



# **Are better health outcomes related to social expenditure?**

A cross-national empirical analysis of social expenditure and population health measures

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# Preface

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The United States fares poorly on many population health outcomes in comparison with other OECD countries, despite spending by far the most per capita on healthcare. This fact has stoked interest in the relationship among expenditure, health outcomes and what are called the social determinants of health. Previous studies have shown that social spending and the ratio of social to health spending are associated with better health outcomes in OECD countries. This exploratory study builds on this finding by widening the scope of the analysis, by incorporating other societal factors – namely, social capital and income inequality – and by assessing these relationships not only at the cross-national level but also at the cross-state level within the United States.

In order to do so, we addressed several exploratory research questions:

1. Is the relationship between social expenditure and health outcomes robust when more countries and years are added to previous analyses?
2. Does the type of social spending (e.g. on particular age groups or social challenges) influence the relationship between social spending and health outcomes?
3. Do wider contextual factors influence both social expenditure and health outcomes?
4. Do findings about the relationship between social spending and health outcomes hold at the sub-national level, i.e. within the United States?

The intended audience for this report is two-fold. We hope that the report's findings are of relevance and interest for policymakers, practitioners and other interest groups considering or delivering interventions aimed at improving health and wider social outcomes. In addition, with the analysis presented in this report we aim to reach researchers, research funders and policy specialists focusing on social protection systems and public health.

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# Summary

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In an era of limited national budgets and pressing health and social challenges, the need to focus expenditures to achieve better outcomes is a widespread policy concern. In comparison with other OECD countries, the United States in total (public and private spending combined) spends more on healthcare yet still fares worse in many areas of health. This finding has fed an already growing interest in the relationship between health and wider societal factors. Recent research by Bradley and Taylor (2013) found that spending on welfare programmes seems to be related to health outcomes in interesting ways. Their research found that overall higher levels of social spending are associated with better health outcomes for OECD countries. Further, a higher ratio of social to health spending in OECD countries was associated with better health outcomes.

If countries that spend more on social programmes than they do on health have better health outcomes, all other things being equal, then this raises strategic questions for governments who wish to improve health outcomes. This is an important question especially when budgets are constrained and there are rising costs associated with the burden of poor health. However, identifying an association between social spending and health outcomes is the first in several necessary steps towards answering this question and understanding its implications for government spending decisions.

First, there could be many reasons that an apparent association between health outcomes and social spending may appear that, when tested, would begin to unravel. For example, outliers could weigh too heavily, skewing the findings and creating an apparent effect that disappears once the outliers are removed. Or, even if the relationship between the two

holds after testing in a variety of ways, it is also possible that some underlying driver is responsible for both the higher social expenditure and the better health outcomes. If this were the case, one might seek to identify factors that influence and are associated with both social spending and health and test these. If such factors were found, this would indicate a deeper level at which governments may (also) need to intervene if they are to improve their population's health. This exploratory study sought to make progress on testing the relationship between social spending and health outcomes, and on some of the wider societal factors that could be considered candidates for driving or being related to both social spending and health outcomes.

In order to do so, the study focused on the following research questions:

1. Is the relationship between social expenditure and health robust when more countries and years are added to previous analyses?
2. Does the type of social spending (e.g. on particular age groups or social challenges) influence the relationship between social spending and better health outcomes?
3. Do wider contextual factors influence both social expenditure and health outcomes?
4. Do findings about the relationship between social spending and health hold at the sub-national level, i.e. within the United States?

To answer these questions, this study extends earlier analyses by widening the scope of such analyses, by incorporating other societal factors – namely, social capital and income inequality – and by assessing these relationships not only at the cross-national level but also at

the cross-state level within the United States. These two factors were chosen because they each have been shown to be associated to population health in separate (extensive) literatures and because both factors are central in current debates about the social determinants of health. In addition, both social capital and inequality capture something about the wider social environment within which expenditure decisions are made. Our analysis brought together externally validated health outcomes (as opposed to self-reported measures) and a range of otherwise disparate data sources to assess which of these factors seemed to be associated with better health outcomes where they were found across OECD countries. In doing so, we build on rich literatures on a range of policy areas, including social protection, social capital, inequality and health.

## Approach

The first part of the study builds on a previous cross-national analysis undertaken by Bradley et al. (2011) and examines the relationship between social spending and health outcomes. In concrete terms, we:

- Include additional countries and health indicators and extend the time period of observations,
- Run analyses on a narrower group of countries and run models excluding the United States,
- Explore the possibility and effect of time lags,
- Look at changes within individual countries over time, and
- Look at the impacts of different types of social expenditure (e.g. unemployment, old age).

To further explore the context, we incorporate social capital and income inequality into the analysis. In line with the existing literature, social capital is measured at a cross-country level through the level of interpersonal trust in a country. Income inequality is measured using the

Gini coefficient, a standard measure of income inequality, and the Palma ratio, a more recent measure of income inequality based on the ratio of the cumulative income of the highest-earning 10% of the population to the cumulative income of the lowest earning 40%.

The final step in the analysis is to focus on a single country, the United States. Recognizing that the United States is diverse, we use US state-level data to assess whether the relationships found at the cross-national level are present at the US state level as well.

## Findings

With its public and private spending combined, the United States spends significantly more on healthcare than its high-income counterparts, and this difference has increased over time. Rising proportionate US health spending relative to social spending is in stark contrast to other OECD countries' spending patterns. In contrast to the health expenditure trajectory, the United States has consistently spent much less on social programmes than the majority of its high-income counterparts, meaning that the gap between health and social expenditure in the United States has widened over time.

**Countries with greater social expenditure have better health outcomes, even when this is tested in many different ways.** We tested this finding by including more countries, incorporating additional health indicators, extending the years under consideration and looking at trends within individual countries. We also found the same relationship when we removed the United States from the analysis, which we did to make sure that the apparent relationship is not driven by the United States as an outlier on a range of indicators.

