels and five welfare cluster types. The multilevel regression analyses show that income-related health inequalities do not differ across welfare regimes in Europe, whereas significant differences in educational health inequalities exist. The welfare cluster of CEE EU members has the highest educational health inequalities of all welfare clusters.

The study contributes two main results to current research: the four welfare clusters in post-communist countries and the high educational health inequalities in central eastern European EU members. The results show that the particularities of each country need to be recognized. The post-communist countries are grouped in more than one cluster, namely four different clusters. There are clear differences between the eastern European countries that are members of the EU and those whose economies have been heavily dependent on the International Monetary Fund (IMF), the World Bank, and other donors.

The variations in the size of educational health inequalities show how important it is to differentiate between post-communist countries, as inter-cluster inequalities differ greatly.

Educational health inequalities are particularly pronounced in the cluster of CEE EU members, i.e., in those countries where educational expansion is well advanced. The differences in educational health inequalities are all the more striking as I could not find differences in income-related health inequalities between the clusters—nor between east and west. A more comprehensive understanding of health inequalities in Eastern Europe promises to generate additional insights into the determinants of health inequalities beyond that region.

There are two aspects in this paper that deserve further investigation: the continuing study of regime types in Eastern Europe, and a more detailed analysis of educational expansion as a moderator of socioeconomic health inequalities. First, it seems important to examine whether there will be future changes in the clusters of the welfare states of post-communist countries. In my cluster analysis of the post-communist countries, I find a similarity with the geopolitical linkages of the countries. The geopolitical dimensions have shifted since 2008 and continue to do so, for example Ukraine's orientation (although officially suspended) towards the EU, away from Russia; the EU's Stabilisation and Association Agreements with several Balkan states, which is a first step towards EU membership application; or Croatia's EU membership since 2013. Not intuitively at first glance, the Baltic States clustered with other former members of the Soviet Union instead of other EU members. This may be due to the historical context and the clustering of the Baltic States may therefore change over time. Furthermore, the question arises whether eastern European countries, especially the CEE EU members, will one day fit into the existing typologies produced by Esping-Andersen or Ferrera. All in all, it will be interesting to see whether the welfare clusters will be maintained or whether some countries will change their cluster membership.

Second, based on my findings, future research should address the impact and consequences of educational expansion on educational health inequalities. Are educational health inequalities changing from the current health gradient to a health gap, with the lower education group particularly suffering from health disadvantages? If the group of people with lower educational attainment becomes smaller and smaller, there is, on the one hand, a risk that these people will be left behind and that health inequalities will further increase. On the other hand, it can be assumed that targeted interventions that benefit this lower educational group are more effective, as the small group is more homogeneous.

4.2 Study II: Income inequality and social expenditures

This study is linked to the expenditure approach and looks at social expenditures as a percentage of GDP. Besides social expenditures, I also examine income inequality and GDP. Income inequality based on market incomes highlights the need for redistribution and social expenditures. The EVS 2008/2009 includes some countries that are not covered by Eurostat statistics and various other sources of social expenditure have been used for these countries as a result. Reliable data on social expenditure were not available for Bosnia-Herzegovina and Kosovo and these countries were therefore excluded from the analysis. Data sources are listed in Study II, Appendix B.

Using the data of the EVS 2008/2009 and the self-compiled macro data, I examine the following research questions on the basis of a two-step hierarchical analysis:

Are higher levels of social expenditures related to lower health inequalities?

Does income inequality increase health inequalities?

With the two-step hierarchical analysis I examine the effect of income on health—income-related health inequality—separately for each country. Bryan and Jenkins (2016) describe several advantages of the two-step approach. First, as I look at each country individually in the first step, I can identify outliers and possible causes of variations in the data. The two-step approach offers a valuable descriptive overview of health inequalities in Europe, which serves as helpful background knowledge in Study I and Study III, where I apply simultaneous multilevel analyses. Second, the insights into the level of health inequality per country enriches the "graphical approach that provides a non-statistical view of country-level variation" (Bryan & Jenkins, 2016: supplemantary material: 8). Third, for large sample sizes given in the European Values Study, the estimates have the correct standard errors and the approach has no methodological disadvantages. In the second step of the hierarchical analysis, the countries represent the units (i.e. 42 observations); the income coefficient as an indicator of health inequality is the dependent variable which offers an easy interpretation.

The analyses in Study II have also provided a basis for decisions which I then applied to the other research papers, such as the modelling of subjective health as the dependent variable or how to deal with (many) missing values of the independent variable.

I tested three ways of using subjective health as a dependent variable: ordinal, linear, and dichotomous. The comparison of the different modelling of subjective health—as a dummy

variable for poor health and as ordinal dependent variable—shows no substantial differences. A robustness check included a linear regression on the metric use of the 5-point scale of self-rated health. The comparison of results shows only small differences between the ordinal and the linear model. This is important for complex simultaneous multilevel models and subjective health is therefore used as a metric dependent variable in linear regression models in Study I and Study III (see also Olsen & Dahl, 2007). In order to incorporate all the information given by the respondent, including the fine gradations at the edges of the response scales, I use subjective health as a 5-point variable in the other studies. In this way, I avoid the dilemma of combining the response categories in a dummy and the question of where the cut-off points should be set. Recoding subjective health into "poor health" or "less than good health" as some researchers do (Eikemo et al., 2008a; Eikemo et al., 2008b) is a reduced reflection of the respondent's information. I follow the WHO's positive definition of health by using the full range of answers given (for a further discussion see Chapter 4.4).

Robustness checks and sensitivity analyses show that the way in which missing values of income are dealt with has only a marginal impact on the results. Multiple imputations produced more conservative estimates but did not change the results. The results remained the same, regardless of whether I imputed the missing values of income or applied listwise deletion, i.e., cases with at least one missing value are excluded from the analyses. The influence of the missing values is not as strong as one would expect given the high numbers.

It is generally assumed that there is a negative relationship between generous social policies and health inequalities (Bergqvist et al., 2013). However, I could not confirm this in Study II, using social spending as indicator for social policies. I did not find any significant relation between social spending as a % of GDP and income-related health inequalities. A recent study by Alvarez-Galvez and Jaime-Castillo (2018) confirmed my findings.

As expected, income inequality is positively associated with health inequalities. Income inequality leads to health inequalities independent of national wealth. The control variable GDP had a negative effect on income-related health inequalities. The analyses showed that the Gini index dominated in the context of the three macro determinants of health inequalities and had a stable positive effect across the model variations (see Study II, Table 1: standardized beta coefficients).

Although the Gini index (based on market income) in the models has a significant influence on health inequalities, while social expenditure does not, this is nevertheless an

indication of the importance of social policy in its role as a redistributive mechanism. Future research could examine the impact of social redistribution on health inequalities by using the Gini index, which is based on disposable income compared to market income.

The most recent EVS 2017 contains fewer countries than the EVS 2008, but the possibility of a time comparison is given for all countries of the EVS 2017, which would be an interesting follow-up analysis. The financial crisis may have had an impact on the EVS 2008 data, so a comparison nine years later would provide insights into whether and to what extent the financial crisis has affected the 2008 results.

4.3 Study III: Does minimum income protection make a difference?

In Study III, I applied the institutional approach and studied the characteristics of one social policy scheme in particular. I chose minimum income protection as a last safety net and looked at the statutory national benefit rates from the SPIN/SaMip database. This might differ from the actual payment, which can be lower (due to sanctions) or higher (due to claims for additional benefits, such as housing supplements) than the statutory rate. The use of the statutory rates ensures comparability between countries and social systems. Furthermore, I assume that the levels of the statutory rates are relevant and known in society, and influence the whole society reaching beyond the target group.

In this paper, health inequalities were modelled based on the effect of income on health. I assume that minimum income protection influences the link between income and health, but not between education or occupational status and health; income is therefore the decisive social determinant of health in Study III. The research question specifies the focus on income:

> *How is minimum income protection associated with income-related health inequalities?*
>
> *Do higher benefit levels improve the health of the lowest income groups and the middle income groups?*

Education and occupational status are included as control variables in the analyses. The analyses were carried out using a simultaneous multilevel model with two variables at the macro level: GDP per capita and benefit levels of minimum income protection. I tested the moderating effect of benefit levels on the relationship between income and health with a cross-level interaction.

I have operationalized household income for each country in quintiles and calculated cross-level interaction terms for five different income groups accordingly. In this way, I was able to answer the second research question as to whether minimum income protection also has an effect on middle and higher income groups. Even though the benefits of the minimum income protection as the last safety net are means-tested (Bahle, 2019), I assumed that knowledge of generous benefit levels also has effects on the middle class: it provides a degree of security, reduces stress, and therefore has a positive effect on health.

Study III differs from the other studies in the use of the data. As mentioned above, the institutional approach requires specific information on institutional measures. Publicly available statistics are less common in countries with low GDP because of the administrative effort and bureaucracy involved in obtaining correct institutional and/or statistical information on social policy programs. Many post-communist countries are not included in the usual databases and, had I used EVS data, I would have been forced to omit many countries from my analysis. In contrast, the European Social Survey (ESS) covers many EU member states plus Iceland, Israel, Norway, Russia, Switzerland, Turkey, and Ukraine and has been running every two years since 2002. It is therefore well-suited to combine microdata with macro-level data, e.g., from Eurostat, and I was able to analyze six rounds from 2002 to 2012.

Benefit levels of minimum income protection have a significant positive effect on individual subjective health. Contrary to my assumptions, however, the influence of the benefits on health inequalities could not be confirmed. The income gradient in health at the micro level is also reflected in the cross-level interactions terms; the positive effect of minimum income protection decreases with each quintile down the income distribution. The lower income groups thus had no health advantage over the other income groups in countries with higher benefit levels. In countries with higher generosity of benefits, such as Luxembourg, it appears that income-related health inequalities are even greater than in countries with lower benefits, such as Poland or Lithuania. Overall, I did not find any confirmation that minimum income benefits reduced income-related health.

Recipients or beneficiaries of minimum income protection and social assistance were not identifiable in the ESS data and the number of recipients is consequently subsumed in the lowest 20% of the income distribution. While the ESS do not provide the data to test whether minimum income protection has a positive effect on the health of this group in particular, compared to other income groups, it is this kind of analysis that may contribute to comparative research on social policy and health inequalities. The question could be

addressed through a panel analysis of the health of recipients before social assistance benefits are claimed, during receipt, and after termination. Comparisons of the degree of stigmatization of the different minimum income protection schemes in Europe could also be considered.

Additional research questions could relate to the coverage of minimum income protection in the population and the non-take-up of benefits despite entitlement. To what extent does the health of recipients differ from the health of people who are entitled but do not claim benefits? Here, too, stigmatization of recipients might play a role.

I look at benefit levels of minimum income protection because I want to understand the impact of a social policy which is considered the last safety net on health inequalities. Would health inequalities look different if there was an unconditional basic income instead of means-tested, targeted minimum income protection? According to the fundamental cause theory (Link & Phelan, 1995), health inequalities persist because socioeconomic status determines not only money but also power, knowledge, and prestige. However, beyond the resource aspect of an unconditional basic income, other aspects of the unconditional basic income, such as trust and solidarity, could have a reducing effect on health inequalities. First results of the basic income experiment[3] of Kela, the social insurance institution in Finland, show that the treatment group has better health than the control group (Kangas et al., 2019).

4.4 Limitations

In Chapter 3, I have described specific limitations for each approach. However, there are also two additional limitations which are relevant for all three studies. They will be addressed in greater detail in this chapter.

The first challenge is the use of subjective health as dependent variable. To measure health inequalities, which is indicated by a (significant) effect of socioeconomic variables on health, I used self-rated health as a subjective measure of individual general health status. While critics argue that self-rated health is an "extremely broad concept of health" (Fritzell & Lundberg, 2006: 8), I see beneficial opportunities in this fact. Subjective health is understood holistically and includes both physical and mental states of health. This is the interpretation of

[3] The experiment consisted of a basic income of 560 Euros/month for two years. This corresponded to the monthly net amount of the basic unemployment allowance and the labor market subsidy. For the treatment group, 2000 persons aged 25-58 were randomly selected from all recipients of unemployment benefits (as of November 2016).

health in many social science surveys; the ESS even mentions in the interviewer instruction that general health refers to both physical and mental health. This concept comes very close to the WHO definition of positive health, „which is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity“ (WHO, 1978).

The WHO's emphasis on social well-being is called into question by studies which claim that there is a ‘true’ health status which often does not correspond to one’s own perception of health (Bago d'Uva et al., 2008; Jürges, 2007; Lindeboom & Van Doorslaer, 2004). I, however, follow Jylhä (2009) and Huisman and Deeg (2010), who reject this argument but assume that subjective health is the perception of one's own state of health. Individual variations in pain sensitivity or perceived impairment by a disease influence the self-assessment of health and may not correspond to external expectations based on objective health indicators (Bailis et al., 2003). According to Jylhä (2009), cultural differences can be reflected in the overall health of the population, even if no differences would be assumed on the basis of similar objective health indicators, such as infant mortality rate or life expectancy. A comparison of Germany, Denmark, and Sweden, which have similar objective indicators, shows these differences: Germans tend to under-rate their health, while Danes and Swedes tend to over-rate their health (Jürges, 2007). On the other hand, in Kosovo, respondents report good subjective health, which is not reflected in the aggregated objective indicators of infant mortality or life expectancy (see also Study I). In the framework of ‘true’ health, the differences in subjective and objective health measures are explained by the absence of scale equivalence of response categories between different cultures and languages and between social subgroups (Burgard & Chen, 2014; Jürges, 2007, 2008; Tandon et al., 2002). Response category cut-points are probably interpreted differently according to culture and social group. The assumption of ‘true’ health would call into question the results of my research on health inequalities, as the health differences between social groups might be biased and based less on social inequalities than on a different understanding of the response categories.

The high number of missing values on the income variable poses a second problem. In all three of my papers, I have included equivalized household income as an explanatory variable. A significant positive effect of income on health indicates the existence of health inequalities. Since the question of individual or household income is often perceived as intrusive by respondents, income is considered a sensitive variable in social surveys, which usually contains many missing values (Tourangeau & Yan, 2007). In the case of household income, the additional challenge for respondents is that they may not even know the income of each

household member. However, many respondents who refuse to provide or lack detailed information are willing to provide their income in ranges in a follow-up question. Even if information about the exact income is lost, mean values of the category ranges can be used to include those cases in the analysis and reduce the number of missing income values. Nevertheless, the rate of missing income data is quite high. In the EVS data set, the missing values on the income variable amounted to 18%, but the proportion of missing values varied greatly from country to country and in a few countries was as high as 40%. In the cumulated file of the ESS 1-6, the share of missing cases on income was 27%. Here, the missing cases also fluctuated between 3% in Norway and 57% in Portugal. The high number of missing values was treated with multiple imputations for the analyses of Study II. In the other two studies, which include complex multilevel analysis methods, missing values were treated by listwise deletion instead of multiple imputations. Sensitivity analyses in Study II showed that results were robust regardless of the treatment of the missing income values. Multiple imputations led to more conservative estimates but did not affect the coefficients. Further sensitivity analyses were carried out in the other studies, both with flagged missing income values and with national mean imputation of missing income data. Overall, it is safe to assume that the influence of the missing values is not as strong as one might have feared from the many missing cases on household income.

5 Discussion and outlook

In my dissertation project, I decided to tackle the macro sociological question of the role of social policies with a variable-oriented approach and cross-national analyses. However, the impact of social policies on the relationship between socioeconomic status and health could also be analyzed using the case-centered approach and a single-case study. Looking at a country over time, however, most changes tend to be gradual (see, e.g., Study III which confirms higher variation across countries than across time) and there is little variance in social policies. There are a few countries in which significant reforms have been implemented. Obvious changes resulted from the welfare reforms in Finland during the economic crisis of the 1990s, which were not reversed after the crisis, or the Hartz reform in Germany in the early 2000s. Pega et al. (2013) describes social policy reforms as natural experiments that allow researchers to draw causal conclusions. While effective interventions could be derived the conclusions cannot be transferred to other countries because the economic and social context has been ignored. Yet, an analysis with more detailed information at the individual level would offer the opportunity to clarify the relevance of the

moderating effects of social policies for the mechanisms (material/structural, psychosocial, behavioral).

The three research papers at the core of this project analyze the moderating effect of social policies on socioeconomic health inequalities. I use three different indicators to represent social policies: welfare regimes, social spending, and statutory benefit levels of minimum income protection. In each study I confirmed the presence of income-related and educational health inequalities in European countries. I found a significant positive effect of social policies on individual or average population health, regardless of the indicator chosen for social policies: welfare clusters, social expenditures or benefit levels. The findings for the moderating effect of social policies on the relation between socioeconomic status and health are inconclusive, however.

My work finds little confirmation of an effect of social policies on income-related health inequalities. In Study II and III, I introduced education as a control variable because education affects both income and health. I did not analyze in greater detail whether educational health inequalities were moderated by social policies. However, in Study I, in which I introduced education as an additional explanatory variable, I found an effect of social policies on educational health inequalities.

As an indicator of socioeconomic status, educational attainment affects health through material, psychosocial, and behavioral mechanisms. In addition, education has a placement function for occupational positions, and an indirect influence on income and health (Geyer, 2008; Lahelma et al., 2008; Schnittker, 2004). Education reduces the risk of being unemployed (Eikemo et al., 2008c; Knesebeck et al., 2006). Diplomas and certificates act as broadly recognized signals for skills and abilities, which further increases the social return on education (Zajacova & Lawrence, 2018). The human capital theory claims that education imparts knowledge, effectiveness, and problem-solving skills, which in turn influence how people manage stressful situations (Mirowsky & Ross, 2003). According to Link and Phelan (1995), education is a fundamental cause of health inequalities as education provides health-beneficial resources. The importance of education as a social determinant of health is evident from the description of the different mechanisms between education and health. Having noted the impact of welfare regimes on educational health inequalities, my primary conclusion is that future research should focus on education as a social determinant of health.

In the light of educational expansion, it is all the more important to pay attention to the social inequalities caused by educational attainment. We should not be surprised to observe two phenomena at the same time: constant improvements in overall population health are bound to go hand in hand with increasing educational health inequalities. Even though the number of people with lower levels of education is decreasing, this is not reflected in the absolute health inequalities between groups of lower, middle or higher educational attainment. The declining number of people with lower levels of education offers the opportunity for more effective targeted interventions, such as health education at school. The empowerment of women, especially in terms of their educational attainment, which is usually an issue in developing countries, is also crucial in western industrialized countries. Women as mothers are multiplicators of health behavior and enhance the health of their offspring and their families (Mechanic, 2002).

The focus on educational health inequalities should not distract from the existence of income-related health inequalities in all European countries—as well as in the United States (Chetty et al., 2016). Since they are not affected by social expenditures and benefit levels, or vary across different welfare regimes, they need more attention to resolve their persistence. This is what Johannes Siegrist pointed out in his keynote speech: The pursuit of new approaches is a must.

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Study I:

Health inequalities in Eastern Europe. Does the role of the welfare regime differ from Western Europe?

Health inequalities in Eastern Europe. Does the role of the welfare regime differ from Western Europe?

When we study the impact of social policy on health inequalities, we find that most research is based on Western European countries. This study expands the geographical focus by including post-communist countries from Eastern Europe, Russia, and the Caucasus. The 2008/2009 round of the European Values Study (EVS) provides a unique opportunity for this analysis, since it covers 23 post-communist countries and 20 Western European countries. The study uses multilevel cross-sectional analyses to examine the moderating role of welfare regimes on socioeconomic health inequalities. Many reviews claim that the results for welfare systems and health inequalities are inconsistent. However, since the studies selected for the reviews are mainly focused on Western Europe—only a few include Central Eastern European countries—we still need to find out how welfare regimes in post-communist countries moderate the link between socioeconomic status and health. A cluster analysis based on 13 social and economic indicators generates 4 welfare regimes within the post-communist countries which are used for further analyses. Regarding the achievements of the communist countries in compulsory secondary education, the expectation is that the educational health inequalities differ between Eastern and Western Europe. The multilevel analyses confirm that social gradients in health related to education and income exist in both Western and Eastern Europe. However, while income-related health inequalities are similar, educational health inequalities are most pronounced in the welfare cluster of the EU Member States of Central and Eastern Europe.