**Public social expenditure by governments seems to have a particularly strong relationship with health outcomes.** The strength of the association with better health outcomes is greater when we look only at

public social spending (i.e. that provided by government) than when we also include private spending. This is particularly important given the fact that the United States relies on private social service provision to a much larger extent than do the majority of other OECD countries.

**Some areas of social expenditure, such as old-age spending, appear more strongly positively related to better health outcomes than others.** In addition, the strength (and at times direction) of the relationship with better health outcomes varies depending on the area of social expenditure (e.g. unemployment, family programmes etc.). The majority of observed associations between health outcomes and each of the nine social spending categories were positive, although there were several exceptions. The most consistent relationships were found for old-age spending. This applied even to health outcomes not intuitively related to retirement welfare, such as infant mortality and low birth weight.

**Better health outcomes seem to be even more evident when the data are looked at over a longer time period from when the social expenditure occurs – perhaps because social expenditure can take time to translate into better health outcomes.** We tested time lags of various lengths and found that the associations get somewhat stronger with lags greater than seven years.

**Countries with higher levels of trust in others tend to have both higher levels of social spending and better health outcomes.** Adding social capital to the analyses produces notable,

albeit relatively minor, shifts in strength to the relationship between social spending and health outcomes.

**Higher inequality is associated with an even stronger association between social spending and health outcomes.** Our analysis found that the association of health outcomes with social spending is stronger in less equal contexts. In other words, social protection may be more important for health outcomes in more unequal societies.

**There is also a strong positive relationship between social expenditure and health outcomes across US states.** We found associations between higher social spending – measured in this case by public cash transfers – and better health outcomes across US states. As with our cross-national analysis, the associations differed depending on the type of expenditure, with the strongest results for unemployment and income maintenance payments.

## Conclusion

In summary, our analyses confirm and build on the observed relationship between social spending and health outcomes. Additional findings include the differential association of spending depending on the spending category in question. In addition, we found that social capital and income inequality are relevant contextual factors. Both interrelate with social spending and with health outcomes, as well as through their potential role in moderating the relationship between social spending and health outcomes.



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# Abbreviations

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BEA	Bureau of Economic Analysis (USA)
EU15	EU member states before the 2004 enlargement
EU28	EU member states after the 2004 enlargement
FPL	federal poverty level (USA)
GDP	gross domestic product
GSS	General Social Survey (USA)
OECD	Organisation for Economic Co-operation and Development
SOCX	OECD Social Expenditure database
WHO	World Health Organization



# Chapter One. Introduction: The American health paradox



Many health outcomes in the United States, notably life expectancy or low infant birth weight, are poor relative to those in other developed countries, with the United States typically ranked towards the bottom of Organisation for Economic Co-operation and Development (OECD) nations (Nolte and McKee 2008; Woolf and Laudan 2013). Much of the research on how to improve US population health has focused on American health systems, health-related behaviours and health expenditures (see, e.g. Murray et al. 2013). In short, factors directly related to healthcare and medicine are often (and not surprisingly) considered as a means to address poor health outcomes. In parallel, an important field of research has identified and shed light on what are termed the social determinants of health. Work led by Richard Wilkinson, Kate Pickett and Sir Michael Marmot, for example, has contributed to an expansion of the scope of research on (inequalities in) health outcomes by incorporating social factors that impact on health (see Marmot et al. 2008; Marmot and Wilkinson 2005). Levels of poverty, levels of employment and unemployment, social services, and housing are among the social factors identified as having an impact on population health. Through this broader perspective on health, outcomes are studied as the product of a complex intersection of social, economic and cultural factors with health behaviours, medicine and healthcare. This study focuses on broader factors associated with health, bringing together research on social expenditure, social capital and inequality.

Much of the wider social context influencing health is part of a social environment shaped by government decisions, policy and practice through the provision of welfare and benefits. This is a costly infrastructure, becoming more costly with large-scale demographic change and shifting dependency ratios in many countries (Jahn et al. 2014; Kitao 2014; Scruggs 2007b; Walker and Maltby 2012). The importance of the social context in relation to health outcomes has informed new lines of inquiry. For example, Elizabeth Bradley and Lauren Taylor have looked beyond health expenditure to consider the role

of social expenditure – the funding of social programmes that seek to address challenges, such as poverty, lack of childcare and poor housing that are part of the social context (Bradley and Taylor 2013). Their cross-national comparative analysis assessed whether and how social expenditure relates to health outcomes across the OECD (Bradley and Taylor 2013).<sup>1</sup>

Bradley and Taylor observed that while the United States spends much more on healthcare than other countries, its level of spending on social programmes, such as unemployment benefits or retirement, has been notably lower (see Figure 9 in Appendix D). Further, they found that levels of social spending were positively associated with better outcomes across a range of health measures, including life expectancy, potential years of life lost and infant mortality, across the OECD (see Table 1).<sup>2</sup> Based on their findings, Bradley and Taylor suggested that:

*...the United States has favored investments in healthcare over social services. According to the numbers, this inequity may result in poorer health than might be attained by recalibrating the balance of health and social spending (2013, p.48).*

In this study, we aim to explore specific issues raised by the literature covering the wider social context of health outcomes. The research touches on the following areas of research:

**1. Social spending and health outcomes:**

First, we consider the suggestion by Bradley and Taylor (2013) that the balance between health and social expenditure in countries is related to their health outcomes.

**2. Social factors, social spending and health outcomes:**

We then broaden the analysis to incorporate certain aspects of the wider social context within which health and social expenditures occur and how they might affect the relationship between social spending and health outcomes. The significance of these relationships, together with the fact that they have generally not been looked at alongside social expenditure, led us to

**Table 1. Rankings on social spending, health spending and life expectancy, OECD countries**

Social spending (% of GDP)			Health spending (% of GDP)			Life expectancy at birth (years)		
Rank	Country	Value	Rank	Country	Value	Rank	Country	Value
1	Sweden	25.7	1	United States	14.4	1	Japan	83.0
2	Denmark	25.2	2	France	10.6	2	Switzerland	82.3
3	France	24.6	3	Germany	9.7	3	Spain	81.9
4	Finland	23.6	4	Canada	9.4	4	Iceland	81.8
5	Austria	23.4	5	New Zealand	8.8	5	Italy	81.7
...	...	...				...	...	...
<b>23</b>	<b>United States</b>	<b>15.3</b>				<b>27</b>	<b>United States</b>	<b>78.5</b>

Source: OECD SOCX and Health databases, 2009 data

undertake exploratory analysis in order to consider the potential relationships among social expenditure, social capital, inequality and health outcomes.

To explore these relationships it is important to clarify: (a) What do we mean by social expenditure and what ‘kinds’ of social expenditure are included? (b) What are key indicators of health outcomes? and (c) What aspects of the social and cultural context are considered?

Much of our early work in this study involved selecting indicators and suitable datasets to these ends. Social expenditure was taken from the Organisation for Economic Co-operation and Development (OECD) Social Expenditure Database (SOCX).<sup>3</sup> Many studies rely on self-reported health as an indicator of health outcomes, but we chose to use health indicators directly derived from population health statistics, such as life expectancy, seeking to avoid any potential biases in reporting by respondents whose experiences and attitudes may influence their perceptions of their own health.<sup>4</sup> Finally, to explore patterns of relationships among social factors, social expenditures and health outcomes, we undertook a longitudinal, cross-national comparative analysis, and we also looked at the same relationships within the United States. Our aim was to begin to explore the data to see whether patterns could be observed that would indicate potential future

areas for further investigation, rather than to seek to make causal claims.

Our empirical approach was guided by three main considerations. First, social spending changes over time and is made up of a variety of programmatic areas, such as family support, unemployment or housing, as well as programmes within those areas with diverse aims, designs and delivery. The relationship between these areas and programmes and health outcomes may vary substantially. Second, social and health policies and decisions about expenditure are not made in isolation from wider societal factors, such as the political landscape or budgetary constraints. On the contrary, expenditure decisions can be understood as an expression of (and influence on) the wider context in which they are made (see, e.g. Breunig and Busemeyer 2012; Faricy and Ellis 2014; Margalit 2013). And, third, we recognise that substantial variation in health outcomes, social spending and other social and cultural environments exists within the United States. This means that for a large number of questions addressed and raised in this study, treating the United States as a single country may not be appropriate.

In concrete terms, our objective of exploring the wider social context of health outcomes translated into the following questions, with the clear understanding that this exploratory project would only scratch the surface of these

questions. The aim was as much to see whether this first look indicated areas for further analysis as it was to address our questions:

1. Is the relationship between social expenditure and health robust when more countries and years are added to previous analyses?
2. Does the type of social spending (e.g. on particular age groups or social challenges) influence the relationship between social spending and better health outcomes?
3. Do wider contextual factors influence both social expenditure and health outcomes?
4. Do findings about the relationship between social spending and health hold at the sub-national level, i.e. within the United States?

Looking at these questions through cross-national comparisons addresses issues that are relevant for the United States, UK and other countries with a need to improve health outcomes, as well as to increase the overall affordability of better health.

## 1.1. Scope of the report

Given the size and complexity of the subject area and the scale of the challenges involved, there are limitations to what a single study can achieve. Healthcare costs are a multifaceted challenge, and they are a product of numerous contextual factors, including, among others, levels of ill health and need, the cost of health provision and the level or amount of treatment offered by healthcare professionals (Bipartisan Policy Center 2012). Given this complexity, no single solution to reduce costs and/or improve outcomes exists. Our exploratory work focused on one potential facet of improving health outcomes, building from the suggestion that in the United States, a greater focus on social expenditure may be needed (Bradley et al. 2011; Bradley and Taylor 2013).

While the discussion of our findings attempts to take into account to the extent possible the

specificities of the American healthcare policy environment, it inevitably brackets a range of important issues. Some of the most notable issues that may be considered instrumental in lowering US health costs and/or improving health outcomes not covered by this report include high healthcare unit costs,<sup>5</sup> high levels of healthcare consumption,<sup>6</sup> and gaps in access to healthcare.<sup>7</sup>

Ultimately, however, while the suggested inefficiencies of the US healthcare system are important to note, they are unlikely to explain the differential health outcomes on their own.<sup>8</sup> For instance, Woolf and Laudan (2013) suggest that healthcare acts in concert with other important (and arguably much cheaper) determinants of health, of which public policy is an important one.<sup>9</sup> This claim is in line with the objectives of this study, and is of particular importance given increasing concerns about rising inequality and its impacts on health and social services in a tight fiscal climate. As will be discussed in this chapter, it is also in line with the results of our model, which supports and builds on the observation of a relationship between social policies and health outcomes.

## 1.2. Data and methods

### 1.2.1. Underlying methodological approach to the study

Our international comparative analyses focused on the country level, with several years of data for each country. Various measures of health were the outcomes, while potential explanatory variables, including social spending (as a proportion of GDP), were the predictors. For example, we looked at the average proportion of children born underweight in a given year as one outcome. Each country has multiple data points, so in the analysis we adjusted for clustering of observations within countries. We used two modelling approaches. First, we employed standard multilevel linear models (Snijders and Bosker 2012), followed by an approach that exclusively focuses on change over time within

countries (see Tarling 2009).<sup>10</sup> The benefit of the latter approach is that any time-constant or slow-to-change factors relating to a specific country are ‘accounted for’ in the model (for additional details, please refer to Appendix A).

In our analysis of relationships *within* the United States, we also ran multilevel models, with observations clustered by state. Given the structure of government and administration in the United States, we chose states as the unit of analysis rather than county. The rationale for this choice was that, depending on the benefit in question, state governments (along with the federal government) exercise some control over the structure and size of social spending within their territories and that therefore any observed variation among individual states is not solely a function of the size of the covered population.<sup>11</sup>

### Controls variables used in the models

In our analyses, we included control variables in our models. These differed depending on

whether the analyses were international or within–United States only. For the international analyses, we typically only included measures of GDP to account for macro-economic changes (which in turn might also drive both expenditure and health), which is in keeping with previous research (Bradley et al. 2011). For the within–United States analysis, it was possible to include a richer array of controls, which were: state population over time and state-level measures of household income, age, ethnicity and gender. Deviations from these general approaches are mentioned and explained where appropriate.