1 Introduction

Almost 30 years after the collapse of communism in Europe, a clear backlog exists with respect to social science research of post-communist countries (Eder et al., 2017; Kuitto, 2016). This lack also applies to the sociology of health and illness. Some studies have focused on the turbulent 1990s by investigating the increase in mortality in Eastern Europe after the dissolution of the Soviet Union (Cornia & Paniccià, 2000). However, since 2000, comparative health research has been scarce. The present study aims to fill this gap by using the European Values Study (EVS) of 2008/2009. This dataset offers a unique research opportunity since it includes microdata from 23 post-communist and 20 Western European countries.

The inclusion of post-communist countries is particularly attractive for comparative research on socioeconomic inequalities in health. Are health inequalities within post-socialist societies different from those within Western industrialized countries, where inequalities are associated with a lack of social trust and diminishing social capital (Wilkinson, 1996)? In the years of the Soviet era, income was relatively evenly distributed and not the decisive factor that determined one's status in society (Bobak et al., 2000; Marmot, 2004). It was more important to be a member of the nomenklatura, the elite of the Communist Party (Heyns, 2005; Kornai & Eggleston, 2001). So, does income play the same role as a driver of health inequalities now as it does in capitalist societies of the West?

The present study assumes that the communism laid ground for different levels of educational health inequalities in Eastern and Western Europe. The achievements in education during the years of communism—the introduction of compulsory secondary education and the associated higher prevalence of (upper) secondary school qualifications—has influenced the stratification of education in post-communist countries differently from the stratification of education in Western societies where educational expansion came to a halt at the end of the 1970s.

Despite of the common history of communism, Eastern European countries took different paths towards market-oriented economies and democracies. Some countries, such as Hungary and Slovenia, leaned West earlier than other Eastern European countries, and thus were better able to recover from the social and economic turbulence of the transition (Eder et al., 2017; Myant & Drahokoupil, 2011). Today, the former socialist countries differ in terms of prosperity, unemployment, income inequality, and social systems. The aim of the present

study is to examine the extent of these differences and their impact on socioeconomic inequalities in health.

Studies have shown that within-country health inequalities are linked to welfare state systems (Brennenstuhl et al., 2012). Just as the structure and institutions of the welfare state influence the everyday lives of the population, they also influence socioeconomic inequalities in health (Beckfield et al., 2015). This influence already has been studied with data from Western European countries (for a review see Bergqvist et al., 2013), and in a few cases with data that included European Union (EU) members of Eastern Europe (Eikemo et al., 2008b; Eikemo et al., 2008c), Russia, and the Ukraine (Alvarez-Galvez et al., 2014). The present study contributes to the existing literature on welfare states and health inequalities by analyzing 23 post-communist countries and examining how different manifestations of the welfare state lead to different health inequalities. The previous research is primarily based on evidence from Western countries, and seen as starting point. Western Europe serves as a reference category for identifying health inequalities in the various post-communist welfare clusters. This enables readers to place the results in the context of research evidence gained so far instead of looking at the Eastern European region in isolation.

1.1 Theories and mechanisms

A multitude of theoretical and empirical studies point to the importance of the social determinants for health inequalities (Mackenbach, 2012). Two mechanisms—materialistic and psychosocial—explain the distribution of the social determinants on health as the cause of health inequalities; in the life-course theory both mechanisms are then brought together. The materialistic explanation claims that income creates material resources and possibilities for health advantages by investing income in (health-promoting) goods and services. Bambra (2011) stressed that not only individual income is responsible for health inequalities, but also the access of public services such as education and transport, which exacerbate income-related health inequalities. The materialist mechanism explains the social gradient in health by the fact that any additional income can be invested in health (nutrition, recreation, living environment). Absolute income, or absolute poverty, loses its importance as a predictor of health if the most basic material conditions (hygiene, drinking water, prevention of hunger) are met. Nevertheless, health inequalities still are observed in rich industrial nations, across all income levels and regardless of absolute poverty (Balaj et al., 2017; Mackenbach, 2012). Health depends not only on one's own income, but also on the social comparison of one's income position (Wilkinson, 1996) which leads to the psychosocial explanation.

The psychosocial mechanism argues that people compare themselves to evaluate their position in society; usually they look at higher socioeconomic strata and feel worse off as a result. Higher social inequality creates more distressing comparisons (Bambra, 2011). Comparisons with people in a higher social strata and restrictions of choice lead to constant pressure and chronic stress, which affects not only mental health but also physical health through increased cortisol levels (Bartley, 2016; Thoits, 2010). The social gradient in health, which exists independently of absolute poverty across all income groups, and the finding that health inequalities persist in rich countries support the psychosocial approach (Mackenbach, 2012). Income is an important factor, whereby it is less about absolute income and poverty, but rather about status and relative income (Marmot, 2004, 2005).

Education is also a factor contributing to health inequalities through these mechanisms (Knesebeck et al., 2006). Educational attainment reflects certain cognitive abilities that affect behavior, such as health prevention or knowledge of what is necessary for a healthy lifestyle (Mirowsky & Ross, 1998). Furthermore, education increases the chances of future success, e.g., work with better working conditions and higher income (Ross & Wu, 1995).

In the combination of the two mechanisms described so far (Bambra, 2011), the life-course approach on the accumulation of risks assumes that material and psychosocial mechanisms add up over the course of life and lead to a higher risk of ill health; this already begins with the fetus and the newborn, whose starting conditions depend on the socioeconomic status of the mother (Bartley, 2016; Link et al., 2017). Material, social and psychosocial (dis-)advantages add up over the lifetime and manifest health inequalities, especially if the welfare state does not prevent an accumulation of risks (Lundberg et al., 2010). People in post-communist countries have had different experiences during their life-course than in the West. Communism structured society; depending on the transition process, health inequalities were cushioned or aggravated (for the health impact of mass privatization see King et al., 2009); and finally the implementation of social and political reforms (e.g. of the health sector: Kornai & Eggleston, 2001) also had an effect on social inequalities and health. Over the life-course, these historical events have a cumulative impact on one's assessment of health status. Without emphasizing any historical event, each component is reflected in the welfare clusters.

Welfare states have a purpose to avert social risks and guarantee basic social rights (Esping-Andersen, 2002). The differences between welfare states with respect to the implementation of these fundamental rights and what they regard as social risks or personal

responsibility are reflected in different regime types. The idea of the welfare state goes beyond a single social policy, and welfare state objectives include the following: health policies that protect citizens in case of sickness and accidents; the promotion of labor market participation and the securing of living standards in the event of job losses; the fostering of gender equality through family and childcare measures; pension policy; and minimum income protection as the final safety net. Social policy serves as a buffer against serious life events that might damage health. But the list also shows the non-emergency life situations (e.g. universal family allowance) in which the welfare state can influence the social determinants of health and mitigate or exacerbate socioeconomic inequalities. Furthermore, the welfare state is able to provide citizens with a sense of security (Ogg, 2005) that lowers cortisol levels and mitigates the harmful effects of stress on health (Thoits, 2010). Similarly, Hall and Taylor (2009) argue that public policy has a positive impact on health, not only through economic redistribution, but also through strengthening the social resources of individuals and communities. Social resources help individuals to balance the tension between capabilities and life challenges. An imbalance, e.g. overly life challenges like long-term unemployment, leads to stress, anxiety and poor health. Previous comparative analyses have confirmed that the welfare state influences health inequalities by moderating the link between social determinants and health (Bergqvist et al., 2013; Lundberg et al., 2015).

1.2 Welfare clusters in post-communist countries

Earlier studies on welfare regimes and health inequalities have grouped Eastern European countries into one common welfare regime without considering the differences between these countries (Eikemo et al., 2008a; Eikemo et al., 2008b; Van der Wel et al., 2012). Rostila (2007, 225) admitted that this happened “based on relatively weak theoretical grounds". When Esping-Andersen (1990) published his groundbreaking typology of the three worlds of welfare capitalism, the post-communist countries were at the beginning of their transition process. To date, similar studies for Eastern European countries do not yet exist as they do for Western countries, for which Esping-Andersen’s approach has been developed further and now many typologies exist (see Bambra, 2005 for a discussion and further development of Esping-Andersen's typology). Deacon (1992) was one of the first researchers to describe the former Eastern bloc countries as having a “post-communist conservative corporate” welfare regime. However, he also assumed, that this regime would dissolve over time and that the post-communist countries would integrate into the existing welfare regimes of Western countries.

Fenger (2007) examined Deacon's thesis of an integration into Esping-Andersen's welfare regime typology or whether post-communist countries would form specific welfare regimes. Similar to Saint-Arnaud and Bernard (2003), who replicated the typology of Esping-Andersen with quantitative indicators, Fenger (2007) used hierarchical cluster analyses for his study. For Western countries, he found the three welfare regimes of Esping-Andersen with a subgroup of Southern European countries. For the post-communist countries, he found three groups: the former USSR type, the post-communist European type, and the developing type of welfare state. Due to data availability, the cluster analysis included only 15 countries, which is only a selection of the post-communist countries. Nevertheless, Fenger's study has a special value compared to studies that have focused exclusively on the Eastern European EU member states (Castles & Obinger, 2008; Kuitto, 2016).

To identify the welfare state regimes for the 23 post-communist countries in the present study I use the explorative method of cluster analysis (see also Fenger, 2007; Kuitto, 2016). Cluster analysis groups the most similar cases into clusters that differ meaningfully from each other; it is a useful method to find regimes and groups with a high internal similarity (Castles & Obinger, 2008). Since results strongly depend on the selection of indicators that determine the similarity or dissimilarity of countries, the set of indicators must be selected carefully. In their quantitative validation of Esping-Andersen's welfare state typology Saint-Arnaud and Bernard (2003) describe three causally interrelated elements of welfare regimes: social situations, public policy and civic participation. Social situations such as economic activity, employment, family life, health and education, are determined by public policy, which in turn is influenced by the needs of the people. Public policies affect civic participation, e.g. trust, and participation in turn influences the social situations. On the basis of the availability of data, I have chosen 13 economic and social indicators from the three elements of welfare regimes according to Saint-Arnaud and Bernard (2003). To represent social situations, I included gross domestic product (GDP) per capita, adjusted for purchasing power parity (PPP) and economic growth in percentage of GDP to represent economic development. The openness of the economy is captured by the sum of imports and exports in percentage of GDP. The labor market situation is represented by the unemployment rate; the labor market integration of women captures family life. Infant mortality is a sensitive indicator of social development (Conley & Springer, 2001). Instead of life expectancy (Saint-Arnaud & Bernard, 2003), I added the gender gap in life expectancy to the indicators of social situations. The gender gap reflects partly the male mortality crisis of the 1990s due to the transition process and the associated stressful social situation (King et al., 2009). It is also influenced by the

lower life expectancy of men as a result of excessive alcohol consumption, which is particularly remarkable in Russia, Belarus and Ukraine (Cockerham et al., 2006; Marmot, 2004). As indicators for public policy I included general government expenditures in percentage of GDP and public health expenditures in percentage of GDP. To put public health expenditures in perspective, I have also included private health expenditure in percentage of GDP. Furthermore, I included out-of-pocket (OOP) health expenditures (in percentage of total health expenditures) to reflect the different components of private health expenditures in Western and Eastern European countries. In post-communist countries, OOP payments account for a (very) large proportion of private health expenditures. Depending on their size, OOP payments are heavy economic burdens for private households how Qosaj et al. (2018) show for the Kosovo. The third element of welfare regime, civic participation, is measured by Saint-Arnaud and Bernard (2003) with social trust. I supplemented this element with the Gini index on income inequality as a measure of social cohesion (Kawachi & Kennedy, 1997). The erosion of social cohesion and social trust is considered as a factor contributing to health inequalities (Wilkinson, 1996). To ensure the comparability of the indicators, I have rescaled all variables to 0 to 1.

For the grouping of post-communist countries, I apply agglomerative hierarchical cluster analyses (HCA). HCA starts by finding and summarizing the two most similar cases. In the next steps, two clusters are merged, or one case joins an existing cluster. Since the method is hierarchical, regrouping during the clustering process is not possible (Everitt et al., 2001). The present study used two steps to carry out its cluster analysis. First, I started with HCA by using the single linkage method to find the outliers (Belarus, Moldova and Georgia) that could potentially influence the clustering process (Kuitto, 2016; Wiedenbeck & Züll, 2010). Next, to make visible the welfare clusters of the post-communist countries, I conducted an HCA using Ward's linkage method with the squared Euclidean dissimilarity measure, which implies that at each step, the merging of countries is based on a minimum increase in total within-cluster variance after fusion. The outliers were excluded. Kosovo was not included in the analysis, too, because of missing indicators. The dendrogram (see Fig. 1) and the Duda-Hart stopping rule supported a four-cluster solution (for an extended introduction to cluster analysis, please see Everitt et al., 2001).

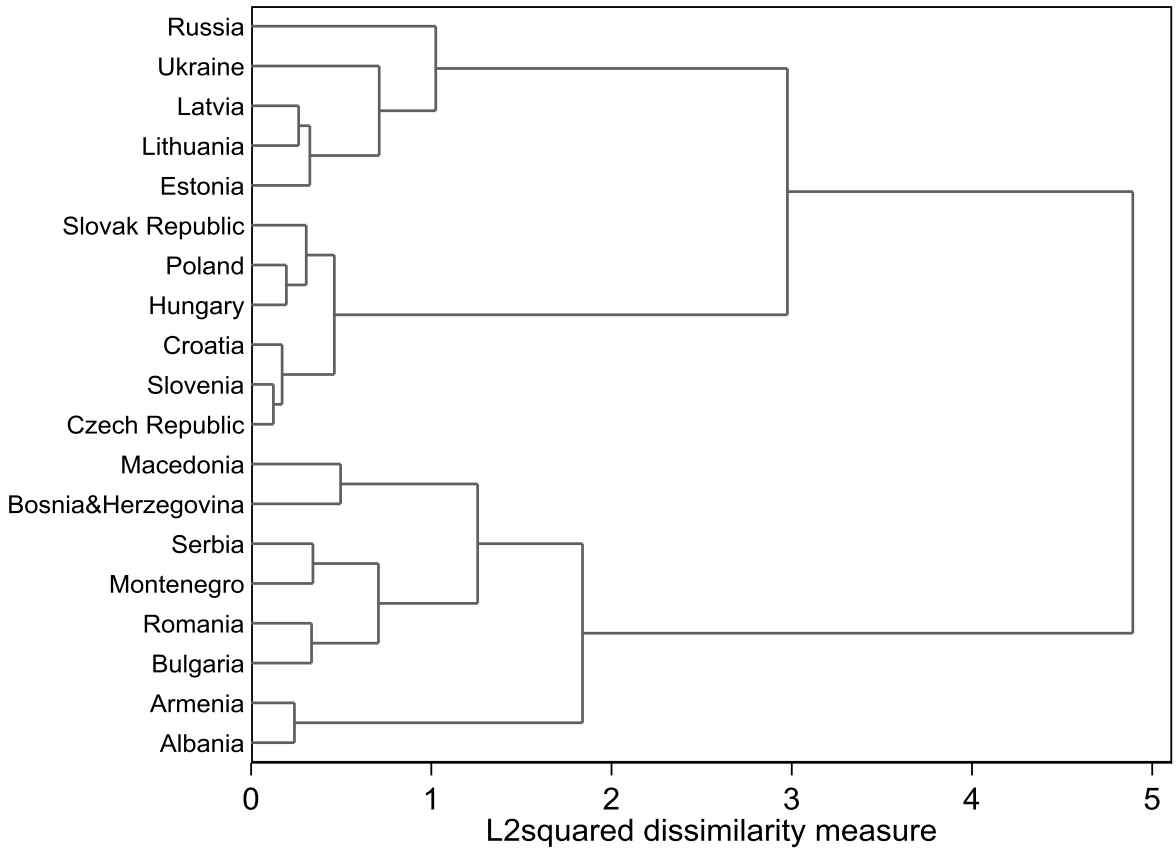

***Fig. 1**. Hierarchical cluster analysis: Dendrogram based on Ward's linkage, without Moldova, Georgia, Belarus and Kosovo.*

The outliers Belarus, Moldova and Georgia were included into the hard transition states due to historical and geopolitical similarities with Armenia. Kosovo was also assigned to this cluster (and not to Serbia), due to proximity to Albania. In Kosovo, Kosovo Albanians make up the demographic majority, which is also reflected in the interview language (77% were interviewed in Albanian). The cluster of hard transition states is likely to be rather unstable compared to the other clusters. Table 1 shows the cluster memberships of the countries and averages for the indicators used.

Table 1 *Mean of Social and Economic Indicators Used for the Hierarchical Cluster Analysis; Over Welfare Clusters.*

		Western Europe	CEE EU members	Balkans	FSU	Hard transition states
Countries included:		see Notes	Croatia, Czech Rep., Hungary, Poland, Slovakia, Slovenia	Bosnia and Herzegovina, Bulgaria, Macedonia, Montenegro, Romania, Serbia	Estonia, Latvia, Lithuania, Russia, Ukraine	Albania, Armenia, Belarus Georgia, Kosovo, Moldova
Indicator	Source					
Social situations						
Gross development product (GDP) per capita (PPP, internat. dollars)	IMF	42760	24260	13170	19880	7970
Growth (% of GDP)	IMF	0.5	3.1	6.3	0.2	5.6
Economic openness (trade in % of GDP)	IMF	115.2	124.2	100.6	102.1	92.4
Unemployment rate	WDI/ ILO	5.7	7.0	16.5	6.3	16.3
Female to male labor force participation rate	WDI	77.7	75.1	70.8	79.3	77.3
Infant mortality rate (per 1,000 live births)	WHO est.	3.6	5.2	9.6	8.6	15.6
Gender gap in life expectancy (Difference of female to male life expectancy at birth, in years)	WDI	5.1	7.4	5.6	11.4	7.2
Public policy						
General government total expenditure (% of GDP)	IMF	45.1	42.6	41.3	38.0	35.8
Public health expenditures (% of GDP)	WHO, HFA-DB	6.9	5.6	4.8	4.2	2.9
Private health expenditures (% of GDP)	WDI	2.3	1.9	2.4	2.2	3.7
Out-of-pocket health expenditures (% of total health expenditure)	WDI	19.3	19.3	31.8	32.2	46.9
Civic participation						
Share of people agreeing on “most people can be trusted”	EVS 2008/09	41.9	22.6	22.9	29.4	17.2
Gini index, based on disposable income	SWIID	28.9	27.0	34.4	34.5	34.6

Notes: Indicators are from 2008. The Western European cluster includes Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

The clusters resemble geopolitical classifications of the post-communist countries. The EU member states of Central and Eastern Europe (CEE), Croatia (member since 2013), Czech Republic, Hungary, Poland, Slovakia, and Slovenia form a group. The Baltic States Estonia, Latvia, and Lithuania form a second cluster with two other successor states of the Soviet Union, Russia and Ukraine. The third cluster includes Bulgaria and Romania (EU members since 2007) and Bosnia and Herzegovina, the Republic of Macedonia, Montenegro, and Serbia which take part in the enlargement process of the EU. The latter share a history of belonging to Yugoslavia until 1992. They also share the experiences of the war in the 1990s, with possible consequences for mental health problems years later (Ringdal et al., 2008). The fourth cluster of the post-communist countries includes countries which differ largely on many indicators to other countries of the region. The cluster labelled 'hard transition states' includes Albania and Armenia and I have supplemented the group with the countries Georgia and Moldova, Belarus and Kosovo.