### 1.2.2. Data sources

This study draws on a number of large cross-national datasets, raising numerous compatibility challenges across countries and reference years, and on a number of different US datasets (Table 2). Within the constraints of the project, we have made every effort to identify and collect the best available data; however, a series of pragmatic

**Table 2. Data sources used in this report**

Data	Source(s)	Time span collected	See technical appendix
Social expenditure (international)	OECD SOCX database	1980–2012	B
Social expenditure (United States sub-national)	Bureau of Economic Analysis (BEA) data on transfers to individuals, accessed through RAND State Statistics	1980–2012	B
Health indicators (international)	OECD Health database, WHO database	1990–2012	C
Health indicators (United States sub-national)	National Vital Statistics System (NVSS), the Behavioral Risk Factor Surveillance System (BRFSS), the Institute for Health Metrics and Evaluation (IHME)	1990, 1997, 2005, 2009	C
Social capital (international)	World Values Survey, European Values Study	1980, 1985, 1991, 1995, 1998, 2005, 2008	E
Inequality (international)	OECD Income Distribution and Poverty database	1980–2012	N/A
Demographic and economic indicators (international)	OECD GDP and Population databases	1980–2012	N/A
Demographic and economic indicators (United States sub-national)	Census data accessed through RAND State Statistics	1980–2012	N/A

choices were made throughout the research. We invite readers to refer to the technical appendices for more detailed discussions of the data sources and their strengths and limitations.

### Overview of variables

In Table 3 below we also provide a brief overview of the definitions of variables used in this report (to allow readers rapid orientation without the need to frequently refer to the technical appendices).

### Social spending data to assess welfare provision

Because social spending represents the basis of all our analyses, we give a brief description

of how social spending data were used in our work (additional details are provided in Appendix B). In our international analyses, we draw on social expenditure data as reported in the OECD SOCX database. This dataset represents the most comprehensive data on spending in various areas of social protection, with information collected for each OECD country, each year. Our working definition of social spending is identical with that of Bradley and Taylor (2013), namely:

Social spending = total SOCX spending – spending in the ‘health’ SOCX category

Social spending captured by SOCX is broken down into nine categories, depending on the social risk the spending is supposed to protect

**Table 3. Outcomes and predictors used in this report**

Panel A: Outcomes		
Outcome	Definition	Unit of measurement
Life expectancy	Life expectancy at birth	Years
Low birth weight	Percentage of newly born weighing under 2,500 g	Per cent
Infant mortality <sup>a</sup>	Deaths under one year of age in a given location	Deaths per 1,000 live births per year
All-cause mortality	All deaths registered in a given location	Deaths per 100,000 population per year
Alcohol intake	Consumption of pure alcohol per capita per year	Litres
Obesity rate	Percentage of population aged 15+ who are obese (BMI higher than 30 kg/m <sup>2</sup> )	Per cent
Smoking prevalence	Percentage of the population aged 15+ reporting smoking every day	Per cent
Panel B: Predictors		
Gini coefficient	Dispersion of income in a given population	No unit; 0 = perfect equality, 1 = perfect inequality
Palma ratio	Ratio of income of the highest income decile (90–100 percentile) over the income of the lowest four deciles (0–40 percentile)	No unit; higher values denote higher income inequality
Interpersonal trust	Percentage of people agreeing with the statement that ‘most people can be trusted’ (as opposed to ‘you can’t be too careful’)	Per cent
Social spending	Expenditure on social protection programmes in a given country	Per cent of GDP (international) USD per capita (state-level)
Type of social spending	A breakdown of social spending into spending categories	Per cent of GDP

Note: <sup>a</sup> Infant mortality data were log-transformed because of their skewed distribution.



against. In addition to breaking down the data by social spending category, SOCX classifies social spending by source, which enables the differentiation between public and private social spending. Due to a lack of data availability, we use overall gross spending in our analyses, which does not take into account the effects of taxation. The unit of measurement used in our analysis is per cent of GDP.

In the US sub-national analysis, we attempted to use data that would be broadly comparable to those used in the international analysis, but there were several differences. First, as a measure of social spending in the United States, we used data from the Bureau of Economic Analysis (BEA) on government transfers to individuals, as collected by RAND State Statistics.<sup>12</sup> This dataset represents a coherent set of data on all US states and the vast majority of US counties and county equivalents. This enables us to make meaningful comparisons to the wider cross-national analysis, though we note that there are some differences in the underlying data. For example, the BEA data leave out any non-governmental payments. In other words, it focuses solely on 'public' spending in SOCX parlance, but this fits with our earlier 'public-only' analysis of SOCX. (A more general limitation is that the classification of transfers into individual categories differs from that of SOCX, meaning that the categories of expenditure differ between SOCX and BEA data.)

Second, we calculated per capita expenditure in each of these areas by dividing the BEA data by the total population of a given state. These were then used in our analysis, which constitutes a departure from the SOCX data, which were analysed as percentage of GDP.<sup>13</sup> As a result, while both international and sub-national analyses offer insights into the role of social spending, they do so in a slightly different manner. Our international analysis, in line with approaches taken in previous studies, looks at how large a proportion of national resources is devoted to individual social policy areas. Our US sub-national analysis, in contrast, looks at the

*relative volume* of social assistance provided in different parts of the same country.

The use of expenditure data in the analysis of welfare states and social policy has its limitations. For instance, Esping-Andersen (1990) noted that 'Expenditures are epiphenomenal to the theoretical substance of welfare states...'. That is, high levels of expenditure might not reflect generous welfare states or extensive social policies, but might simply arise because of high demand (e.g. high unemployment). As such, expenditure may not represent a societal preference for investments in social policies. Still, expenditure data continue to be used in many analyses for two main reasons (Castles 2002):

1. Lack of alternatives: While alternative approaches exist in theory (e.g. Esping-Andersen's 'decommodification indices', which classify welfare states on the basis of entitlement and eligibility criteria of welfare state programmes), underlying data are not always available.
2. Improved quality of SOCX: Over recent years the categories of expenditure within the SOCX database have become more specific and the disaggregation of expenditure makes the data more accurate.<sup>14</sup>

One alternative to using spending data is the Comparative Welfare Entitlement Database, assembled by Lyle Scruggs, Kati Kuitto and Detlef Jahn (see Scruggs 2014). The database is based on Esping-Andersen's decommodification index and collects data on indicators of welfare generosity in three social protection areas: unemployment, pensions and sick leave. Several indicators from each area are brought together to form a single summary, and summary indices from the three areas are also used to construct a composite index of overall 'welfare generosity'. We employed these data in later robustness checks, but we do not report the results of the analyses based on generosity data (available on request from the authors).

A second alternative is to group countries according to the welfare state regime categories specified by Esping-Andersen (1990) and later updated by Ferrera and Hemerijck (2003). Given that we have spending data for each individual country, however, we chose not to utilise country groupings, as this might obscure important variation among countries in the same group.

### 1.3. Structure of the report

This remainder of the report is structured as follows. Chapter 2 presents a replication of Bradley and Taylor's analysis using more recent data and an expansion using multiple

subcategories of social expenditure. Chapter 3 brings into the analysis other contextual factors that may be able to shed light on the relationship between social spending and health outcomes. Chapter 4 offers the findings of a sub-national US analysis conducted at the state level. Chapter 5 includes a synthesis of all the findings from the research, offers a discussion of their policy implications and raises questions for future research. Also attached to this report are a series of technical appendices that provide further background (Appendices E and F), details on the analytical methodology (Appendix A) and data sources (Appendices B and C) along with their limitations, and additional model results (Appendix D.).

**Chapter Two.**  
**A cross-national comparison:**  
**What is the relationship**  
**between social spending and**  
**health outcomes?**



### Summary

The trajectory of US health spending stands out for its divergence from that in its high-income peer countries in two ways. In the past two decades, health expenditure in the United States has been much higher than that in comparable countries. In contrast, the United States has consistently spent less on social programmes than the majority of its high-income counterparts.

Our analyses found that, cross-nationally, the relationship between social expenditure and health outcomes holds over time, in different countries, and within countries. It also holds, and the strength of the relationship changes, when social spending is disaggregated, for example, into source areas (public/private) or policy areas (such as unemployment and old age).

In particular, the spending category Old age expenditure was most consistently associated with all better health outcomes included in our analysis. When we incorporated public (i.e. governmental) social spending only, the observed relationship with better health outcomes was four times stronger than when we incorporated private spending as well.

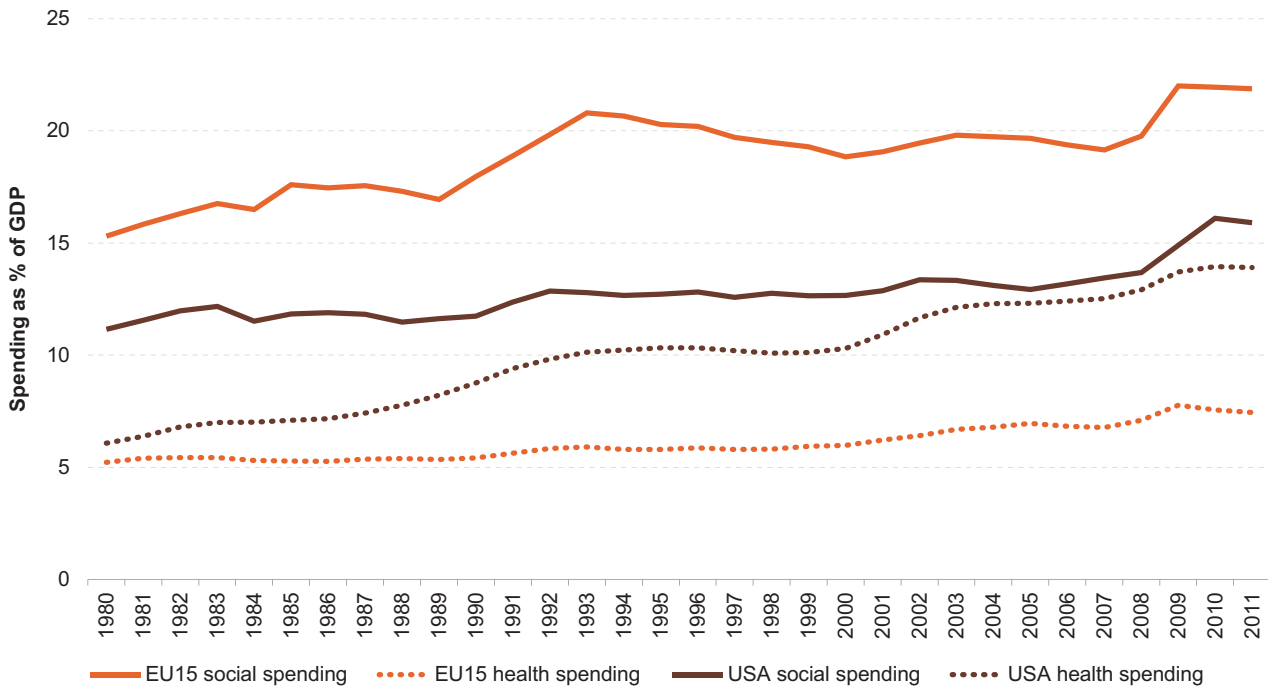
As in many countries, high and rising health spending has featured prominently in American policy debates in recent years, and efforts to reform the US health system have partly been driven by the desire to reduce costs (see, e.g. Kellermann et al. 2012). Indeed, reining in the cost of healthcare was one of the explicit goals of the Affordable Care Act (Silvers 2013).<sup>15</sup> While the United States has high levels of expenditure on health, many have observed that the United States is not achieving the outcomes that might be expected given such high expenditure (e.g. Davis et al. 2014; Ginsburg et al. 2008; Woolf and Laudan 2013).<sup>16</sup>