In a fifth cluster, I have included all Western European countries as a reference group. The dendrogram for the Western European countries confirmed the regime types of Ferrera (1996) who extended Esping-Andersen's typology by a Southern European cluster. There is a Scandinavian cluster which also included the Netherlands, a Bismarckian cluster, the two Anglo-Saxon countries cluster together with Switzerland, and a Southern European cluster. The replication of the well-known Western European welfare regimes is an indicator of the validity of the social and economic indicators used. I have combined the Western clusters to keep the analytical models parsimonious. A differentiation of the regimes into a total of eight would unnecessarily inflate the models because the number of cross-level interaction terms would increase, too. Bryan and Jenkins (2016) point to inaccurate country-level estimators when multilevel models include multiple country-level fixed effects but at the same time have a relatively small number of higher-level units—typical of country studies. Since the present study focuses on Eastern European welfare systems, the approach of combining the Western European clusters is reasonable.

1.3 Objectives and hypotheses

Research on welfare states and health inequalities assumes that welfare clusters moderate the relationship between socioeconomic status and health and weaken the positive effect of status on health. Depending on the welfare cluster, the effect is weaker, and socioeconomic inequalities in health are lower. A ranking of the welfare clusters according to their moderating effects on health inequalities is not the aim—this is also not possible for the Western welfare regimes, as findings are inconsistent and unanticipated (Bergqvist et al., 2013), as the Nordic health puzzle or paradox shows: the Social-democratic welfare regime, which includes the generous and universal welfare states of the Scandinavian countries, actually does not have the smallest health inequalities in Europe (Dahl & van der Wel, 2013; Mackenbach, 2017).

When comparing the regions of Eastern and Western Europe, different expectations meet as how health inequalities are influenced. On the one hand, the welfare state has a long tradition in the West. Social security and redistribution have a mitigating influence on health inequalities (Beckfield et al., 2015; Wilkinson, 2000). On the other hand, the West, or an orientation towards the West, goes along with neoliberal capitalism and market economy, which exacerbate health inequalities (Coburn, 2004; Eikemo et al., 2008a). While redistribution reduces relative income-related health inequalities, capitalism promotes these inequalities when people evaluate their relative position via distressing social comparisons (Dahl et al., 2006; Wilkinson, 2000). In post-communist countries, where social rights were based on employment, and welfare provisions came with job security during socialism (Kuitto, 2016), the transition to capitalism was accompanied by high unemployment and the need to adjust social policies. During the transition social inequalities increased and changed in their substance; they were now results of the market liberalization and no longer due to party privileges (Deacon, 2000; Heyns, 2005). The health effects of the turbulence of the collapse of communism and the transition to a market economy can be clearly seen in the mortality crisis of the mid-1990s (Cornia & Paniccià, 2000).

I assume that the income inequalities in health in Eastern European welfare clusters are higher than in the West. However, these assumptions do not apply to all post-communist countries; for the cluster of the hard transition states, I assume that relative income-related health inequalities cannot be found, but rather absolute income inequalities which were not measured here.

Previous studies on educational health inequalities provide—albeit based on a small selection of Eastern European countries—inconsistent results: Eikemo et al. (2008c) found the countries of Central Eastern Europe in an average position in Europe; a study of former Yugoslavian countries revealed "unexpectedly small inequalities in SRH" (Eikemo et al., 2009), whereas Dahl et al. (2006) find in Slovakia, Poland and the Czech Republic the largest inequalities in the European comparison. In the Soviet Union, education largely has determined a person's profession and associated social status (Gerber & Hout, 1995; Titma et al., 2003). For those with less than secondary education, there was no alternative opportunity for upward mobility through self-employment as in Western capitalist markets (Gerber & Hout, 1995). I assume that educational health inequalities are larger in the post-communist countries than in Western Europe. In line with the findings of Dahl and van der Wel (2013), I assume that the health disadvantages of a lower education are higher in the countries of the former Soviet Union and its satellite states. Although I expect little difference between post-communist welfare clusters and the West in the social gradient between the middle and higher levels of education, the expected higher health disadvantages of the lower education group implicate that the general educational inequalities in Eastern Europe are higher.

2 Methods

2.1 Data and variables

The European Values Study (EVS) of 2008 and 2009 included 23 countries from Eastern Europe and the Caucasus, and 20 Western European countries (EVS, 2016). No other general social survey has covered so many Western and Eastern European countries. The Life in Transition Survey III (LiTS) included 28 post-communist countries, but it does not provide opportunities for comparison with Western Europe. Most countries fielded their surveys in 2008 (Brislinger et al., 2011). Only Great Britain and Iceland finished in March 2010. The highest response rate was reported in Montenegro and Albania with 88% each, followed by Finland with 87%. Great Britain had the lowest response rate with 25%. Luxembourg has the second lowest response rate with 32%.

The dependent variable is *subjective health assessment* measured by the question "All in all, how would you describe your state of health these days? Would you say it is… very good, good, fair, poor or very poor?" According to Jylhä (2009) and Huisman and Deeg (2010) subjective health is an individual summary of information about the perception of physical

and mental states, which is evaluated in a cognitive process, rather than as an indicator for the "true" health of the individual (Jürges, 2007). Using the full range of the five response categories, I treated this variable as a continuous measure (see also van der Wel et al., 2018). While dichotomization leads to a loss of information, especially at the lower end of the self-rated health scale, linear regression results serve easier interpretations. Studies show that results are very similar (Hellevik, 2009; Jutz, 2015). I introduced explanatory variables at the individual and country-level. At the individual level, I am interested in the effect of income and education on health. Since multigenerational households are more common in Eastern than in Western Europe and household sizes vary accordingly (Iacovou & Skew, 2011), I adjusted the *household income* by the square root of the household size *(income/ (number of members in household)$^{0.5}$)*—the equivalence scale used by the OECD (OECD, 2017). Considering the large income disparities between countries included in this study—as the two extreme cases of Luxembourg and Moldova show—I converted the income variable into deciles for each country separately. This approach produced a variable that reflects the relative income situation of the survey respondents instead of the absolute household income. Missing answers, which were most frequently in the income variable, were listwise deleted. This means that individuals with at least one missing answer are excluded from the analyses. The proportion of missing cases per variable was less than one percent except for the sensitive question of household income. In total, there were 19% cases missing, which varied greatly from country to country. To name two extremes: In Portugal 48% and in Macedonia around 4% of respondents did not give any information on their income. In most Southern European countries, more than 35% of the income data were missing (see also Appendix). *Education* is based on the International Standard Classification of Education (ISCED) from 1997, which is divided into three groups: lower (ISCED 0: pre-primary, 1: primary or basic, and 2: lower secondary education), middle (ISCED 3 and 4: upper secondary and post-secondary, non-tertiary education) and higher education (ISCED 5 and 6: first and second stage of tertiary education). Post-communist countries appear to be very similar in the prevalence of lower education (around 20% of respondents), which differs remarkably from Western European countries (around 30%). The numbers show the efforts of the communist regime to promote (upper) secondary education: middle education is on average 16 percentage points higher in Eastern compared to Western Europe.

I included control variables that affect both the dependent variable and the two explanatory variables: age (18 to 100 years of age), sex of the respondent, and a dummy variable—whether the respondent is employed or a student or whether he or she belongs to

one of the following economically inactive groups: pensioners, the unemployed, people who are disabled and hence unable to work, and homemakers who are not otherwise employed.

At the country level, I examined the effects of welfare clusters—the four post-communist clusters (see Table 1) and the Western European welfare cluster, which is used as a reference group—on health inequalities through cross-level interactions with education and income.

2.2 Analytical strategy

Since individuals are nested in countries, a simultaneous multilevel linear model with two levels is appropriate for accounting for the clustering of individuals in countries (Hox, 2010). The size of the effects of income on health and education on health are indicators of health inequalities. If the educational coefficients display a gradient, higher education groups have a health advantage over lower education groups—under control of all other variables—and health inequalities are present. The same applies to income—if increasing income leads to a health advantage, health is not evenly distributed. The present study examines whether these inequalities differ among welfare regimes by adding cross-level interactions between education and welfare regimes, and income and welfare regimes. Since models with cross-level interactions contain a random slope for the individual level variable of the interaction terms, the coefficient may assume a different slope for each country (Heisig et al., 2017).

3 Results

3.1 Findings across countries

The descriptive results show large differences in the occurrence of poor health in Europe. The highest rate of very poor or poor subjective health is found in Moldova with 26%, followed by Russia and Slovakia with 21% and Ukraine and Georgia with 20%. The lowest rate of (very) poor health occurs in Luxembourg with 3.7%, and surprisingly, only 3.7% of Kosovars rate their health as (very) poor, although Kosovo has rather poor health indicators at the macro level. Data from the second Life in Transition survey (LiTS II) confirmed the finding for Kosovo (EBRD, 2010). Kosovo has the youngest European population (Jerliu et al., 2015)—also reflected in the EVS sample—which could have influenced the assessment of subjective health. Apart from Kosovo, a health gap exists between East and West: the rate of those who report (very) poor health is 15% in Eastern Europe compared to 6.5% in Western Europe.

Looking at the full scale of subjective health, the highest average for Western Europe is 3.9 on the 5-point scale. However, surprisingly, the EU members from Central Eastern Europe (CEE) are not next in line; rather, the Balkan countries follow with an average of 3.6 on the 5-point scale, which indicates "good" health. The lowest mean value of subjective health in the cluster of the former SU indicates "fair" (around 3.2) health.

To gain an impression of the health inequalities across countries, Fig. 2 shows the relative health inequalities of income and education, adjusted for age and gender. Inequalities are based on the ratio of the highest to the lowest socioeconomic group.

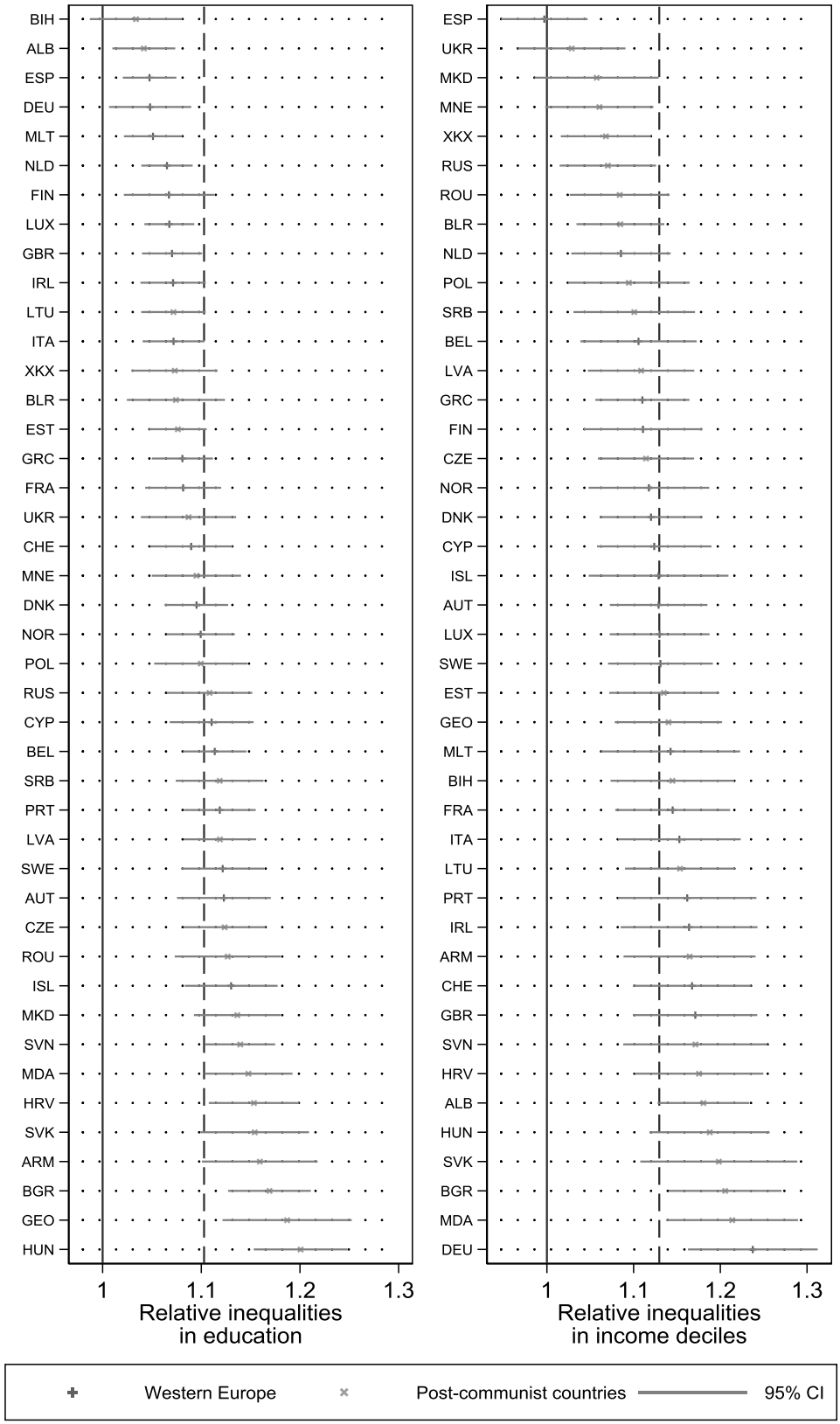

***Fig. 2**. Relative inequalities in subjective health (higher values indicate better health); left panel: rate ratio higher over lower educated; right panel: rate ratio highest over lowest income decile. Adjusted for age and gender; data weighted. Dashed line indicates relative inequalities of the total sample (graphic design based on Präg & Subramanian, 2017).*

3.2 Multilevel regression results for the welfare clusters

The research question to be resolved is whether health inequalities differ among welfare clusters, and whether these clusters have a moderating effect on health inequalities. Table 2 provides the coefficients on subjective health. All the models show the health gradient for education and income, which demonstrates that socioeconomic inequalities in health exist. The positive coefficient of the income variable signals that each further step up in income distribution improves health. In the same way, each further level in education increases the probability of better health. Furthermore, inactive persons such as pensioners or the unemployed have a health disadvantage compared to those who actively participate in the labor market.

The intraclass correlation (ICC) of the random-intercept-only model (not shown in Table 2) is .108, which suggests that around 11% of the variation of subjective health can be explained by cross-country variations (Hox, 2010). Model 1 is a random-intercept model that includes the explanatory and control variables at the individual level. The welfare state clusters, which are based on an explorative cluster analysis with social and economic indicators, explain much of the variance at the country level, which is reduced by 71% from 0.136 in Model 1 to 0.04 in Model 2. Model 2 confirms the descriptive results of the East-West health gap—all welfare clusters in Eastern Europe have a negative coefficient, i.e., the population has a lower health status compared to Western European countries. The coefficients of the welfare regime dummies also show how subjective health differs across the four post-communist clusters. People living under welfare regimes with stronger links to the EU report a better state of health than those living under the welfare regimes of the former Soviet Socialist Republics or the hard transition states.

The last two models include cross-level interaction terms. Model 3 includes cross-level interactions between income and the welfare state regimes. No differences exist in the income-related health inequalities among the post-communist welfare regimes compared to the Western European cluster, contrary to my assumption of higher income-related health inequalities. Model 4 includes the cross-level interaction terms of education and welfare state regimes. No significant effects were found for the interaction terms for the hard transition states. However, the interaction terms for the welfare cluster of EU members from CEE clearly indicated higher educational inequalities, compared to the Western European cluster. Moreover, these interaction terms have a significant positive effect at both the middle and higher education levels supporting the social gradient in health. This finding contradicts the

earlier studies that did not find any differences in educational health inequalities among Central Eastern European and Western European welfare systems (Eikemo et al., 2008c).

In the welfare cluster of the former Soviet Union, a weakly significant positive cross-level interaction (CLI) effect exists for middle education compared to lower education, as well as for higher education (p<= 10%). However, this CLI indicates that the health advantage of higher over lower education is smaller than the advantage of middle education. The Balkans welfare cluster shows a weakly significant social gradient (the CLI of higher education is just below the 10% level of significance). The post-communist welfare clusters are not uniform in their effects. In clusters in which educational health inequalities differ from the Western reference group, these inequalities seem larger, which supports the assumption. The assumption that the health disadvantage of lower education is higher in the FSU welfare clusters is not confirmed since this effect is more pronounced in the CEE-EU.

Table 2: *Determinants of Subjective Health (The Higher the Better) in Multilevel Linear Regression Models. Source: EVS 2008/2009.*

	(1) Individual variables, Random Intercept	(2) Full model (Indiv. variables + welfare clusters)	(3) Full model + CLI on income	(4) Full model + CLI on education
Individual variables				
Male	0.0803 *** (0.015)	0.0804 *** (0.015)	0.0805 *** (0.015)	0.0811 *** (0.015)
Age	-0.0181 *** (0.001)	-0.0181 *** (0.001)	-0.0182 *** (0.001)	-0.0181 *** (0.001)
Economically inactive person	-0.1568 *** (0.021)	-0.1565 *** (0.021)	-0.1548 *** (0.021)	-0.1558 *** (0.021)
Educational attainment (ref. lower level)				
Middle level	0.1170 *** (0.013)	0.1173 *** (0.013)	0.1169 *** (0.013)	0.0698 ** (0.025)
Higher level	0.2109 *** (0.021)	0.2111 *** (0.021)	0.2111 *** (0.021)	0.1621 *** (0.029)
HH-Income in deciles	0.0368 *** (0.002)	0.0368 *** (0.002)	0.0367 *** (0.003)	0.0364 *** (0.002)
Constant	4.2935 *** (0.045)	4.5631 *** (0.054)	4.5652 *** (0.058)	4.5958 *** (0.058)
Macro-level variables				
Welfare clusters (ref. Western Europe)				
CEE-EU		-0.3848 *** (0.058)	-0.4168 *** (0.074)	-0.5002 *** (0.072)
Balkans		-0.3432 *** (0.067)	-0.3241 *** (0.077)	-0.4091 *** (0.075)
FSU		-0.7169 *** (0.089)	-0.6828 *** (0.081)	-0.7615 *** (0.092)
Hard transition states		-0.6034 *** (0.097)	-0.6239 *** (0.110)	-0.6582 *** (0.137)
Cross-level interactions for income				
CEE-EU X income			0.0067 (0.006)	
Balkans X income			-0.0039 (0.007)	
FSU X income			-0.0070 (0.007)	
Hard transition states X income			0.0041 (0.007)	

Cross-level interactions for education					
CEE-EU X middle educ.				0.1478 (0.038)	***
Balkans X middle educ.				0.0929 (0.054)	+
FSU X middle educ.				0.0753 (0.035)	*
Hard transition states X middle educ.				0.0695 (0.071)	
CEE-EU X higher educ.				0.2223 (0.052)	***
Balkans X higher educ.				0.1003 (0.062)	
FSU X higher educ.				0.0536 (0.030)	+
Hard transition states X higher educ.				0.0806 (0.099)	
Variance components and random effects					
var(_cons)	0.1021	0.0268	0.0316	0.0351	
var(Residual)	0.6490	0.6490	0.6478	0.6461	
var(income)			0.0001		
cov(income, _cons)			-0.0007		
var(middle education)				0.0080	
var(higher education)				0.0128	
cov(middle, higher education)				0.0078	
cov(middle education, _cons)				-0.0089	
cov(higher education, _cons)				-0.0107	
ICC	0.136	0.040			
AIC	121278	121230	121193	121115	
BIC	121358	121344	121361	121345	
-2 Log likelihood	-60630	-60602	-60578	-60532	
df	6	10	14	18	

Standard errors in parentheses; $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
N of individuals = 50,352; N of countries = 43. Source: EVS 2008/09, data weighted.

To better understand whether welfare state regimes moderate the effect between income and subjective health, Fig. 3 presents margins plots. The slopes indicate income-related health

inequalities: the higher the level of income, the better the health status. Furthermore, the different levels of health status across the welfare clusters are apparent. Fig. 3 is based on the full model and shows the random slopes compared to the cross-level interactions (Model 3). The right graph shows that the income slopes of the Balkans and FSU are less steep than other welfare regimes. The slopes indicate smaller income-related health inequalities because higher income groups have a lower health advantage due to income than in other regimes. Given the relatively high co-payments for health care especially in the Balkans, it is remarkable that a higher income is not associated with an even higher health advantage compared to other welfare regimes.

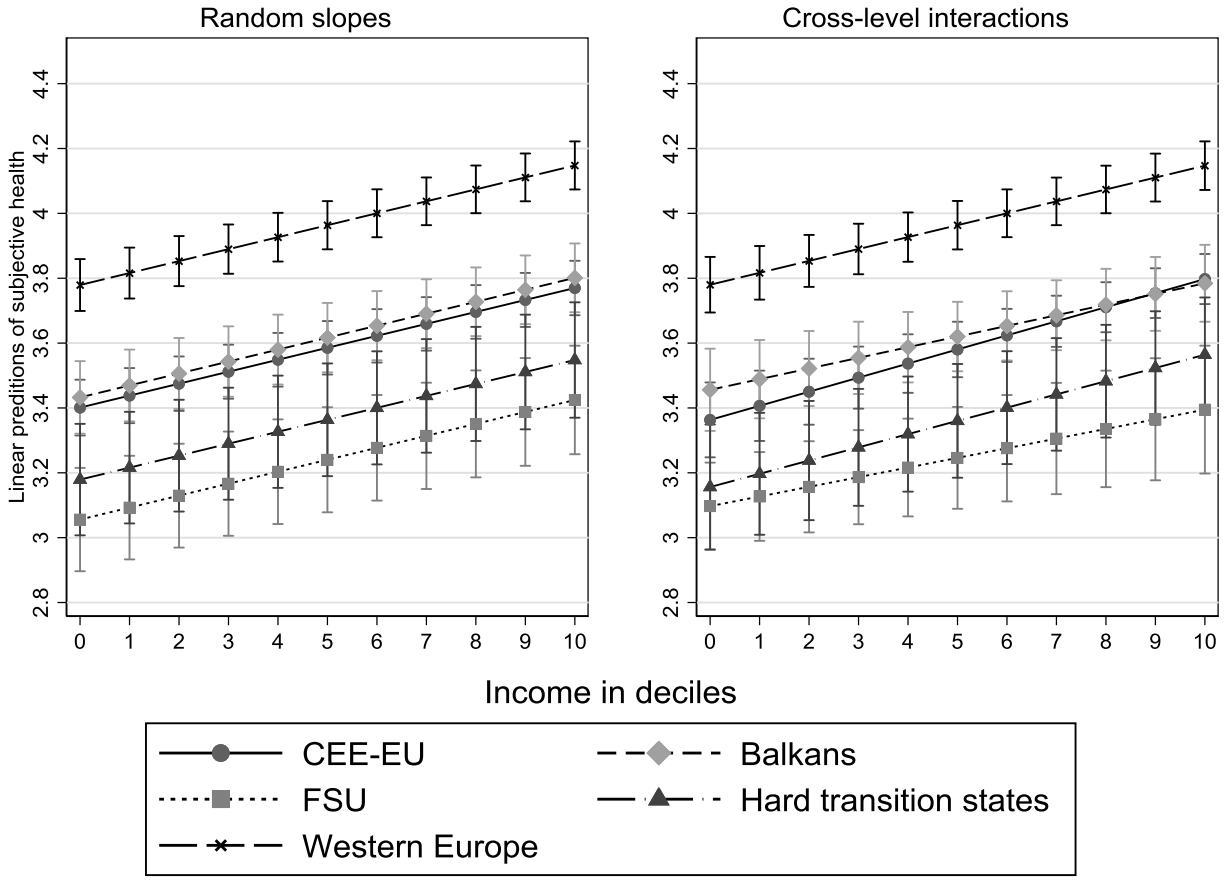

Fig. 3. *Linear predictions of subjective health, comparing the random slope model with the cross-level interaction (M3).*

Fig. 4 shows the moderating effect of welfare regimes on the relationship between education and subjective health. The slopes indicate educational health inequalities: the higher the level of education, the better the health status. The graph on the right also shows how the effects of education on health differ in the welfare clusters when the slopes vary in the cross-

level interactions. The highest health inequalities due to education in Europe are found in the CEE EU member states; the difference in health between those with higher education and those with lower education is greatest. A comparison with the left graph shows that health inequalities in this welfare cluster are larger both because of an increased health disadvantage of lower education compared to middle education, and because of an increased health advantage of higher education. In the welfare cluster of the former Soviet Union, the graph of cross-level interactions shows an interrupted slope: a higher than average health advantage exists for middle education over lower education; with respect to the group with higher education, the slope is flatter.

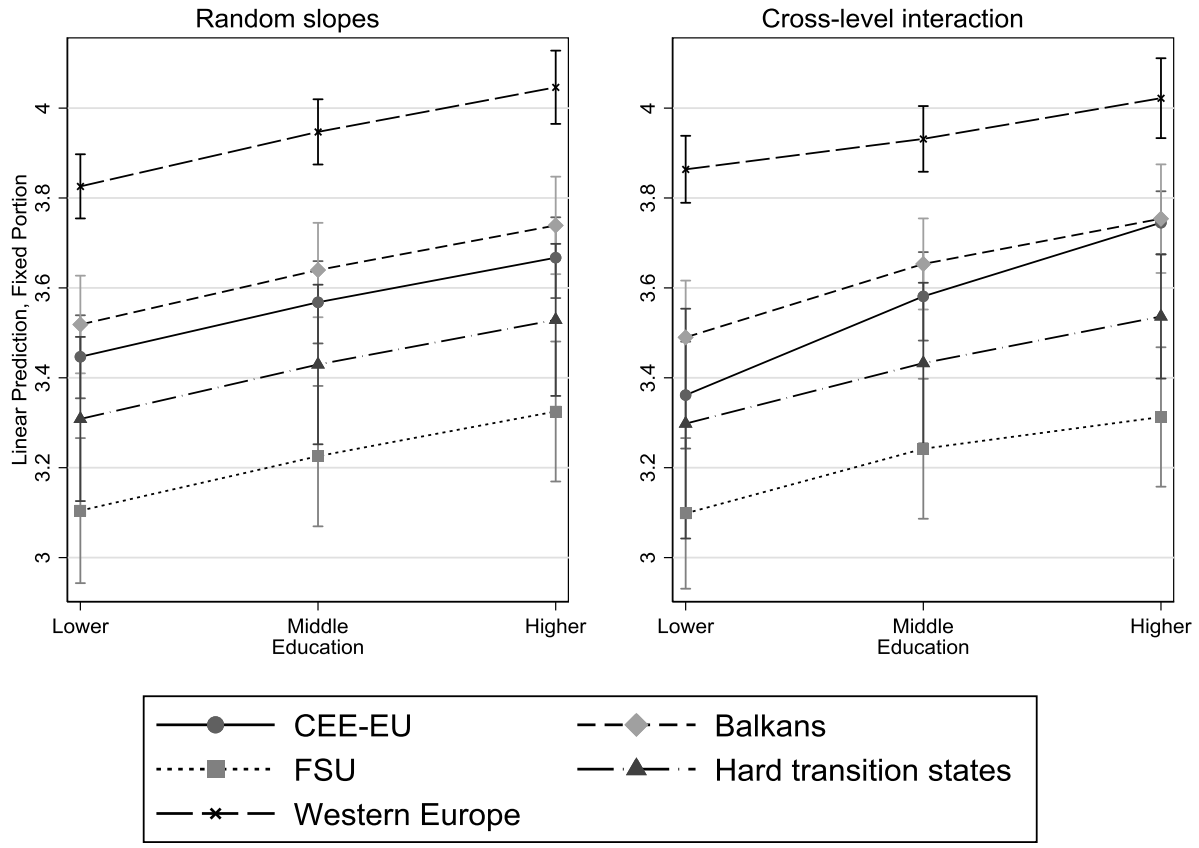

Fig. 4. *Linear predictions of subjective health, comparing the random slope model with the cross-level interaction (M4).*

As robustness check I run analyses that include a geopolitical classification instead of welfare systems. The geopolitical classification includes four groups: (1) Western European countries; (2) all Eastern European EU members as of 2008; (3) countries in the framework of the Western Balkans EU enlargement; and (4) the Commonwealth of Independent States and

associated members as of 2008. Since the geopolitical classification overlaps with the welfare clusters, robust results of the multilevel models are not surprising.

4 Discussion and conclusion

The present study applies multilevel models to test the hypotheses on the moderating role of welfare systems on income-related and educational health inequalities. The results show that while income-related health inequalities hardly differ between the welfare systems of the post-communist countries and Western Europe, educational health inequalities are higher in the welfare systems of EU members from CEE and of the FSU.

The present study makes a twofold contribution to research on health inequalities in Europe. First, it broadens the definition of *Europe* to include Eastern European countries. I do not confine my analysis to countries of the EU, which provide excellent data, but also include countries of the former Yugoslavia, as well as countries such as Belarus, Moldova, Armenia and Georgia, where data is not consistently available. The explanations for missing data are many, since some of these countries lack a social science or statistical infrastructure (Careja & Emmenegger, 2009), and others lack the political will to commission data collection that may make unpleasant facts visible.

The second contribution of the present study concerns Western Europe. The inclusion of Eastern European countries is not an end in itself; rather, it also contributes to the understanding of health inequalities in Western Europe. The most important result concerning income-related health inequalities is the lack of the variation of impacts of the different regimes, which could be a sign that relative health inequalities are universal. Thus, every welfare system faces the same challenges: to establish a community of solidarity, anchor redistribution as a self-evident principle in a modern social democracy, and not play off groups against each other. Wilkinson (1996) has pointed out that everyone benefits from combating relative health inequalities. Educational health inequalities in Western Europe are probably on the rise, even though the expansion of education, which has been occurring since the end of the World War II, was further strengthened by the EU (Allmendinger et al., 2010). The Lisbon Strategy of 2000 defines education as the central starting point of a European employment strategy to counter the developments in a knowledge-based labor market and the demographic changes that will burden the labor market. One benchmark of the Lisbon Strategy is that at least 85% of 22-year-olds should have completed upper secondary

education, which means having a certificate of access to higher education or a completed vocational training. These Eastern European countries achieved their targets in 2008: Slovakia, the Czech Republic, Poland, Slovenia and Lithuania (Allmendinger et al., 2010). Except for Lithuania, these countries are part of the CEE-EU cluster, which attracted attention in my analyses because of their particularly high educational health inequalities. During the expansion of education in the EU, which has increased general aspirations to achieve educational qualifications that may be unrealistic for some, those who fail in this system should not be forgotten—not everyone will be able to obtain a secondary school leaving certificate. Even though this group is getting smaller and smaller, it must not become a neglected minority, which increasingly suffers from health disadvantages.

Although this is the most comprehensive explorative cluster analysis on post-communist countries to date, it is also clear that constantly improved data availability should be used to repeat and refine the cluster analysis in the future. With respect to the present study, the inclusion of the public expenditure on education as an important investment by the state for its citizens failed because six Western Balkan countries have not published any data on it. However, the number of white or grey spots on the map of data availability will decrease. So far, it is mainly the post-communist countries that are now EU members that can provide the necessary statistics and research (Bradshaw et al., 2013; WHO, 2018). This lack of information leads to a persistent under-representation of the Eastern European non-EU countries in comparative collections of social policy indicators (e.g., SCIP, CWED2).

Some further limitations should be mentioned. While a large part of the indicators for the cluster analysis does not go back long enough to create a 10-year average, the individual-level data of the EVS are from 2008 and 2009 and already 10 years old. Additionally, the respondents were likely under the impression of the financial crisis 2007/2008 and its economic consequences. The crisis led to cuts in public spending, including in the health sector, and had an impact on health (Abebe et al., 2016; Reibling et al., 2017) and health inequalities (Ruckert & Labonté, 2017); however, the crisis might have initiated the inevitable reforms that Mladovksy et al. (2012) described for health policy in Europe. The question of whether the clusters found with 2008 data are stable over time and still work today is directed to future research.

The use of subjective health as an indicator of general health status in cross-national comparisons and in comparisons of sub-groups within a society is criticised, as the response category cut-points might be interpreted differently according to culture and social group

(Burgard & Chen, 2014; Tandon et al., 2002). However, this criticism assumes that subjective health is an indicator of "true" health (Bago d'Uva et al., 2008; Jürges, 2007). Jylhä (2009) and Huisman and Deeg (2010) contradict this assumption and argue that subjective health is the perception of one's own state of health. Cultural differences can therefore be reflected. Furthermore, subjective health is a strong predictor of mortality (DeSalvo et al., 2006; Idler & Benyamini, 1997; Jylhä, 2009) and remains the most commonly used health measure (Zajacova et al., 2017).

Anchoring vignettes and objective measures such as biomarkers would avoid the construct bias and reporting heterogeneity (Morris, 2018; Tandon et al., 2002). However, these possibilities are unusual for social surveys. In EVS, subjective health is the only health measure; the results cannot be checked for their robustness against other health measures, such as functional limitations. Morris (2018, 562) recommends to "attempt to control for the individual, contextual or methodological sources of non-equivalence", which I seek by controlling for socio-demographic variables and applying multilevel analyses where individuals are nested in the cultural context of their countries. A robustness check using z-standardized subjective health instead of the original variable showed that educational and income-related health inequalities might have been underestimated. This is in line with previous findings of increased socioeconomic health inequalities after accounting for reporting styles (Morris, 2018).

Due to the cross-sectional nature of the data, it is not possible to draw causal inference about the relationship between socioeconomic status and health or between welfare clusters and health inequalities. Despite the limitations, the analysis of the present study should be a start in the right direction, which is more than necessary almost 30 years after the collapse of communism. Deacon (1998, 204) has suggested, just a few years after the transformation process began, that „The future of welfare states in Europe cannot be understood without looking beyond the West European borders of Europe“.

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Study II:
The role of income inequality and social policies on income-related health inequalities in Europe

The role of income inequality and social policies on income-related health inequalities in Europe[4]

Introduction: The aim of the paper is to examine the role of income inequality and redistribution for income-related health inequalities in Europe. This paper contributes in two ways to the literature on macro determinants of socioeconomic inequalities in health. First, it widens the distinctive focus of the research field on welfare state regimes to quantifiable measures such as social policy indicators. Second, looking at income differences completes studies on socioeconomic health inequalities, which often analyze health inequalities based on educational differences.

Methods: Using data from the European Values Study (2008/2009), 42 European countries are available for analysis. Country characteristics are derived from SWIID, Eurostat, and ILO and include indicators for income inequality, social policies, and economic performance. The data is analyzed by using a two-step hierarchical estimation approach: At the first step—the individual level—the effect of household income on self-assessed health is extracted and introduced as an indicator measuring income-related health inequalities at the second step, the country-level.

Results: Individual-level analyses reveal that income-related health inequalities exist all across Europe. Results from country-level analyses show that higher income inequality is significantly positively related to higher health inequalities while social policies do not show significant relations. Nevertheless, the results show the expected negative association between social policies and health inequalities. Economic performance also has a reducing influence on health inequalities. In all models, income inequality was the dominating explanatory effect for health inequalities.

Conclusions: The analyses indicate that income inequality has more impact on health inequalities than social policies. On the contrary, social policies seemed to matter to all individuals regardless of socioeconomic position since it is significantly positively linked to overall population health. Even though social policies are not significantly related to health inequalities, the power of public redistribution to impact health inequalities should not be downplayed. Social policies as a way of public redistribution are a possible instrument to reduce income inequalities which would in turn lead to a reduction in health inequalities.

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1 Introduction

Since Wilkinson (1996) published *Unhealthy Societies: The Afflictions of Inequality*, many scholars have studied the effect of macro determinants on average population health. The number of studies on the relationship between the welfare state and average health, which recent reviews (Bergqvist et al., 2013; Muntaner et al., 2011) have examined, gives an impression of the significance of this area of research. Most findings indicate that an association exists between improved average population health—e.g., measured by life expectancy, infant mortality, self-reported health, or certain health symptoms—and egalitarian political traditions and welfare state generosity compared to conservative political traditions and low levels of welfare state spending (Muntaner et al., 2011). However, regarding the variance of population health, a research gap persists.

The present study aims to narrow this research gap by providing insight into how socioeconomic health inequalities are related to income inequality and social policies. Socioeconomic inequalities in health mean that health outcomes vary according to socioeconomic factors such as education, income, or occupation. The explanations about how these factors affect health are manifold, ranging from diverse psychosocial mechanisms (Uphoff et al., 2013) to material factors to differences in health-related behavior (Bartley, 2004; Mackenbach, 2006). Psychosocial factors affect health directly, e.g., chronic stress affecting the immune system, and indirectly via health-damaging behaviors such as e.g. smoking (Mackenbach, 2006). The explanation which focuses on material factors is based on the lack of material resources (direct effect), which also indirectly affects health via psychosocial stress and health-related behavior (e.g. malnutrition). Furthermore, health-related behavior also contributes to health inequalities: E.g. lower social status groups show less attendance for preventive medical care (Jungbauer-Gans & Gross, 2006).

The present study focuses on income-related health inequalities as income represents a household's material condition and thus is a useful measure of socioeconomic status (Mather et al., 2014). Income creates material circumstances that affect health via the quality of housing, food, medical care, and opportunities for recreational and physical activities (Bartley, 2004). Looking at income differences complements studies on socioeconomic health inequalities which often use education as indicator for socioeconomic position (Bergqvist et al., 2013). Nevertheless, following Lahelma et al. (2004: 327) who point out the interrelations of the key indicators of socioeconomic position—education, occupational class, and income—I introduce education as control variable.

It is important to not confuse determinants of health with determinants of *health inequalities* (2008). An increase in national income, meaning an increase in the standard of living, which would improve health, does not necessarily lead to decreasing health inequalities. If everyone benefits in the same way from a higher standard of living, the level of average health rises, but health inequalities could persist, as Figure 1a shows. Link and Phelan (2002) describe this as the fundamental cause approach: people with more socioeconomic resources are able to maintain their health advantage over people with fewer resources. However, one also could imagine that higher socioeconomic status (SES) groups benefit more from an increase in national income, e.g., via certain expensive medical innovations (Huijts & Eikemo, 2009). In this scenario, the people who could not afford medical treatment increases, and hence health inequalities also would rise (Figure 1b). On the other hand, if lower SES groups benefit more than higher SES groups from an increase in living standards (e.g., secure housing becomes affordable for all), health inequalities are reduced (Figure 1c).

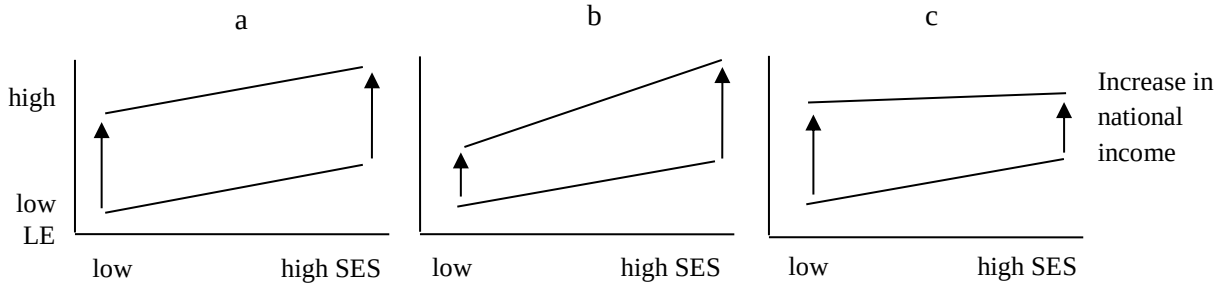

Figure 1: *Different scenarios about how an increase in national income could affect health inequalities (arrows represent the size of health inequalities), using the example of life expectancy. Note: LE=life expectancy; SES=socioeconomic status.*

These three depictions reveal that an automatism between increases in national income and health inequalities does not exist: the relationship depends on how the increases are distributed within a society. The distribution happens via two processes: first, by the distribution of personal earnings and second, by redistribution via social policies. Both processes indicate whether only a small elite or the broad public participates and benefits from economic wealth.