It might be tempting to think that high expenditure is a stable feature of American healthcare, and that it may be the price to be paid for having some of the most advanced equipment and treatments in the world. However, the marked gap between health spending and health outcomes is a relatively recent phenomenon. Until the 1980s, health spending in the United States was similar to that in other high-income countries.<sup>17</sup> This suggests that, far from being inevitable, the trend in US expenditure is also a product of market conditions and/or policy choices over time, and is therefore amenable to changes in these choices or conditions. This phenomenon has not occurred exclusively in the United States;

other countries, such as the UK, have also seen periods of increased health expenditure without relative improvements in health outcomes.<sup>18</sup> Nonetheless, the trajectory of US health spending stands out for its clear divergence from its high-income peer countries (see Figure 1, as well as Figure 8 in Appendix D).

In contrast, the level of social spending the United States over the past three decades has lagged behind that of the majority of 'peer' countries (with the exception of Australia and Canada), albeit much less dramatically than has health spending. This is primarily due to two factors: US social spending in the 1980s was already comparatively low and did not grow faster than in the majority of peer countries. As a result, the United States never caught up with countries that had already been spending more, and it fell behind countries that started low but increased their social spending more rapidly, such as Portugal or Japan.

As set out above, one recent study that has commented on poor returns on US health spending was conducted by Elisabeth Bradley and Lauren Taylor (2013). One of the first steps we took was to replicate the basic premise of Bradley and Taylor's work, because the implications of their work are so fundamental for population health that they deserve further attention. We followed their earlier analysis (Bradley et al. 2011)



**Figure 1. Health and social spending in the United States and EU15 countries, 1980–2011**

Source: OECD SOCX database

and explored whether the positive relationship they found between higher social expenditure and better health outcomes holds over a longer period of time and with more recent data.

## 2.1. Replicating findings on social expenditure and health from Bradley et al. (2011)

In our analyses, we use very similar data to that used by Bradley et al. (2011), but we note a few differences in data sources and limitations of the approach taken in analyses to date.<sup>19</sup> Using data from the WHO and the OECD, we explored three of the five outcomes explored in Bradley et al. (2011). These were life expectancy, infant mortality rate and low birth weight. For the health and social expenditure data, we used social spending, health expenditures and the ratio of social to health spending.

Below we present results from our replication of Bradley et al.'s (2011) analysis using SOCX data.

We discuss our results in more detail below, but the summary finding is that the basic premise of Bradley et al.'s (2011) and Bradley and Taylor's (2013) analyses holds in our analyses: social expenditure is associated with better health outcomes. This result holds when analysed under many different circumstances, namely, when we:

- Include additional countries and health indicators and extend the time period of observations,
- Run analyses on a narrower group of countries incorporating the United States and 17 'peer' countries, and run models excluding the United States,
- Explore the possibility and effect of time lags,
- Look at changes within individual countries over time, and
- Look at the impacts of different types of social expenditure (e.g. unemployment, old age).

**Table 4. Multilevel linear model replicating findings from Bradley et al. (2011) on relationship between social spending and health outcomes**

Variable		Model 1	Model 2	Model 3
		Life expectancy	Infant mortality (log)	% low birth weight
Social spending (%GDP)	b	0.05	-0.02	0.02
	se	0.01	0.00	0.01
	p	0.00	0.00	0.06
Log GDP	b	7.87	-1.12	1.35
	se	0.24	0.06	0.21
	p	0.00	0.00	0.00
Intercept	b	-3.33	13.35	-7.77
	se	2.48	0.62	2.14
	p	0.18	0.00	0.00
<b>N country-years</b>		<b>319</b>	<b>308</b>	<b>312</b>
<b>rho (variation among countries over time)</b>		<b>0.94</b>	<b>0.95</b>	<b>0.86</b>

Note: Sample sizes differ among models because of small amounts of missing data for outcome variables.

The first set of detailed results is presented in Table 4. These show that when GDP is taken into account, there is a positive relationship between social expenditure and life expectancy at birth (Model 1). Specifically, a one-percentage-point increase in social expenditure (as a % of GDP) was associated with an additional 0.05 years (18 days) of life lived on average across the population ( $p \leq .001$ ; 95% CI 0.02–0.08). If we imagine for a moment that this is a direct causal effect, then increasing social expenditure by one percentage point in the United States would result in *16 million additional years of life across the entire US population* (320 million  $\times$  0.05). Note that the result remains roughly the same if the United States is excluded.

Model 2, which looks at infant mortality, shows that there is a negative association between social expenditure and infant mortality (b -0.147; se 0.024;  $p \leq .001$ ; 95% CI -0.19 – -0.10), i.e. that increased social expenditure was associated with lower levels of infant mortality. Finally, Model 3 in Table 4 shows the relationship between the proportion of babies born underweight, defined as infants born weighing less than 2,500 g (5 lb

8 oz). The conundrum is that this relationship is positive (albeit not significant at the 5% level), in that greater social expenditure is associated with a higher proportion of infants born underweight (b 0.02; se 0.01;  $p$  0.062; 95% CI -0.001 – 0.045). This finding on infant birth weight was also reported in the Bradley et al. (2011) article, with the explanation that this finding ‘may reflect genetic factors or sociocultural features of the populations that were not controlled for in the analysis’ (p.830). We believe that it would be possible to flesh this out further by including factors known to be associated with low birth weight, such as mother’s age or the proportion of births arising from fertility treatments, such as in-vitro fertilisation (IVF) (OECD 2012a).