1.1 Income inequality

Several reviews (Kondo et al., 2009; Lynch et al., 2004; Wilkinson & Pickett, 2006) address the influence of income inequality on population health. Even though the conclusions are mixed and only partly suggest a negative effect of income inequality on health, the authors acknowledged the relevance of income inequality for health inequalities (Lynch et al., 2004). Income inequality affects the average population health via two possible mechanisms. First, there is the neo-material perspective that suggests that the unequal distribution of income leads to underinvestment in human, physical, or cultural capital, as well as in the educational system and medical services (Bartley, 2004; Muntaner & Lynch, 1999). Privileged groups within a society are able to use privately managed services, and therefore, are no longer interested in maintaining public services. If the quality of public service provision is poor, households act rationally by opting out and investing in the private alternatives available, which further undermines the financing of public services (Epple & Romano, 1996). Lower socioeconomic status groups are more affected, since they are more likely to be dependent on public services and infrastructure, e.g., schools, transportation, and medical services. Higher income inequality would lead to a widening health gap between the people who have little income and who rely on public services, and those who do not.

The second mechanism is psychosocial: everyone in society is subject to social comparison; people look up and down the social ladder and evaluate their social status. Seeing that others are better off than oneself leads to increased stress levels, which eventually could damage mental and physical health (Wilkinson & Pickett, 2006). As a consequence, all people of all income levels are affected by health inequalities—independent of absolute poverty. The observed income gradient in health often is interpreted as evidence of this mechanism (Kawachi et al., 2002; Lahelma et al., 2004) since it describes how health worsens with every step down the social ladder.

Subramanian and Kawachi (2006) studied the effect of income inequality on the subjective health of different population groups in 50 US states by applying a two-level binomial hierarchical mixed model. They analyzed whether income inequality at the state level affects the health of different socioeconomic groups differently. Amongst other socioeconomic factors, they looked at equalized household income. They did not find a differentiating effect of state income inequality on different socioeconomic groups, such as the five income groups they looked at, but an equally negative effect of income inequality on the subjective health of all socioeconomic groups. They concluded that there is no association between income

inequality and socioeconomic health inequalities. On the other hand, in a previous study of Subramanian et al. (2001), which examined the subjective health of three different income groups (low, middle, and high) in 39 US states, they found a cross-level interaction effect for income inequality and individual income on health.

An analysis of the relationship between wealth and health in 16 countries using the SHARE data is presented in Semyonov et al. (2013). Across all countries, the authors found a positive and significant effect of wealth on health (net of income), but not for income on health (net of wealth). Health was measured using a Physical Health Index based on 41 items that asked for physical limitations and various illness symptoms. By applying Hierarchical Linear Models, they found a significant cross-level interaction between income inequality and wealth, which supports the thesis that income inequality affects the relationship between wealth and health. However, generalizations should be drawn carefully, since their results were influenced by the special case of the United States. Once the US is excluded from the analyses, the effect of income inequality on the relationship between wealth and health is no longer statistically significant.

1.2 Social policies

Whereas income inequality represents the unequal distribution of earnings, social policies reflect the attempt to redistribute earnings through taxes and social security contributions. These policies aim at increasing individual resources not only through financial benefits but also via social services, e.g., public education, public health, and social security expenditures (social insurance and social assistance). Social policies alleviate the tight budget constraints that impact the lower income strata. Furthermore, people with lower income do not only benefit from targeted social assistance, but also from public investments in general, such as the availability of primary care facilities or public transportation, which are health beneficial (Lundberg et al., 2008a; Lundberg et al., 2008b).

Two possible mechanisms help to determine the relationship between social policies and health inequalities: first, social policies affect health inequalities indirectly by reducing the harmful effects of income inequality on health inequalities; and second, the provision and availability of public services directly promotes health. Health inequalities are reduced, since the lower income group benefits especially from public services. While the first mechanism follows a psychosocial approach, the second follows a neo-material approach.

When applying the various interpretations and operationalizations of welfare state policies, the evidence shows that generous social policies are positively related to population health and reduce health inequalities (for reviews see Beckfield & Krieger, 2009; Bergqvist et al., 2013; Muntaner et al., 2011). Many studies have analyzed the relation between the welfare state and population health, mostly by applying a regime approach as a social determinant (Bergqvist et al., 2013; Muntaner et al., 2011). In a review article (Muntaner et al., 2011), of 73 empirical and comparative studies that discussed the role of politics on population health and health inequalities, the authors specified 31 studies that focused on welfare state generosity as a social determinant. More than half of the evaluated papers in this category found a positive association between welfare state generosity and population health or lower health inequalities. In another review (Bergqvist et al., 2013), the articles are divided into the Regime approach, which covered welfare state regime typologies; the Institutional approach, which studied policy programs; and the Expenditure approach, which analyzed the relationship between social or health spending and average health. Even though the authors could not find results for the Regime approach as consistent as did Muntaner et al. (2011), they found a positive association between generous policies (the Institutional approach) and health in general. Five articles were subsumed under the Institutional approach, which analyzed health inequalities. Of these five, only one study found a reduction in income-related health inequalities, while the four other studies did not find that the benefits and social policies had any positive impact on reducing health inequalities. The studies that followed the Expenditure approach found that both social and health spending were associated with smaller socioeconomic health inequalities.

In an early review of mostly descriptive studies on socioeconomic health inequalities (Dahl et al., 2006), it was found that the Nordic countries—characterized by a Social-Democratic welfare state model that includes higher levels of social benefits and services—did not have lower income-related inequalities in self-rated health. Using data from the European Social Survey 2002 and 2004, another study (Eikemo et al., 2008a) found that the smallest income-related inequalities in self-rated health occurred not in the Nordic countries, but rather in the Bismarckian countries (e.g., Germany, France, Austria, Belgium).

The few review studies that exist show that there is little research regarding the impact of welfare institutions or social spending on health inequalities. Only around a third of the studies (9 of the 31), that followed the welfare state approach in the literature review of Muntaner et al. (2011), discussed socioeconomic inequalities in health. Notably, in the review

of Bergqvist et al. (2013), half of the reviewed articles (28 of the 54) studied socioeconomic health inequalities. Nevertheless, in both articles the authors argued for future research with a focus on the relationship of social spending to the health of different socioeconomic groups (see also Lundberg, 2009).

1.3 Hypotheses

When looking at income inequality and its implications for health inequalities, Wilkinson (1996) claimed that income inequality negatively affects everyone's health. This claim seems to suggest that the average population health could worsen, but this reduction would not impact health inequality either positively or negatively. It overlooks the fact that people in the lower income strata are especially vulnerable because they have few buffers to protect them. Income inequality especially impacts the health of the lower income strata, which leads to increasing differences in the health of different socioeconomic groups. Thus, I hypothesize that income inequality increases health inequalities, regardless of whether the mechanism is via disintegration or the disinvestment in public services.

Social policies are related to an increase in average population health (Muntaner et al., 2011). In sum, improvements of the health of lower income groups outweigh the redistributive burden for higher income groups (e.g., via higher taxes) (Lundberg et al., 2010). Here, generous social policies are indicated by the extent of social spending. Social spending serves as a proxy for the availability and quality of public welfare. The higher the social spending, the better are public welfare services and institutions (Lundberg et al., 2008a). The more that is redistributed from overall economic performance (either in the form of direct benefits or in investments in public spheres, such as education or health care), the greater the benefit for lower income groups. Therefore, I hypothesize that generous social policies reduce health inequalities.

Furthermore, I assume that income inequality and social policies have additive effects on health inequalities, but they do not influence each other's impact on health inequalities.

2 Data and Methods

2.1 Data

To test the theoretical expectations outlined so far, I use the European Values Study (EVS) round 4 from 2008 and 2009, which is currently the most complete survey of European countries (EVS, 2011). The EVS is based on random probability samples with an intended net sample size of 1,500. Depending on the size of the country, the sample size could be lower (e.g., in Iceland and Ireland). The mode of interview is usually face-to-face. For documentation of the data, see EVS (2010). The sample includes 44 countries and is restricted to individuals older than 17. However, due to the non-availability of macro data, particularly the Gini index, Bosnia and Herzegovina and Kosovo are not included in the analyses, which reduced the sample to 42 countries.

Further restrictions arise when individuals have missing values on one of the variables used. I applied list-wise deletion for both the dependent variable and the control variables. For most of the countries, the share of deleted cases ranged between 1 and 10 per cent. In four countries, the share was between 10 and 15 per cent. Ireland was an exception with 20 per cent deleted cases.

In order to study the role of income inequality and social policies on health inequalities I apply a two-step hierarchical estimation, first at the individual level, second at the country level.

2.2 Individual-level variables

The dependent variable for analyses at the first step was subjective general health based on the following question: ‘All in all, how would you describe your state of health these days? Would you say it is… very good, good, fair, poor or very poor?’ Subjective health is a valuable measure for health because it is strongly associated with mortality and functional ability (Burstrom & Fredlund, 2001; Idler & Benyamini, 1997; Jylhä, 2009; O'Donnell et al., 2008).

By combining the response categories of subjective health into having very good or good vs. less than good health I follow the approach of other colleagues (see, e.g., Vonneilich et al., 2011). Additionally, to address the problem of losing information when recoding several response categories into a binary variable, I used subjective health with the original 5-point

response scale (see also Beckfield & Olafsdottir, 2009; Olafsdottir, 2007). Since I did not assume an equidistant scale, I considered the 5-point scale of subjective health as an ordinal-scaled variable.

The explanatory variables in the model of the first step are income quartiles. Income was imputed due to the large number of missing values in some countries. The multiple imputation was carried out using the STATA command *mi impute* (StataCorp, 2013). Regression equations on household income were run to complete the missing income data based on other available data in the cases. In the linear regression model for the multiple imputations, I included all the variables used in the analyses and an additional auxiliary variable for occupational status using European Socio-economic Classification (ESeC) from the Institute for Social and Economic Research (ISER). I performed a sensitivity analysis by running the models without imputed income values. Besides a slightly higher number of countries showing significant ($p \leq 0.05$) income-related health inequalities, the results were similar. Household income, counting all types of income after taxes, was originally asked using 12 country-specific answer categories in the EVS (2010). The dataset also provided versions of the income variable that were converted to purchasing power parity (PPP) in Euros to establish comparability between countries. Furthermore, I applied the square root scale to assess equalized household income. After these adjustments of the income data, income quartiles were calculated.

Further variables which influence health are included as control variables: age (ranges from 17 to 100), sex, living together with a spouse or partner and employment status. With increasing age, probability of poor health, chronic diseases, and constraints in daily activities increase. Sex is also found to be a strong predictor of health. Usually, women report a higher rate of poor health then men. Living together as a couple also may affect health. Not as much as being married, but benefits from the closeness of a life partner makes this variable meaningful to control for. Employment status was represented by a dummy variable for the non-working (retired/pensioned persons, the unemployed, people who are disabled and hence unable to work, and housewives not otherwise employed).

Furthermore, education is an important control variable when studying socioeconomic health inequalities, since the effect from income on health might be mediated by this variable. To analyze the independent contribution of income on health, education is adjusted for. Education was measured according to the International Standard Classification of Education (ISCED 97).

2.3 Country-level variables

At the second step, the macro level, the dependent variable is health *inequality*. Health inequality was estimated as the effect of income on subjective health in the first step. Depending on the use of subjective health as a dummy or an ordinal variable, two models were tested.

I used two explanatory variables—income inequality and social policies. Income inequality was measured with the Gini index provided from the Standardized World Income Inequality Database (SWIID) (Solt, 2013). The SWIID is based on the Luxembourg Income Study (LIS) and offers comparable high quality data (Solt, 2009). The estimate of Gini index used in this publication is based on equalized (square root scale) household market income (pre-tax, pre-transfer). Market income was chosen, since the net income includes social transfers, which are measured via the indicator of social policies. Nevertheless, it was found that the choice of indicator for income inequality did not make a difference with respect to determining the relationship between income inequality and mortality (Kawachi & Kennedy, 1997). Data is from the respective year in which the surveys were fielded, i.e., from 2008 for most countries, and from 2009 for Belgium, Finland, the UK, Italy, and Sweden.

Several possibilities exist for measuring social policies. For example, a lot of research has used welfare state regime types, which limit the methods of analyses to regime comparisons (Eikemo et al., 2008a; Eikemo et al., 2008b; see also Muntaner et al., 2011). Using social spending as an indicator of the generosity of social policies enabled me to apply a quantitative measure that guaranteed at least some comparability.

In order to focus on social spending for people most in need, I used social protection expenditure as percentage of GDP. This indicator consists of 'transfers, in cash or in kind, by social protection schemes to households and individuals to relieve them of the burden of a defined set of risks or needs' (Eurostat, 2011: 27), as well as the administration costs of the management and administration of those specific schemes. Data on social protection expenditures (SPE) was not available from a single source. However, for most countries, data for public social protection expenditures was derived from the European System of integrated Social PROtection Statistics (ESPROSS) from Eurostat (2014), and the Social Security Expenditure Database of the International Labour Organization (ILO) (2014). For some countries, data was available from both sources, which enabled me to verify that the numbers, and consequently the underlying concept of the different data sources, were comparable.

Comparisons with some national statistics further supported the numbers provided by the ESPROSS database. For some of the Western Balkan countries, data was collected on the basis of publications of the World Bank (2006) and the World Health Organization's (WHO) European Health for All database (HFA-DB) (2013). Also, this data is from 2008 instead of 2007, as it was for the other countries. In the Appendix B I present an overview of the variables and the data source for the numbers of social protection expenditures.

Additionally, I introduced economic performance as a control variable in the models. Economic performance is based on the gross domestic product per capita (GDP p.c.) in purchasing power parities (IMF, 2011). To reduce the influence of potential outliers, I built averages using data from the years 2007, 2008, and 2009 according to data availability. After confirming the often found curvilinear association of GDP with health (Wilkinson, 1996) with the data in use, I applied the logarithm of GDP p.c.

2.4 Analytical strategy

To measure the influence of the macro determinants on health inequalities, I applied a two-step hierarchical estimation (Achen, 2005; Beckfield et al., 2013; Jusko & Shively, 2005; Treiman, 2009). The approach of the two-step hierarchical estimation allows for an analysis of nested data (e.g., individuals in countries) in a straightforward manner. Especially in cross-national opinion research, we can use the fact that each cluster (e.g. countries with over 1000 observations) includes enough observations to allow for a separate analysis (Jusko & Shively, 2005). At the first level, variation in the dependent variable is explained by the individual level variables of the specific unit—in this case: the country. At the second level, the first-level parameters (such as e.g. the effect of income on health) are implemented as dependent variable in a model also including country-level explanatory variables. For the present study, as a first step, I ran country-wise regressions, both logistic and ordered logistic, since I generated two different basic models: the first model uses as a dependent variable a recoded dummy variable of poor health, and the second uses the original 5-point response categories of subjective health as an ordinal variable. The micro level analyses were weighted by a general weight factor provided in the dataset. The weight adjusts the sample's characteristics age and sex to their distribution in the national populations (EVS, 2010).

To present the effect of income on subjective health, I used marginal effects at the mean (MEM), since they offer an intuitive interpretation compared to logit coefficients or odds ratios. MEM show how the probability of the occurrence of the dependent variable is

predicted to change as the independent variable changes by a unit—holding all other control variables at their means. In the case of the health dummy variable, MEM expresses the difference in the predicted probabilities of 'less than good' health as being in the lowest versus the highest income quartile—holding all other variables at their means. The interpretation of MEM for the ordinal dependent health variable (ranging from 1 *very good* to 5 *very poor*) is more complex, since one MEM exists for every response category. To solve this problem, I generated one single indicator, based on the calculation of an index of dissimilarity: for every country, I summed up the absolute value of the five different MEM as being in the lowest versus the highest income group on subjective health. Subsequently, I divided the sum by two. The higher the index, the higher are the health inequalities (Wagstaff et al., 1991).

In the second step, at the country level, the two indicators of income-related health inequalities, which were estimated in the first step, were used as dependent variables. In the ordinary least squares (OLS) regression models the determinants of health inequalities were introduced one by one. Following this approach, rather than applying simultaneous multilevel analyses, enabled me to consider country specifications and to study outlying cases. Both description and regression diagnostics regarding outlying cases were simplified. The results are presented in standardized regression coefficients. Standardized regression coefficients allow for a comparison of the effects of independent variables with different units of measure.

3 Results

3.1 Results from the first step, (ordered) logistic regressions

When running the model using the health dummy 'less than good health' as the dependent variable, 23 out of 42 countries displayed significant income-related health inequalities (i.e., the effect on health of being in the lowest income quartile compared to the highest income quartile was significant, $p<.05$). Countries with non-significant findings were scattered across Europe; there was no cluster found according to specific regions such as, e.g., Scandinavia or Eastern Europe. The highest inequalities are found in Germany: the probability of having less than good health is around 26 percentage points higher for respondents in the lowest compared to the highest income quartile. The lowest significant effect is found in Greece: the probability of having poor health in the lowest income quartile is only seven percentage

points higher. The two measures for health inequalities and the significance level of the effect of income on health are found in the Appendix B of the present study.

Applying the country-wise ordered logistic regressions with the original 5-point scale of health showed that 32 countries had significant income-related health inequalities ($p<.05$). The ten countries with non-significant effects of income on health were from all regions of Europe and did not cluster. Denmark stands out with an inverse but not significant effect, i.e., the respondents of the lowest income quartile claimed to have better health than those of the highest income quartile. Similar to the indicator of health inequalities described above, Germany showed, next to Lithuania, the highest health inequalities with an index of dissimilarity (ID) of 22 per cent. This means that, while holding the control variables at their means, 22 per cent of the respondents in the lowest income quartile would have to change their response category of health to have a health distribution equal to the highest income quartile. Belgium had the lowest significant health inequalities (an ID of 7%).

In accordance with previous research, I confirmed the health gradient in income for both the health dummy and the original variable of subjective health for most countries. Not only did the weakest income group assess their health worse than the highest income group, but also the groups in between fell into a similar pattern: the lowest compared to the highest income quartile was the worst off, but the second income quartile was still more disadvantaged than the third quartile is, when compared to the highest quartile.

3.2 Results from the second step

Table 1 presents the results for the first indicator of health inequalities, which was based on the health dummy variable. There is some support for the hypothesis of a positive association (.34) of income inequality and health inequalities: a higher Gini index is related to higher health inequalities, although not at a conventionally significant level (Table 1, Model 1). When the other two macro determinants were introduced (Model 4, 5 and 7), the Gini index gained significance throughout all model specifications.

The relation between social protection expenditures and health inequalities could not be confirmed. As expected, SPE and health inequalities are negatively related (-.25), but the relation does not reach significance (Table 1, Model 2). When running the analysis in which both GDP p.c. (logged) and SPE were introduced as macro determinants (Model 6), the

standardized regression coefficient of SPE on health inequalities was heavily reduced, which indicated an importance of GDP over SPE.

Table 1: *Standardized beta coefficients of income-related health inequalities (MEM of 'less than good health') on macro determinants, 42 European countries, 2008/09: comparison of macro determinants.*

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Gini index	.336+			.354*	.425*		.425*
	(.056)			(.038)	(.011)		(.013)
SPE in % of GDP		-.248		-.267+		-.0923	-.0244
		(.113)		(.079)		(.652)	(.900)
GDP p.c. in PPP, logged			-.297+		-.390*	-.236	-.374+
			(.056)		(.011)	(.251)	(.063)
Number of cases	42	42	42	42	42	42	42
R^2	.119	.0616	.0883	.190	.263	.0931	.265
adj R^2	.097	.0381	.0655	.149	.226	.0466	.207

Standardized beta coefficients; *p*-values in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-tailed tests)

Source (dependent variable): EVS (2011); data weighted using a sampling weight. Income-related health inequalities adjusted for age, sex, living together, education and employment status.

Sources (independent variables): IMF (2011), SWIID (Solt, 2013), Eurostat (2014), ILO (2014), ADB (2014), WHO (2013), World Bank (2006).

GDP p.c. (logged) had a negative effect on health inequalities meaning that economic performance reduced income-related health inequalities (Table 1, Model 3). The effect of economic performance on health inequalities was linked to income inequality (Model 5). While controlling for the Gini index, the standardized regression coefficient of GDP p.c. (logged) on health inequalities increased and was significant at a higher level. Still, income inequality was the dominating explanatory effect for health inequalities: models including the Gini index showed the highest adjusted R^2. Furthermore, the Gini index appeared as the highest standardized regression coefficient compared to the log of GDP p.c. and SPE.