Following Wooldridge (2003, p.430), we also ran the models from Table 4 with  $t-1$  dummies for the time-periods in our analysis. This was not the approach taken by Bradley et al. (2011), but including such time-dummies accounts for ‘secular changes’ that are not being modelled (and captures some of the unobserved time-varying heterogeneity). The result for life expectancy was to substantially reduce the coefficient for

log(GDP), from 7.87 to 2.44, and also to reduce the coefficient for social spending, from 0.05 to 0.03. For log(infant mortality), the inclusion of year-dummies does not affect the result for social expenditure, but again reduces the coefficient for log(GDP) (from -1.12 to -0.51). The most startling effect of including time-dummies was on the association between log(GDP) and the proportion of children born underweight. In the model with time-dummies added, the log(GDP) coefficient changes direction from being positive (1.35) to negative (-1.23), and is still significant.

### **Extending the work in Bradley et al. (2011) through additional analysis**

In trying to reproduce the results from Bradley et al. (2011), there is value in extending their analysis further to examine whether changes to data or assumptions impact on findings. For example, the original study covered 11 years of data for 30 countries. We wondered whether those 11 years were anomalous for some reason and whether the pattern would change if we looked at more years. We also wondered whether the particular countries included by Bradley et al. (2011) might have been atypical and the pattern would be different if we included additional countries. To find out, we re-ran the models above using all available OECD country data. This new analysis had the benefit of adding between 400–600 observations by including more countries and more years.<sup>20</sup> The results (given in Appendix D) show a similar pattern of relationships to that found by Bradley and Taylor's study: social expenditure is positively associated with life expectancy and also with the proportion of underweight births, but is negatively associated with infant mortality and all-cause mortality (discussed further below). These findings are further reassurance that the specific time period and group of countries studied in the 2011 paper is not somehow unusual.

While the OECD brings together the world's advanced economies,<sup>21</sup> there are still substantial differences within this group. For instance, US GDP per capita is more than three times that of

Mexico. This raises the question of whether there is something particular about the relationship between health outcomes and social expenditure in larger vs the smaller economies. To test this question, we limited models to so-called 'peer countries' identified in *U.S. Health in International Perspective: Shorter Lives, Poorer Health* (Woolf and Laudan 2013).<sup>22</sup> Once again, running these models with only those 'more similar' countries showed the same pattern of results (not shown in this report).<sup>23</sup>

We were also conscious that the models we ran were based on health outcomes and predictors *from the same year* as the changes in expenditure. What this means is that those models were effectively testing whether changes in expenditure are associated with health outcomes *at the time of the expenditure*. In reality there are likely to be time lags between when expenditure occurs (or changes) and health outcomes. To assess this, we ran models checking the health outcomes with lagged predictors, with lags running from one to ten years after the expenditure.<sup>24</sup> We found that social expenditure was associated with health outcomes in much the same pattern as reported above, even over time, and that in some cases the association strengthened. For example, with a ten-year lag, the association between social expenditure and life expectancy was [b 0.15; se 0.01; p.000], roughly three times as large as when expenditure and outcomes are measured in the same year (as in Table 4).<sup>25</sup>

We also wanted to check that the original results were not limited to a particular set of health outcomes. Therefore, in consultation with experts on comparative health systems analysis,<sup>26</sup> we widened our analysis by looking at another widely measured health outcome – all-cause mortality. All-cause mortality is widely used as a measure of 'national health' and has been the focus of research exploring the relationship between social programmes and health (see, e.g. Roelfs et al. 2011). In addition, we were interested in exploring the association between social spending and each of three

lifestyle factors: smoking, drinking and obesity. These further tests found that increased social expenditure was associated with higher levels of obesity and with lower levels of alcohol and tobacco use and lower all-cause mortality.

Strong association between higher social expenditure and better health outcomes generally persisted. The two main exceptions were that higher social expenditure was also associated with higher incidence of low birth weight and higher levels of obesity (full results are reported in Tables 26 and 27 in Appendix D).

### Do these results also hold within countries over time?

So far we have looked at these associations across countries over time. What about looking at these associations within countries over time? As is the case for cross-national comparisons, there are many stable – but unmeasured – factors within countries that may influence results. We extended the 2011 analysis of Bradley et al. by focusing on the association between *changes* in social expenditure and *changes* in health outcomes

(that is, the association between change in expenditure 2008/09–2009/10 and change in outcome in the same time period).<sup>27</sup> Even when we focussed on *change* in social expenditure and *change* in health outcomes, a statistically significant relationship between the two persisted. The results are presented in Table 5. As was the case for the cross-national comparisons, we found the same pattern of results when checking with: (i) all available OECD data; (ii) just ‘peer countries’; (iii) multiple lags; and (iv) alternative outcomes [available from one of the authors (AS)]. This tells us that there is a dynamic relationship between social expenditure and health, in that the relationship changes over time. This was (in some cases) especially evident when we factored in substantial delays between changes in expenditure and changes in outcomes.

As with the cross-national models, we re-ran these results including time-dummies for years, which acted to attenuate some results. There was again a reversal of the relationship between log(GDP) and low birth weight, from positive without time-dummies to negative with time-dummies. This

**Table 5. Within-country analysis of cross-national data (relationship between *changes* in social expenditure and *changes* in health outcomes)**

Variable		Model 1	Model 2	Model 3	Model 4
		Life expectancy	Infant mortality (log)	% low birth weight	All-cause mortality
Social spending (%GDP)	b	0.06	-0.02	0.03	-2.93
	se	0.01	0.00	0.01	1.04
	p	0.00	0.00	0.01	0.01
Log GDP	b	8.24	-1.27	1.63	-591.40
	se	0.24	0.07	0.21	18.93
	p	0.00	0.00	0.00	0.00
Intercept	b	-7.23	14.93	-10.70	7074.00
	se	2.48	0.66	2.17	192.10
	p	0.00	0.00	0.00	0.00
N		319	312	307	308
rho		0.97	0.93	0.96	0.97