When income-related health inequalities were analyzed based on the index of dissimilarity as the dependent variable in the model, the results were similar (Table 2). Running models

with each macro determinant separately, the direction and size of the coefficients were found to be very similar to those in the models discussed above. The Gini index was positively related to health inequalities (.39, p<.05), i.e., higher income inequality was linked to higher health inequalities (Table 2, Model 1). Figure 2 illustrates the relation between health inequalities and income inequalities in 42 European countries.

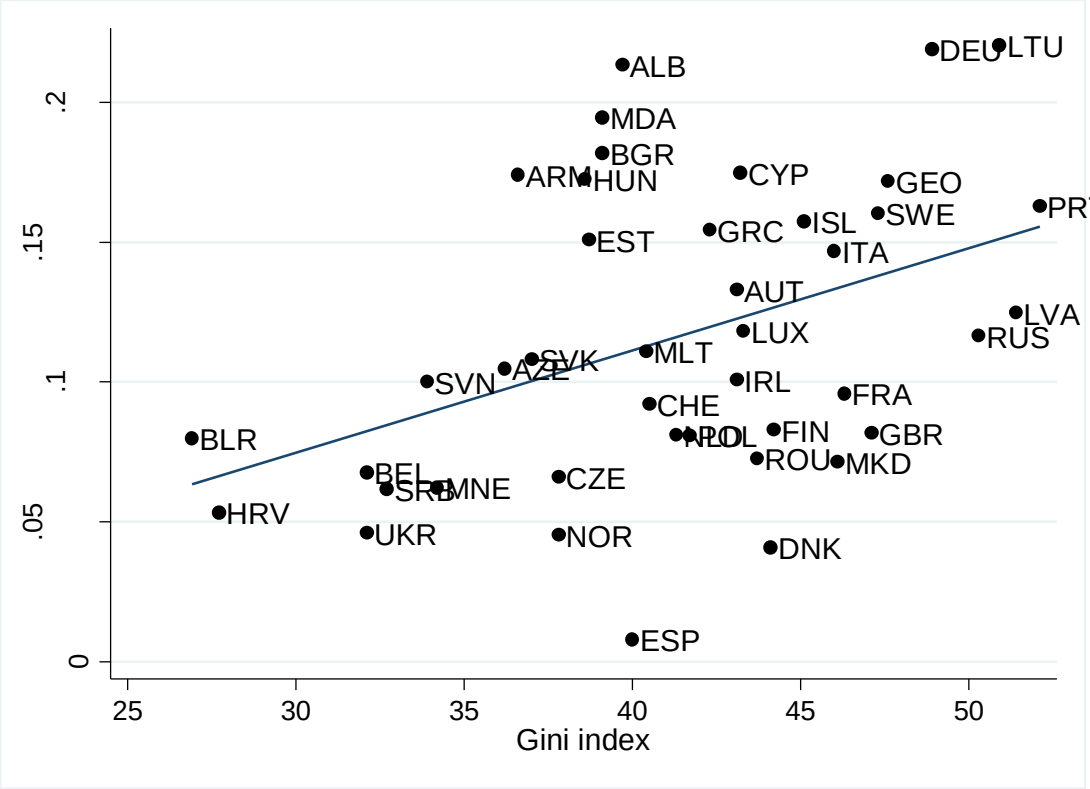

Figure 2: *Scatter plot of health inequalities against the Gini index in 42 European countries. Health inequalities are measured using the index of dissimilarity. Linear regression equation and coefficients are y=-0.016+0.003β, r=.39 (p≤0.05).*

Also, higher social protection expenditures were related to reduced health inequalities (-.25, n.s.; Table 2, Model 2). The non-significant findings between SPE and health inequalities are not due to the small number of cases, namely 42 countries, as the correlation between SPE and average population health was significant (p<.001). When compared to the other indicator of health inequalities discussed above, GDP p.c. (logged) was not significantly correlated with health inequalities this time (Table 2, Model 3). Again, income inequality was the dominating explanatory effect for health inequalities.

Table 2: *Standardized beta coefficients of income-related health inequalities (Index of Dissimilarity) of macro determinants, 42 European countries, 2008/09: comparison of macro determinants.*

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Gini index	.390*			.409*	.464**		.455**
	(.022)			(.013)	(.006)		(.008)
SPE in % of GDP		-.252		-.274+		-.190	-.117
		(.107)		(.066)		(.360)	(.547)
GDP p.c. in PPP, logged			-.219		-.320*	-.0933	-.241
			(.163)		(.034)	(.652)	(.225)
Number of cases	42	42	42	42	42	42	42
R^2	.158	.0635	.0480	.233	.255	.0685	.264
adj R^2	.137	.0401	.0242	.194	.217	.0207	.206

Standardized beta coefficients; *p*-values in parentheses
+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-tailed tests)
Source (dependent variable): EVS (2011); data weighted using a sampling weight. Income-related health inequalities adjusted for age, sex, living together, education and employment status.
Sources (independent variables): IMF (2011), SWIID (Solt, 2013), Eurostat (2014), ILO (2014), ADB (2014), WHO (2013), World Bank (2006).

3.3 Sensitivity Analysis

When a sample is small, such as 42 countries in this case, single data points could be critical for estimating the regression and interpreting the effects of the results (Jann, 2009). When operationalizing health inequalities, using the dummy variable of poor health, the case of Germany stands out, since it has the highest income-related health inequalities, but ranges in the middle of the three macro determinants. Previously, lower or medium health inequalities were found in Germany (Eikemo et al., 2008a; van Doorslaer & Koolman, 2004). Regression diagnostics showed a noticeable overall influence (Cook's Distance, DFFITS) of the data point of Germany due to large residuals. Estimating the analyses without the exceptional case of Germany gives different, i.e., more significant, results: the effect of social protection expenditures on health inequalities increases and becomes significant at the 5% level. Similar modifications can be found for the effect of GDP (logged) on health inequalities. The Gini index is not significant.

Nevertheless, the analysis of 41 countries, excluding the outlying case of Germany, supports the conclusions of the previous analyses. Even though income inequality as a single determinant no longer plays a significant role in health inequalities, the pattern is again very similar to the analyses of all 42 countries. However, it is notable that GDP (logged) seems to be the most important determinant for the association to income-related health inequalities, contrary to the findings based on all 42 countries.

Implementing the index of dissimilarity as the dependent variable, regression diagnostics showed that Moldova might have an overall influence on the regressions, but a regression analyses that excluded the case of Moldova did not offer any different insights than running the analyses with all 42 countries.

4 Discussion

The first hypothesis was that income inequality increases health inequalities. In all models and with both versions of the health inequality indicators this could be confirmed. The Gini index appeared as the only independent variable showing a stable significant relation with health inequalities throughout all model specifications.

The second hypothesis regarding social policies is not confirmed. Social protection expenditure is not significantly related to health inequalities even though the coefficients are in the expected direction: Higher social protection expenditures are related with lower health inequalities. Since social protection expenditures are correlated with average population health (.49, $p<.001$, own analysis) it appears that social policies have a health-promoting impact for all of society—though not specifically for certain groups in need, e.g. the lower income groups. Social policies contribute to better population health but do not show a negative effect on health inequalities.

As a third hypothesis, I assumed that income inequality and social policies have additive effects on health inequalities. This assumption can neither be declined nor confirmed, since both income inequality and social protection expenditures do influence each other's impact on health inequalities only slightly (Model 4 compared to Model 1 and 2, respectively). On the one hand, this speaks against the psychosocial mechanism of the relation between social policies and health inequalities. Harmful effects of income inequality on health inequalities are only slightly balanced by social policies (Model 4). On the other hand, the neo-material mechanism, i.e. that the availability of public services directly reduces health inequalities

because lower income groups benefit the most, seems to play a part, as economic performance reduces the impact of social policies on health inequalities (Model 6).

Regarding the control variable ‘economic performance’, the findings show a negative link between GDP p.c. (logged) and health inequalities, which means that higher economic performance is related to lower health inequalities. This is contrary to previous studies that found only weak or no associations between GDP p.c. (logged) and health inequalities (Link & Phelan, 2002; Semyonov et al., 2013). However, a specific of this study is the EVS data which comprises a wide range of countries with various levels of national income (see Appendix B). Some countries are indeed at a lower stage of economic development, where additional GDP matters for the reduction of health inequalities—contrary to the country selections of the above mentioned studies.

In the introduction, I described two processes of distribution of national income. The analyses show that only the distribution of personal earnings, measured by the Gini index, seems to play a role regarding health inequalities. Redistribution via social policies, measured by social protection expenditures, does not reduce health inequalities. Consequently, when thinking about reducing income inequality in order to reduce health inequalities, social policies do not seem to be the best fit to balance out unequal incomes. However, the reason is the mechanism of how social policies affect health inequalities rather than the mechanism of redistribution by itself. According to Dallinger (2011), government income redistribution works effectively in the way that indeed the lowest income group benefits from public redistribution while the highest income group experiences income losses. The middle class holds its position. Even though social policies are targeted towards lower income groups, they might be too diverse in their impacts to show a distinct health-promoting benefit for disadvantaged income groups. However, to solve this question, further research on specifically health-promoting effects of various social policies is necessary.

4.1 Strengths and limitations

With respect to future studies, the limitations of this study should be discussed. In 2008, the European Values Study covered the whole geographical area of Europe. Although the EVS represents a unique dataset that integrates various European societies, it may include field work that varies in quality across different countries.

For macro-comparative analyses, low numbers of units of analysis are typical (Muntaner et al., 2011). In this case, the number of countries analyzed (42) was an inevitable constraint that should be kept in mind when interpreting the results. Usually, to study people nested in countries, the typical approach is to use simultaneous multilevel analysis; instead, to gain more detailed information on single countries, I used a two-step approach—I extracted country-specific effects of household income on subjective health from the micro level at the first step, and subsequently introduced them as dependent variable at the macro level in the second step. This led to the finding of the outlying case of Germany: high health inequalities are combined with a medium level of Gini index, social expenditures, and GDP, as well as medium subjective health at the mean (see Appendix A and B). Future research could show if this is a specific finding and hence an artefact of the EVS data, or whether income-related health inequalities did indeed increase compared to findings based on earlier data.

Since little research has used a comparative approach to focus on *inequalities in* health in a comparative angle of view (Beckfield et al., 2013), an agreement on the best indicator for socioeconomic health inequalities does not yet exist. Subjective health includes both the physical and mental aspects of health. Even though it is often criticized because it is based on individual perceptions, subjective health is widely used in research on population health as well as health inequalities (Dowd & Zajacova, 2007). Since this present study is based on within-country income-related health inequalities, cross-national differences in response styles of self-assessed health (Jürges, 2007) are negligible. The question whether socioeconomic factors such as income influence respondents' self-assessment of health, which would bias the estimation of health inequalities, is not solved yet. Jürges (2008) finds that response behavior differs according to different socioeconomic groups. On the other hand, van Doorslaer and Gerdtham (2003: 14) conclude that income-related health inequalities are "unlikely to be biased by such reporting tendencies".

A strong point of this present study is that it tests two different dependent health variables in country-specific models at the first step. When using the effect of income on health, both health variables have certain advantages and disadvantages as indicators of health inequalities. The interpretation of marginal effects at the mean is more straightforward when running regressions on the health dummy variable. However, after combining the categories less information was obtained compared to using the original 5-point response scale; also, the way the categories were combined is perhaps controversial. Therefore, health inequalities were also calculated on the basis of a dummy variable of (very) poor health versus fair and

(very) good health as recommended by Etilé and Milcent (2006). Probably due to the rather low share of respondents with (very) poor health, only a few countries displayed significant income-related health inequalities. Since it was questionable as to whether this health dummy was an appropriate indicator for health inequalities if it targeted such a small number of respondents, I decided against presenting those results.

Regarding the index of dissimilarity as an indicator of health inequalities, I discovered that using the original 5-point response scale as a metric rather than an ordinal variable led to approximately equivalent results at both the first and second step.

Studying income-related health inequalities across countries imposes the challenge to generate one variable for income across a variety of countries. In this case, the variable had to ensure that respondents' income in Luxembourg was comparable to respondents' income in Moldova—to name two extreme cases. Additionally, some countries had a high rate of missing values. Both factors were taken into account when computing the income variable but nevertheless could be interpreted as a limitation of this study. For future studies, education instead of income might be an interesting measure for socioeconomic health inequalities. However, given that half of the EVS dataset consists of post-communist countries, where a good part of the adult population was educated during Communism and equal access to education was emphasized (Micklewright, 1999), educational health inequalities would need to be interpreted carefully, for they might not adequately describe socioeconomic inequalities.

While the Gini index is a widely used and recognized indicator for income inequality, one single predominant measure for the impact of social policies in comparative health inequality research is missing. Dahl and van der Wel (2013: 60) even claimed that 'a social expenditure approach is new in this field of research.' Using social protection expenditures in the percentage of GDP as a quantitative measure for social policies should be understood as just a starting point for further analyses. The number of various countries in the EVS made it impossible to find one single data source for social protection expenditures. However, with Eurostat, I found a database encompassing 30 countries (see Appendix B). Furthermore, I took reasonable care in data investigation for the other countries and tried to double-check with other sources, e.g., national statistics. Although social protection expenditures already are a specification of the comprehensive understanding of social policies, it would be interesting for future research to look at the effects of schemes of social protection, i.e., minimum income protection, on health inequalities.

5 Conclusion

The present study investigates the importance of macro determinants for reducing income-related health inequalities. In particular, the aim of the study is to analyze the role of income inequality and social policies as determinants of health inequalities. As found in earlier studies (van Doorslaer et al., 1997), the Gini index plays an important part when studying the relations between the macro determinants and health inequalities. When comparing the standardized regression coefficients, the Gini index has the largest effect throughout all model specifications, even though interpretations of non-significant effects have to be considered carefully. Income inequality has more impact on health inequalities than social protection expenditures, independent of the design of the health variable used as the base for health inequalities. Even though the findings were not as clear as desirable, due to non-significance, the results show the negative association between social policies and health inequalities as expected. Overall, the power of redistribution within societies to impact income-related health inequalities should not be downplayed, yet increases in national income do not automatically lead to reduced health inequalities. The redistribution of income and economic resources plays part in reducing health inequalities, as it depends on the extent to which the population benefits from increased GDP through redistribution.

List of Abbreviations

ADB	Asian Development Bank
ESeC	European Socio-economic Classification
ESPROSS	European System of integrated Social PROtection Statistics
EVS	European Values Study
GDP p.c.	Gross domestic product per capita
HFA-DB	European Health for All database
ID	Index of dissimilarity
ILO	International Labour Organization
IMF	International Monetary Fund
ISCED 97	International Standard Classification of Education, revision in 1997
ISER	Institute for Social and Economic Research
LE	Life expectancy
LIS	Luxembourg Income Study
MEM	Marginal effects at the mean
OLS	Ordinary least squares
PPP	Purchasing power parity
SES	Socioeconomic status
SPE	Social protection expenditures
SWIID	Standardized World Income Inequality Database
WB	World Bank
WHO	World Health Organization

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Appendix A: Sample sizes and individual-level variables.

	EVS sample size[a]	Age	Age	Sex	Subjective health
		Mean	Std. Dev.	Proportion of male respondents	Mean
Albania	1,388	41.1	14.8	0.49	3.74
Armenia	1,424	44.0	17.6	0.43	3.38
Austria	1,485	46.5	17.6	0.43	3.98
Azerbaijan	1,450	34.4	12.4	0.50	3.67
Belarus	1,435	42.3	17.1	0.40	3.27
Belgium	1,498	48.1	17.4	0.48	3.96
Bulgaria	1,406	50.2	17.6	0.43	3.49
Croatia	1,319	45.4	18.2	0.40	3.60
Cyprus	993	49.9	18.6	0.44	4.00
Czech Republic	1,693	48.5	18.2	0.46	3.73
Denmark	1,422	50.0	16.6	0.50	4.21
Estonia	1,510	50.2	18.5	0.35	3.44
Finland	1,049	47.3	14.9	0.48	3.63
France	1,491	50.0	18.3	0.46	3.87
Georgia	1,482	45.6	17.1	0.37	3.33
Germany	1,877	49.7	16.5	0.47	3.71
Great Britain	1,457	51.5	18.9	0.42	3.91
Greece	1,451	49.6	18.5	0.43	4.03
Hungary	1,466	44.6	17.7	0.48	3.49
Iceland	690	44.7	16.1	0.51	4.16
Ireland	813	45.9	17.6	0.41	4.31
Italy	1,392	47.6	18.0	0.49	3.81
Latvia	1,407	46.9	18.4	0.37	3.33
Lithuania	1,433	46.6	17.9	0.45	3.41
Luxembourg	1,565	39.7	17.5	0.49	4.09
Macedonia	1,307	44.3	15.9	0.57	3.96
Malta	1,468	52.2	17.8	0.37	3.76
Moldova	1,490	45.1	17.6	0.46	3.17
Montenegro	1,418	42.6	16.4	0.45	3.69
Netherlands	1,494	54.8	17.4	0.45	3.92
Norway	1,081	45.7	16.1	0.51	4.10
Poland	1,384	44.5	17.0	0.45	3.66
Portugal	1,490	52.6	18.7	0.40	3.48
Romania	1,323	48.1	17.1	0.44	3.50
Russia	1,427	46.2	17.8	0.33	3.09
Serbia	1,364	45.9	16.8	0.47	3.53
Slovak Republic	1,443	53.6	16.5	0.40	3.36
Slovenia	1,291	48.8	17.9	0.46	3.64
Spain	1,456	47.8	19.2	0.44	3.93
Sweden	1,011	49.4	14.7	0.48	4.00
Switzerland	1,227	49.8	17.8	0.46	4.08
Ukraine	1,486	47.9	17.8	0.38	3.10

[a] After list-wise deletion of the dependent and control variables and multiple imputations on household income. The share of deleted cases ranges between 1% and 10%. Ireland with 20% deleted cases is an exception. Sources: EVS (round 4) [29].

Appendix B: Country-level variables.

	Health inequalities		GDP (PPP) p.c.	Gini index	Social Protection Expenditure in % of GDP	Sources of SPE data
	MEM of 'less than good' health	Index of Dissimilarity				
Albania	0.233 ***	0.213 ***	6,799	39.7	10.4	ILO
Armenia	0.194 ***	0.174 ***	5,373	36.6	4.2	ADB
Austria	0.141 ***	0.133 ***	38,941	43.1	27.8	EUROSTAT
Azerbaijan	0.084 +	0.105 **	8,687	36.2	3.3	ADB
Belarus	0.089 *	0.080 *	12,091	26.9	18.1	ILO
Belgium	0.075 +	0.068 *	35,692	32.1	26.9	EUROSTAT
Bulgaria	0.195 ***	0.182 ***	12,650	39.1	14.1	EUROSTAT
Croatia	0.046 n.s.	0.053 n.s.	18,032	27.7	21.7	ILO
Cyprus	0.152 **	0.175 ***	28,445	43.2	18.2	EUROSTAT
Czech Republic	0.060 n.s.	0.066 +	24,545	37.8	18.0	EUROSTAT
Denmark	-0.002 n.s.	0.041 n.s.	36,695	44.1	30.7	EUROSTAT
Estonia	0.162 **	0.151 **	19,661	38.7	12.1	EUROSTAT
Finland	0.108 +	0.083 n.s.	34,955	44.2	25.4	EUROSTAT
France	0.128 ***	0.096 **	33,735	46.3	30.9	EUROSTAT
Georgia	0.227 ***	0.172 ***	4,786	47.6	6.4	ILO
Germany	0.264 ***	0.219 ***	34,890	48.9	27.8	EUROSTAT
Great Britain	0.068 n.s.	0.082 *	35,345	47.1	24.7	EUROSTAT
Greece	0.068 *	0.154 ***	29,552	42.3	24.8	EUROSTAT
Hungary	0.162 **	0.172 ***	18,841	38.6	22.7	EUROSTAT
Iceland	0.084 n.s.	0.157 **	39,504	45.1	21.4	EUROSTAT
Ireland	0.032 n.s.	0.101 n.s.	41,254	43.1	18.3	EUROSTAT
Italy	0.161 **	0.147 ***	29,902	46.0	26.6	EUROSTAT
Latvia	0.113 *	0.125 **	16,321	51.4	11.3	EUROSTAT
Lithuania	0.249 ***	0.220 ***	17,939	50.9	14.4	EUROSTAT
Luxembourg	0.116 **	0.118 **	81,179	43.3	19.3	EUROSTAT
Macedonia	0.048 n.s.	0.071 *	9,383	46.1	14.1	ILO
Malta	0.100 *	0.111 ***	23,930	40.4	17.7	EUROSTAT
Moldova	0.194 ***	0.195 ***	2,859	39.1	17.5	ILO
Montenegro	0.033 n.s.	0.062 n.s.	10,572	34.2	17.6	WB
Netherlands	0.091 **	0.081 *	40,343	41.3	28.3	EUROSTAT
Norway	0.056 n.s.	0.045 n.s.	52,308	37.8	22.5	EUROSTAT
Poland	0.076 n.s.	0.081 *	17,347	41.7	18.1	EUROSTAT
Portugal	0.186 ***	0.163 **	22,812	52.1	23.9	EUROSTAT
Romania	0.070 n.s.	0.073 n.s.	12,012	43.7	13.6	EUROSTAT
Russia	0.114 *	0.116 ***	15,293	50.3	12.1	ILO
Serbia	0.097 +	0.062 n.s.	10,463	32.7	22.9	WB/WHO
Slovak Republic	0.070 n.s.	0.108 *	21,162	37.0	16.1	EUROSTAT
Slovenia	0.084 n.s.	0.100 *	28,397	33.9	21.3	EUROSTAT

Spain	0.041	n.s.	0.008	n.s.	30,323	40.0	20.8	EUROSTAT
Sweden	0.117	**	0.160	***	37,039	47.3	29.2	EUROSTAT
Switzerland	0.101	**	0.092	*	40,721	40.5	25.1	EUROSTAT
Ukraine	0.054	n.s.	0.046	n.s.	6,903	32.1	22.7	ILO

n.s. not significant, + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-tailed tests)

Source (dependent variable): EVS (2011); data weighted using a sampling weight. Income-related health inequalities adjusted for age, sex, living together, education and employment status.
Sources (independent variables): IMF (2011), SWIID (Solt, 2013), Eurostat (2014), ILO (2014), ADB (2014), WHO (2013), World Bank (2006).

Study III:
Health inequalities in Europe: Does minimum income protection make a difference?

Health inequalities in Europe: Does minimum income protection make a difference?

Poverty, a risk factor for ill health, could be alleviated by generous welfare states. However, do generous social policies also reduce the health implications of socioeconomic inequalities? This study investigates how minimum income protection is associated with socioeconomic health inequalities. I hypothesize that higher benefit levels are associated with lower health inequalities between income groups. Minimum income benefits support the people most in need, and therefore should improve the health of the lowest income groups, which in turn would reduce overall health inequalities. I test this hypothesis with the European Social Survey (2002–2012) and the SaMip dataset using three-level multilevel models, covering 26 countries. The results show a robust relationship between benefit levels and individual self-rated health. However, the hypothesis of reduced health inequalities is not completely supported, since the findings for the cross-level interactions between income quintiles and benefit levels differ for each quintile.

1 Introduction

While population health benefits from increasing national wealth, socioeconomic inequalities in health still exist in all advanced, industrialized countries (Mackenbach, 2012; Wilkinson, 1996). To date, many studies have described how health inequalities vary in size between Western societies (Dahl et al., 2006; Mackenbach, 2006). Even though the relationship between generous welfare regimes and overall population health is well established (Brennenstuhl et al., 2012), previous studies have not consistently found a relationship between the generosity of a welfare state and the size of its health inequalities. An explanation for these inconsistent findings could be that studies usually focus on the different types of general welfare regimes instead of specific areas of social policies within the welfare state (Lundberg et al., 2015). Both objects of study might differ in the way how they affect health. Previous studies indicated that focusing on specific social policies compared to studying the welfare regimes might be the missing point (Beckfield and Bambra, 2016; Burstrom et al., 2010; Lundberg et al., 2015). In their review of 33 studies on health, health inequalities and

welfare regimes, Brennenstuhl et al. (2012: 399) concluded that 'results were more consistent among the studies that examined policy instruments.' Indicators of generosity, such as regulation of benefits or size of specific public expenditures, are associated with better overall health and lower health inequalities. This approach breaks up the 'black box' of the welfare state by showing which features of specific policy programs are important when studying health inequalities and drawing policy-relevant conclusions (Brennenstuhl et al., 2012; Lundberg, 2008). The present paper contributes to this line of research by studying minimum income protection and its effect on (a) individual health and (b) health inequalities. The goal is to assess whether minimum income protection (MIP) accounts for the variations in the extent of health inequalities across Europe. To date, research has focused on policies for single mothers, family, old-age, and unemployment policies (Burstrom et al., 2010; Ferrarini and Norström, 2010; Lundberg et al., 2008; Lundberg et al., 2015; Rodriguez, 2001), while minimum income protection has received only minimal attention despite its fundamental relevance to poverty and income-related inequalities (Bahle et al., 2011; Nelson, 2012).

The lack of studies analyzing the effects of minimum income benefits on public health is even more surprising, since minimum income benefits are the core of the welfare state idea, both historically and as a last safety net to provide a bare minimum of social security (Bahle et al., 2010). Minimum income benefits provide a basic living standard for people without income or access to benefits based on social insurance contributions (Bahle et al., 2011). Especially with respect to the role of minimum income protection schemes as last safety net, it is important to study their effects on health, and even more so in light of the welfare state retrenchment during the last decades.

Welfare states in Europe went through a transformation from a social insurance to a social investment state (Hemerijck, 2012; Morel et al., 2012). Classical social insurance programs are becoming less important, and other areas of welfare production such as family policy are moving towards the center of political attention (Morgan, 2012; Garritzmann et al., 2017). In the course of the reforms of social insurance programs, non-contributory minimum income protection has become more significant for poverty alleviation (Bahle et al., 2011; Hemerijck, 2012; Marx and Nelson, 2013). Benefit levels or coverage have not changed as the economic situation in the countries has changed, so the need for minimum income protection exists and is increasing (Van Mechelen and Marchal, 2013). As consequence of the financial crisis in 2008/2009 many European countries struggled with high youth unemployment (Diamond and Liddle, 2012), and restrictions on the duration of employment protection during the years

preceding this crisis increased the necessity of social assistance for the long-term unemployed. Young people and the long-term unemployed are generally not covered by unemployment insurance and must therefore rely on minimum income benefits.

In addition to the positive effects of generous social assistance for the health of vulnerable groups, I assume that minimum income protection also influences the link between income and health in all social classes. Earlier research consistently has found that generous social policies and benefits are related to good overall population health and that these positive effects on health are not restricted to those who (are entitled to) receive benefits (Bergqvist et al., 2013). Therefore, the present paper examines whether the health of middle and higher income groups is affected positively by more generous benefits, even when individuals in these groups run close to a zero risk of ever being a recipient of minimum income benefits. If minimum income protection affects the income and health of the rich, this situation would influence the size of health inequality in society as well.

2 Minimum income protection and health inequalities in the framework of the institutional theory

Generous welfare states are more likely to prevent life risks from accumulating and disadvantages in one area of an individual's life from affecting other areas at the same time, e.g., becoming unemployed while maintaining health insurance coverage. Consequently, the degree to which welfare states differ in their generosity, in terms of minimum income protection, is a possible explanation for varying health inequalities across countries (Lundberg et al., 2008; Saltkjel et al., 2013). The present study seeks to explain why health inequalities vary across countries by drawing on the institutional theory of health inequalities (Beckfield et al., 2015). Institutions—including welfare institutions in the context of the present study—set the 'rules of the game in a society' (North, 1990: 3). In their application of the 'rules', institutions distribute social determinants that enforce or reduce health inequalities. Beckfield et al. (2015) have described health inequality as a function of redistribution, compression, mediation and imbrication.

Due to my focus on one particular social policy, minimum income protection, I have concentrated especially on two mechanisms of the institutional framework—redistribution and compression. Both mechanisms can be used to explain variations in health inequalities across European countries. The first mechanism, *redistribution*, redirects resources among the population and shifts social determinants of health, so that the disadvantages of one group and

advantages of the other group are offset or at least reduced. Redistribution can be applied to minimum income protection since it shifts economic resources from tax payers to those who are in need. Welfare institutions are instrumental for redistribution of income, since they redistribute collective resources to compensate for negative individual life events, e.g., job loss (Fritzell and Lundberg, 2006). With regard to the concept of redistribution, I assume that higher minimum income protection benefits are accompanied by lower health differences between income groups.

The second mechanism, *compression*, means a change in the distribution of social determinants of health, mainly understood as a compression at the lower or upper end of a distribution. Beckfield et al. (2015) have described compression as limiting how low or high social determinants can become within society. While redistribution changes the income distribution at both ends because some people benefit from others giving up something, the mechanism of compression reflects only impact on one side of the distribution. Beckfield et al. (2017) use the following example to illustrate compression: a minimum wage policy only affects the lower end of the income distribution, while the fiscal policy design has a compressive effect only on the upper end. We find in the provision of social assistance benefits as a minimum income the lower limit for those at the lowest end of the income distribution (irrespective of the non-take-up of social assistance benefits). Lifting people out of poverty, and thereby reducing the number of poor people and improving their health, plays a decisive role in how minimum income protection reduces health inequalities. Following the idea of compression, I assume that higher minimum income protection leads to lower health inequalities because the disadvantages of the lower income groups in terms of their social determinants of health are reduced by generous benefits. The improved material conditions of the lowest income group lead to better health of this group and thus to lower overall health inequalities. In their study on minimum income protection and mortality, Nelson and Fritzell (2014) found exactly this effect: more financial resources to cover the basic needs of the poor lead to increased health. Social assistance in the form of cash benefits enables recipients to participate in society and consume goods beneficial to their health, such as nutritious food and/or activities such as sports (Diez-Roux et al., 1999).

I have described how the two mechanisms, redistribution and compression, explain the link between income and health among *lower* income groups. It seems obvious that the positive health effects of generous benefits are to be expected only with respect to lower income groups—probably even only for the lowest income group, which constitutes the target

group of minimum income protection, since the most distinctive feature of social assistance is means-tested benefits. Due to means-testing, the number of recipients of minimum income protection is low in Europe, around 5% of the working age population in the year 2007 (Bahle et al., 2011: 218; for 2009 see Van Mechelen and Marchal, 2013). Irrespective of the low number of minimum income protection recipients, I expect that a larger percentage of society is aware of the last safety net and its characteristics, since in times of economic distress, the middle classes become more sensitive to the risk of long-term unemployment and social reforms (Lengfeld and Hirschle, 2009).

Aside from a general awareness of the generosity of minimum income protection, higher income groups are unlikely to directly benefit from this protection because these benefits come into play after all other social benefits, such as unemployment insurance benefits, have lapsed or are not available to individuals. When looking at redistribution, it is clear that middle and higher income groups are burdened by income redistribution, since they pay higher income taxes and social security contributions to support the tax-financed MIP schemes. On the one hand, higher income groups may feel that although they support a generous last safety net, they are unable to reap any direct benefits; yet, on the other hand, higher income groups may perceive generous social policies as protecting, even though they are unable to take advantage of monetary benefits. According to Pfeifer (2009), in times of austerity and when labor markets are under pressure, the likely opponents of MIP, such as the well-educated and high income groups, tend to criticize minimum income protection policies to a lesser extent. Awareness of a last-safety net affects stress levels and may have subliminal positive effects on health, which has been confirmed for the middle class with respect to unemployment protection: Sjöberg (2010) found that generous unemployment benefits reduced the psychosocial stress of job insecurity even among the employed. However, whereas the availability of collective resources may contribute to a middle income group's feelings of security and predictability, higher income groups may perceive redistribution to support 'overly generous' minimum income protection differently. Dallinger (2013) has found that the income of the highest and lowest income groups—as givers and receivers, respectively—are affected to a greater extent by welfare state interventions than the income of the middle class.

While we assume that the second mechanism, compression, can explain a reversal of health disadvantages at the lower end of income distribution, at the higher end the effects of compression do not exist. Ultimately, the (labor) market decides about the size of income and

to date, limitations do not exist. The lack of compression, of regulation at the high-end incomes, is a possible explanation as to why health advantages for higher income classes, and ultimately health inequalities, still exist, even though Western European countries have taken many initiatives to tackle health inequalities (Mackenbach, 2010).

The institutional theory of health inequalities not only provides an explanation for why the health of MIP recipients would improve through more generous social protection, but also expects a positive effect from higher minimum income protection on the health of the remaining population. Simply put, the existence of a *last safety net* and the knowledge of its benefits among the general population also positively affect those people who are not impacted or threatened by economic hardship due to unemployment, disability, or old age. The approaches I have examined to this point suggest two hypotheses. First, I hypothesize that the more generous the MIP benefits, the smaller the health differences are between the income groups. Second, I hypothesize that the lower health inequalities of countries with more generous benefits are due to a decline in the health disadvantages of the lower and middle income groups, and not by a decline in the health advantages of the higher income groups. Higher income classes do not experience health disadvantages due to more generous MIP benefits. The following analyses test these two hypotheses.

3 Data and Methods

3.1 Description of data

The data source used by the present study is the cumulative file of the European Social Survey (ESS), which includes the six rounds from 2002-2012 (ESS ERIC, 2014).[i] Only countries with a minimum of two completed surveys during that period are included in the cumulative file. 13 out of 26 countries completed every survey between 2002 and 2012. The analysis contains 137,947 individuals aged 15 to 64 from 26 countries in up to 6 ESS rounds. Since the macro variables *minimum income benefits levels* and *gross domestic product (GDP)* are time variant, I nest countries in the years of interviews (2002, 2004, 2006–2013). In a few countries in which the fieldwork of one ESS round proceeds over a period of 2 years, the year of interview is more precise than the ESS round (e.g. in Belgium, the fieldwork period for ESS round 5 went from October 2010 until May 2011).

Missing cases are treated according to a listwise deletion that initially deleted 67,247 cases from the data set. The variable with the most missing cases was *household income*, namely a

26.6% item nonresponse. To perform a sensitivity analysis on applying listwise deletion, I ran a model that includes a flag variable on missing income, which did not change the analysis results of the model based on listwise deletion.

3.2 Variables

3.2.1 Dependent variable

The dependent variable is *self-rated health (SRH)*, which I measured using a single item: 'How is your health in general? Would you say it is _____.' Response categories were *very bad, bad, fair, good,* or *very good*. The interpretation of the dependent variable is: the higher the values, the better the health. SRH is a strong predictor of mortality and morbidity (Idler and Benyamini, 1997; Jylhä, 2009). Furthermore, SRH is an appropriate measure for health inequalities. With Swedish data, Burstrom and Fredlund (2001) found a similar predictive power of SRH with respect to subsequent mortality across all occupational classes, among men and women, and different age groups.

3.2.2 Explanatory variables

Income in quintiles

Socioeconomic inequalities in health are measured via a household's total net income. From round 3 to 4, the ESS changed its income measure from a survey-wide 12-point scale of a household's total net income to national income categories based on the deciles of the actual household income range in the respective country. Calculations of the deciles are based on external sources, such as national register data or representative country-wide surveys (e.g., EU-SILC).

To harmonize the two income measures across the 6 rounds, I recoded a household's total net income from round 1 to 3 into quintile categories (after conversion to purchasing power parity [PPP] and applying the square root scale as an equivalence measure); I also collapsed the 10 income deciles from round 4 to 6 into five quintiles (see also Schmidt-Catran, 2014). To reduce potential bias due to varying sizes in the income quintiles across countries—some income quintiles contained more or less than 20%—I applied a weight at the individual level as correction, so each income quintile contained 20% of a country's sample. In addition, I applied ESS post-stratification weights. As sensitivity analysis, I ran models that included a dummy variable for the ESS rounds 1 to 3, which accounts for the possibility that the two

income approaches from round 1 to 3 and 4 to 6 cannot be combined. This dummy was not significant, and the substantive results did not differ.

Benefit levels of minimum income protection

The generosity of minimum income protection was operationalized by the annual benefit level (in 1,000 Euro PPPs). The variable is from the Social Assistance and Minimum Income Protection Interim Data Set (SaMip), which is designed for cross-national comparisons (Nelson, 2013). It contains data from 1990 to 2013 on the level of social assistance and minimum income benefits after income taxation. Benefit levels are based on the type-case approach—benefit levels are calculated in line with national legislation for three standardized types of household: a single person household without children; a lone parent family and a two-parent family, each with two children. With respect to the variable utilized, I averaged the benefit levels of the three type-cases, which represents the yearly minimum income benefit level per country. The original variable from the SaMip data set is *MIPavey*. This variable includes social assistance standard rates, housing supplements, and—if applicable—refundable tax credits and family allowances. Table 1 lists the 26 social assistance programs used in SaMip (Nelson, 2013).

Table 1. *Social assistance programs included in the minimum income benefits of 26 countries.*

Country	Name of social assistance programs/legislative framework
Austria	Bedarfsorientierte Mindestsicherung
Belgium	Revenu d'intégration
Bulgaria	Месечна социална помощ
Cyprus	Δημόσιο Βοήθημα
Czech Republic	Systém pomoci v hmotné nouzi
Denmark	Kontanthjælp
Estonia	Toimetulekutoetus
Finland	Living Allowance
France	Revenu de Solidarité Active
Germany	Grundsicherung für Arbeitsuchende/Hilfe zum Lebensunterhalt
Great Britain	Income Support
Hungary	Rendszeres Szociális Segely
Iceland	Félagslega aðstoð
Ireland	Supplementary Welfare Allowance
Italy	Minimo Vitale
Lithuania	Piniginė Socialinė Parama
Luxembourg	Revenu Minimum Garanti
Netherlands	Wet Werk en Bijstand, WWB/Algemene Bijstand
Norway	Økonomisk Stønad
Poland	Zasilek Okresowy
Portugal	Rendimento Social de Inserção
Slovakia	Dávka v hmotnej
Slovenia	Denama Socialna Pomoc
Spain	Ingreso Minimo/Renta Mínima de Inserción
Sweden	Ekonomiskt bistånd/Försörjningsstöd
Switzerland	Aide Sociale

Source: SaMip Documentation.

3.2.3 Control variables

Several demographic and socioeconomic variables may influence both health and income, and thus, should be controlled for when analyzing health inequalities: age, sex, number of household members (linear and squared), education, and employment status. I restricted the sample to respondents of working age (15 to 64 years according the OECD (2018) definition), as in most countries only people below retirement age have access to social assistance, while older people in need receive social pensions. Education was classified according to the International Standard Classification of Education (ISCED 97) and used in five ordinal categories: Less than lower secondary education (ISCED 0-1); Lower secondary education completed (ISCED 2); Upper secondary education completed (ISCED 3); Post-secondary non-tertiary education completed (ISCED 4); and Tertiary education completed (ISCED 5-6). Employment status includes the employed, unemployed, and those not in labor force, such as people in education, people doing housework, the permanently ill, and the retired.

At the macro level, GDP per capita functions as a control variable to adjust for national wealth, which affects health, the relationship between individual income and health, and the level of minimum income protection benefits.[ii] GDP data is available from the World Development Indicators (WDI) of the World Bank data collection. Based on previous research (Wilkinson, 1996), I included the log of GDP in 1,000 PPP (constant 2011 international dollars) to acknowledge the curvilinear relationship between GDP and population health.

Due to the small number of observations at the country level, it is crucial to check for influential cases. Based on an assessment of DFBETAs and Cook's D, Luxembourg was identified as an influential case. Following Van der Meer et al. (2010), I used a country dummy for Luxembourg, which significantly improved the model (Likelihood-ratio test: Prob > chi2 = 0.000).

3.3 Analysis methods

I accounted for the structure of the data—individuals nested in countries and years—by using a simultaneous multilevel analysis with three levels (Schmidt-Catran and Fairbrother, 2016). In this case, 137,947 individuals (Level 1) were nested in 155 country-years (Level 2) that were again nested in 26 countries (Level 3). Models are estimated using the mixed command in Stata 15.1.

The Intraclass Correlation (ICC) provides the proportion of total variance at the higher levels. The ICC at the country-year level was calculated according to Hox (2010: 34; eq. 2.16). The models include random intercepts and random slopes, i.e., the relation of household income and health does not only vary between years and countries in their intercept, but also in their slopes. In random slope models, the regression lines of income and health for all countries and years can have different intercepts and different slopes. I developed the models step by step, starting with the intercept-only model and ending with the final model, which was specified by random slopes and cross-level interactions. The interactions test the impact of minimum income benefits on income-related health inequalities. To interpret the cross-level interactions in a meaningful way, I centered the variable for minimum income benefits at the grand-mean.

4 Results

4.1 Descriptive analyses

Minimum income protection varies broadly across Europe. In 2012, monthly minimum income benefits were EUR 1800 (PPPs) in Switzerland compared to EUR 155 (PPPs) in Bulgaria. The upper half of the benefit levels in Table 2 is dominated by Nordic countries, whereas Eastern European countries are at the lower end. A comparison of MIP benefits and gross earnings (in Euros for a single person with earnings of 100 percentage of an average worker) emphasizes that high benefits signify generosity: countries with higher monthly benefits are not simply richer countries, but often have a higher ratio of benefits to earnings.

Table 2 shows further the average of self-rated health, the shares and the ratio of ‘very good’ self-rated health according to the lowest and highest household income quintiles for the ESS round 6, 2012 in 26 European countries. I ranked and grouped these countries based on the level of their minimum income benefits packages. Average population health was highest in Cyprus and Ireland with a 4.4 (equivalent to good health) on the 5-point answering scale compared to the lowest value of a 3.6 (equivalent to fair/good health) in Estonia. A health gradient across the five income quintiles was visible in all countries, which indicates the presence of health inequalities. Table 2 provides the percentage of those reporting ‘very good’ health, although health differences can be found for every response category (output not shown). The last column presents the ratio of the percentage of those with ‘very good’ health in the highest income quintile compared to the lowest quintile, which is a first descriptive indicator for health inequalities. The increasing size of the ratio indicates higher inequalities.

The descriptive data gives an impression that health and minimum income benefits are related. Countries that are grouped in the two highest groups of minimum income benefits tend to have better population health. Moving down the table, overall population health worsens with lower benefit levels. A similar pattern can be found in the ratio describing health inequalities. Moving down the column with decreasing minimum income benefits, health inequalities increase as indicated by the steadily higher percentage of people reporting 'very good' health in the highest over the lowest income quintile. However, the exceptions that deviate from the general pattern—such as the Czech Republic with very high health inequalities (ratio of 3.6) and medium benefit levels—suggest that the relationship might be spurious. Another example is Poland, which has rather low benefit levels and, at the same time, low health inequalities.

Table 2. *Minimum income benefit levels (EUR PPPs) and average self-rated health in total and for the lowest and highest income quintile across 26 European countries in 2012.*

Benefit levels (descending)	Minimum income benefits /month	Working age population health	% with very good health, for each household income quintile		Ratio* Q5/Q1
			Q1	Q5	
Luxembourg	2042	3.91	24.1	38.7	1.6
Switzerland	1842	4.21	26.2	52.7	2.0
Ireland	1782	4.36	31.0	70.3	2.3
Denmark	1729	4.19	36.0	46.9	1.3
Cyprus	1471	4.42	49.6	84.2	1.7
Netherlands	1466	3.82	10.9	24.6	2.3
Norway	1449	4.12	30.0	44.8	1.5
Germany	1433	3.68	10.9	23.3	2.1
Finland	1408	3.95	23.1	30.0	1.3
Iceland	1363	4.25	26.5	55.4	2.1
Sweden	1290	4.11	33.3	41.1	1.2
Great Britain	1135	4.05	21.5	44.8	2.1
Belgium	1117	3.94	18.3	30.2	1.7
Austria	1079	4.14	30.9	43.9	1.4
Slovenia	1042	3.92	17.5	38.5	2.2
Italy	935	3.77	11.8	14.3	1.2
France	830	3.86	19.3	33.7	1.7
Czech Republic	749	3.97	12.8	46.7	3.6
Spain	612	3.82	15.5	27.3	1.8
Lithuania	468	3.66	7.0	17.2	2.4
Portugal	455	3.89	9.7	33.9	3.5
Slovakia	448	3.85	9.8	33.4	3.4
Hungary	430	3.73	10.7	27.8	2.6
Estonia	399	3.56	8.9	18.6	2.1
Poland	389	3.81	12.7	23.7	1.9
Bulgaria	155	3.81	14.8	35.5	2.4

*Health ratio: ratio of very good health, highest to lowest income quintile.
Source: SaMip and ESS, round 6 (2012); except for AT (round 3, 2006) and IT and LU (round 2, 2004); data weighted; listwise deletion.

4.2 3-level analyses

The intercept-only model (M0) in Table 3 suggests that considerable cross-national variation exists with respect to self-rated health at the country level (ICC: 0.06). The ICC for the country-year level (ICC-L2) was 0.006. The variance at the country-year level is extremely small compared to the overall variance. Thus, in our sample, health varies to a greater extent across countries than across years.

In Model M1, the individual level variables are introduced in a random-intercept model. Including the variables in the model reduces the variance components at the country level by 11% and at the individual level by 15%. For the explanatory variable—income quintiles—I found a typically health gradient of income: each step down the socioeconomic status ladder is significantly negatively associated with individual health. The lowest income quintile has the strongest health disadvantage compared to the highest income quintile, followed by the second quintile, and so on. Even though people from the fourth income quintile appear to have only a small health disadvantage compared to the fifth quintile, this effect is significant. All control variables are significant, and coefficients are associated with self-rated health in line with earlier research: with increasing age, people tend to have worsening health, and women often report less good health than men (Bambra et al., 2009), and an increasing number of household members is associated with better health up to a certain number of members, after which health is affected in a negative way (illustrated by the negative quadratic term). The better educated report better health (Knesebeck et al., 2006). Compared to the currently employed, those not in the labor force and the unemployed report worse health (Bambra and Eikemo, 2009).

Before introducing the country-level variables and the cross-level interactions, I tested whether the association between household income and self-rated health varied across countries by adding random slopes at both the level of country-years and the level of countries. At both levels, the random slopes of the effect of income quintiles were significant. Since this finding indicates that the effect of income on health indeed varies across countries, earlier research on income-related health inequalities in Europe (Jutz, 2015; Eikemo et al., 2008) is confirmed. A Likelihood-ratio test suggested a better model fit when using a model with random slopes.

In model M2, I examined the effect of minimum income protection and economic performance on overall self-rated health. Countries with more generous benefits appear to

have better individual health. The significantly positive effect of minimum income benefits on health confirms earlier research that examined mortality and life expectancy (Nelson and Fritzell, 2014). GDP p.c. is also associated with health in a positive way, as previous studies have shown (e.g., Kangas, 2010). The country dummy of Luxembourg is significant which is in line with findings from regression diagnostics tests. Country-level variance is further reduced by around 47%.

In the final model M3, I tested the hypothesis that minimum income benefits reduce health inequalities. This model included cross-level interaction terms for income quintiles and minimum income benefits (centered at the grand-mean). The cross-level interaction terms of the 1st, the 3rd and the 4th income quintile differed significantly from the reference of the 5th income quintile and MIP, with the interaction terms showing a gradient—except for the 2nd cross-level interaction term (p<10%). The health disadvantage, which increases with each level down in the income distribution, is reflected in the cross-level interaction terms similar to the constitutive terms. MIP does not reduce the health disadvantages of the lower income groups compared to the fifth quintile. Measures of fit, such as the Akaike information criterion (AIC), indicates that the final model was the model with the best fit, whereas Bayesian information criterion (BIC) supports model M2.[iii]

Table 3. *Multilevel linear regression of self-rated health on minimum income protection benefit levels (MIP) in 26 countries.*

	M0	M1	M2	M3
Constant	3.9397***	4.6202***	2.8565**	2.8480**
	0.0429	0.0496	0.8933	0.8924
Age (15-64)		-0.0186***	-0.0186***	-0.0186***
		0.0014	0.0014	0.0014
Female		-0.0262*	-0.0261*	-0.0260*
		0.0131	0.0130	0.0130
# of Household Members		0.0401***	0.0344***	0.0343***
		0.0080	0.0074	0.0075
# of HH Members,		-0.0033**	-0.0028**	-0.0028**
squared		0.0011	0.0010	0.0010
Highest level of education		0.0608***	0.0609***	0.0609***
		0.0048	0.0047	0.0047
Employment status				
(ref. employed)				
Not in labor force		-0.1973***	-0.1971***	-0.1971***
		0.0178	0.0177	0.0177
Unemployed		-0.1213***	-0.1196***	-0.1199***
		0.0185	0.0194	0.0194
Income Quintiles				
(ref. 5th Quintile)				
1st Quintile		-0.2885***	-0.2995***	-0.2931***
		0.0172	0.0163	0.0197
2nd Quintile		-0.1759***	-0.1821***	-0.1782***
		0.0141	0.0134	0.0148
3rd Quintile		-0.1055***	-0.1130***	-0.1075***
		0.0118	0.0102	0.0111
4th Quintile		-0.0611***	-0.0682***	-0.0635***
		0.0121	0.0110	0.0119
Country level variables				
Country Luxembourg			-0.3260***	-0.3262***
			0.0814	0.0815
GDP pc			0.1707*	0.1712*
in PPP USD, log of			0.0860	0.0860
Monthly MIP			0.0119*	0.0169**
in 100 PPP EUR, centered			0.0052	0.0056
Cross-level interactions				
1st Quint. X MIP				-0.0078*

				0.0031
2nd Quint. X MIP				-0.0047^{+}
				0.0028
3rd Quint. X MIP				-0.0067**
				0.0023
4th Quint. X MIP				-0.0058**
				0.0022
Variance components				
Level-3 variance	0.0450***	0.0401***	0.0214***	0.0214***
	0.0054	0.0047	0.0034	0.0034
(countries)				
Level-2 variance	0.0042***	0.0037***	0.0026***	0.0026***
(country-years)	0.0006	0.0005	0.0004	0.0004
Level-1 variance	0.6900***	0.5893***	0.5851***	0.5852***
	0.0091	0.0076	0.0078	0.0078
(individuals)				
Level-3 var (income)			0.0008***	0.0008***
			0.0002	0.0002
Level-2 var (income)			0.0046***	0.0044***
			0.0006	0.0006
ICC L-3	0.061	0.063		
ICC L-2	0.006	0.006		
AIC	442198	413974	413345	413343
BIC	442238	414122	413532	413570
-2 Log likelihood	-221095	-206972	-206654	-206649
df	0	11	14	18

Standard errors in second row.
N of individuals = 137947; N of country-years = 155; N of countries = 26.
Sources: ESS (rounds1-6), data weighted, listwise deletion; SaMip.
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 1 (a) shows the margins plots of predicted self-rated health across the five income quintiles from the random slopes model (M2) for different levels of MIP. The benefit levels (EUR PPPs 500, 1000, 1500, and 2000) are according to the arrangements in Table 2. Predicted health increases by higher income and with higher benefits levels.

To study the possible moderating role of minimum income benefit levels on health inequalities, cross-level interactions are applied. Figure 1 (b) shows the cross-level interaction effects of the five income quintiles and minimum income benefit levels on self-rated health, based on model M3. We see that more generous MIP seems to increase health differences between the lowest and the highest income group. At the low MIP benefit level of 500 Euros

which is roughly the same level as in Lithuania or Portugal, the health advantage of the higher income groups is less pronounced than in countries with higher benefit levels of 1500 or 2000 Euro per month such as in the Netherlands or Luxembourg. Moreover, the lowest income quintile does not seem to benefit from generous minimum income protection. The predicted health status in the lowest income quintile assumes similar values of around 3.8 (on the 5-point scale) across the four different benefit levels.

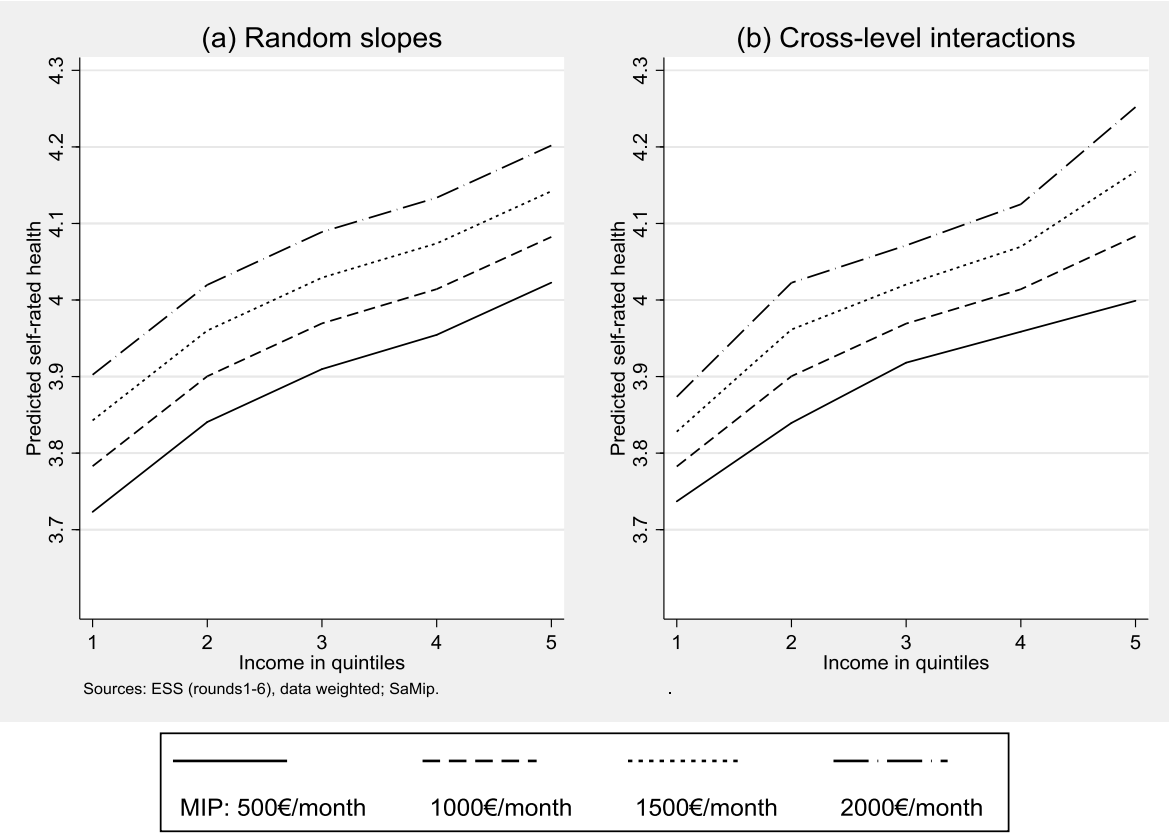

Figure 1. *Margins plots based on model M2 vs. M3.*

5 Discussion

Researchers have found a positive relationship between welfare state generosity and population health, not only regarding egalitarian, more generous welfare states (Muntaner et al., 2011) but also with regard to the design of specific programs and benefit levels (Bambra and Eikemo, 2009; Ferrarini and Norström, 2010; Lundberg et al., 2008; Nelson and Fritzell, 2014). The present study builds on this research and has taken it one step further by looking at one social policy program in particular—minimum income protection. The results of the present study confirm that generosity in benefit levels is related significantly to overall

population health, as also was found by Nelson and Fritzell (2014) for mortality. Even when controlling for a country's wealth, the significant positive effects of minimum income benefits on health remains. In addition, the present study confirms earlier findings that income-related health inequalities vary by country.

However, the main purpose of the present study was to test whether higher minimum income benefit levels reduce health inequalities. My first assumption, that more generous benefits would reduce differences in health between income groups, is not supported. Cross-level interaction terms in Table 3 and in graph (b) of Figure 1 show that the health differences between the income quintiles are not reduced after introducing the interaction with benefit levels which means that minimum income protection does not lead to a reduction of the income gradient in health. All interaction terms are significant. Graph (b) even shows that the differences in health between the lowest and the highest income quintile are largest at the highest benefit level and not, as expected, at lower benefit levels such as 500 Euro per month.

After rejection of the first hypothesis, the second hypothesis can only be evaluated to a limited extent. My analysis shows that the health disadvantage of lower income groups is not reduced by generous minimum income protection. A steeper slope between the first and second income quintiles with increasing MIP benefits indicates that there are large differences in predicted health between these two groups. Higher benefit levels do not reduce the health disadvantage of the lowest income quintile. This finding is surprising, since minimum income protection is targeted towards those with low or no income at all. The recipients and beneficiaries of minimum income protection are in the lowest income group. For this study, it was not possible to test this finding further, since the ESS does not collect data on the share of minimum income benefits as part of household income but asks for the main source of income with one response category called *any other social benefits or grants*. Over the six ESS rounds, fewer than 4% choose this answer category, and only about 15% of the lowest income quintile fall into this category. Possible health-beneficial effects of higher benefit levels for recipients of minimum income protection and social assistance do not seem to have led to a visible decline in health disadvantages of the lowest income quintile. According to the mechanism of compression, the results might be an indication that the numbers of beneficiaries is too small to show an effect for health inequalities. My arguments made in the second chapter that a larger share of the population is aware of the beneficial effects of minimum income protection are not supported by the findings. The level of MIP has no impact on middle income groups, which would have led to a reduction in health inequalities.

In addition, the number of actual recipients of MIP in the lowest income group may be too small to influence health inequalities. The mechanism of compression therefore does not come into play for minimum income protection schemes.

In line with the second hypothesis, I find that the higher income classes are not disadvantaged, even if MIP benefits are generous. The steep slope between the second highest and the highest income quintile displays the health advantage of the highest income group. Interestingly, this is most evident in the slope of the highest benefit level (2000 Euro per month), while it is not that obvious at the low level of 500 euros per month. The health advantage of the highest income quintile, which is more pronounced at higher benefit levels, might indicate that this particular group is 'rich enough,' and may not experience any negative effects such as higher taxes from welfare generosity. Overall, health inequalities are not reduced by generous benefit levels, but rather increased, and this is partly due to a clear health advantage of the top income group.

Recognizing the robust positive main effect of minimum income benefit levels on individual health, it also is important to point out the inconclusive relationship of minimum income protection and health inequalities. To better understand the link between minimum income protection and health inequalities, further research should study the recipients of minimum income protection and how changes in benefit levels or how transitions in and out of social assistance affect their individual health. In addition to benefit levels, future research also could include other aspects of minimum income protection, such as conditions of reception, duration of benefits, or possible sanctions. Overall, the findings of my study tentatively suggest that the benefit level does not make a difference in health for the lowest income group compared to the highest income group but that higher benefit levels even lead to an increased health advantage of the highest income quintile. Minimum income protection, which is existential for people who are not covered by any contributory social insurance programs, may not be an appropriate instrument for reducing income-related health inequalities.

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[i] Since macro data on minimum income benefit levels were not available beyond 2013, the most recent ESS modules were not part of the analysis.

[ii] Another possible control variable is the size of the welfare state which is usually measured with total social expenditures (TSE) in % of GDP (Nelson and Fritzell, 2014), e.g., from Eurostat/ESSPROS. The results remained robust, irrespective of whether TSE were included in the analysis or not. Since the variable TSE was not significant, it was excluded to keep the models concise.

[iii] Depending on the data structure, sample sizes of different levels are used. Here, the sample size of level 1 is used (as also provided by Stata) for the Bayesian information criterion (BIC), but to avoid confusion, interpretation of AIC is preferred (Hox, 2010). To all measures of fit applies that lower values represent better model fit.

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