**Table 6. Main SOCX spending categories and examples of corresponding social programmes**

Category	Example
Old age	pensions, early retirement pensions, home-help and residential services for the elderly
Survivors	pensions and funeral payments
Incapacity-related	care services, disability benefits, benefits accruing from occupational injury and accident legislation, employee sickness payments
Health	in- and out-patient care, medical goods, prevention
Family	child allowances and credits, childcare support, income support during leave, sole parent payments
Active labour market policies	employment services, training, employment incentives, integration of the disabled, direct job creation, start-up incentives
Unemployment	unemployment compensation, early retirement for labour market reasons
Housing	housing allowances, rent subsidies
Other	non-categorical cash benefits to low-income households, other social services (i.e. support programmes such as food subsidies, which are prevalent in some non-OECD countries)

Source: Adema et al., (2011, p.90)

Note: Health is not included in our overall measure of social spending

consistent difference suggests that the results reported in Bradley et al. (2011) are sensitive to model specification and secular trends.

## 2.2. Does it matter where social expenditure goes?

So far the analyses presented here and elsewhere treat social expenditure as a single 'pot' of funds. However, the reality is quite different. In this section, we try to understand whether *where* funds are spent matters for health outcomes. For instance, social expenditure could be distributed across a range of areas broadly considered social, for example, work, housing and family/childcare. Helpfully for our analysis, the main dataset we draw upon, the OECD's SOCX, divides social spending into nine distinct categories, which are summarized in Table 6 along with illustrative examples of social programmes that are covered by each category.

Based on the existing literature, it might be expected that some categories of social spending would have stronger associations with health outcomes than others. For instance, given the evidence on the positive effects of early

interventions across a range of outcomes – such as improvements in health-related indicators (e.g. child abuse, maternal reproductive health and maternal substance abuse), improvement in educational outcomes, gains in emotional or cognitive development, and reduced criminal behaviour (Allen 2011; Heckman 2000; Karoly et al. 1998) – one might expect spending on family programmes would be important, particularly with respect to early life outcomes.<sup>28</sup>

### 2.2.1. How do different types of social expenditure relate to health outcomes?

To begin with, we explored the relationship between the *size* of different 'pots' of social expenditure and overall levels of social expenditure (Table 7). These simple observations tell us that the size of individual 'pots' varies notably, both across time and across individual countries. Overall, the category Old age constitutes the largest share of total social expenditure, averaging 47% over time, but ranging between 17% and 80% in different years. Because the category Old age is such a large proportion of social expenditure, we might expect the results for overall social spending and the

**Table 7. Size of individual social spending pots as a share of overall social expenditure (2011 values)**

Category	United States	OECD average	EU15 average
Old age	66.1%	50.4%	48.9%
Survivors	4.4%	6.2%	6.7%
Incapacity-related	11.7%	14.6%	14.8%
Family	4.5%	13.3%	12.4%
Active labour market policies	0.8%	2.8%	3.9%
Unemployment	5.0%	5.2%	7.4%
Housing	1.9%	2.7%	2.0%
Other	5.6%	4.9%	3.8%

category Old age to be very similar. However, we do not know that they are similar for certain, and the relationship might change once we include all types of expenditure, which we do next.

We include the different ‘pots’ of expenditure side-by-side as predictors of health outcomes (Table 8).<sup>29</sup> Given the strong relationship with health outcomes identified in the literature on employment and unemployment (e.g. Marmot et al. 2012), we expected that active labour market policies might be associated with more positive health outcomes. Similarly, one might expect that there would be strong associations between, for example, expenditure on family programmes and infant mortality, or between active labour market spending and life expectancy. However, when we looked at the data, we were interested to find that active labour market spending was *not associated* with two of the four health outcomes and was actually negatively associated with life expectancy. Similarly, spending on family programmes was not associated with infant mortality. Both of these results raise further questions about *how* expenditure might be associated with health outcomes, or the causal pathways or mechanisms that flow from social expenditure to different outcomes related to health.

Leaving these questions to one side, we found consistent relationships between expenditure in the categories Old age (effectively retirement payments), Survivors and Housing and health

outcomes. Perhaps predictably, increased expenditure in the category Old age was associated with increased life expectancy and lower levels of all-cause mortality. But more surprisingly, this expenditure was also associated with both higher proportions of underweight births and lower levels of infant mortality. We explore these findings in greater detail below.

#### **(Why) does old-age expenditure really matter?**

The finding that expenditure in the category Old age is consistently related to health outcomes – particularly outcomes associated with the earliest years of life – is puzzling. We wondered if there was something unique about this expenditure and what the implications would be if this finding represented a ‘real’ relationship to health outcomes.

For one, spending in the category Old age across the OECD varies substantially. In the United States, for example, old-age programmes represent a much larger share of the overall ‘social pot’ than they do in other OECD countries (Table 9), and this share has been growing much more rapidly in the United States than elsewhere. So as a follow-up analysis, we used the *share* of social expenditure that is spent on old-age programmes to capture the relationship between the category Old age and other social expenditure categories, again controlling for GDP. The results

**Table 8. Relationship between social expenditure categories and health outcomes**

Variable	Model 1	Model 2	Model 3	Model 4
	Life expectancy	Infant mortality (log)	% low birth weight	All-cause mortality
Old age	+	-	+	-
Survivors	+	-	+	-
Incapacity-related	+			
Family	+		+	-
Active labour market policies	-			+
Unemployment		-	-	-
Housing	+	-		-
Other			+	+
Log GDP	+	-	+	-
<b>N</b>	<b>697</b>	<b>601</b>	<b>658</b>	<b>663</b>

Note: Positive sign denotes positive association, negative sign denotes negative association; only significant associations are marked.

(Table 11) show that increased spending on old age as a share of social expenditure was associated with greater life expectancy as well. Specifically, a one-percentage-point change in old-age expenditure within the SOCX 'pot' was associated with a change of 0.03 of a year in life expectancy (roughly 11 days), on average. While the result is consistent with the result of our analysis so far, it still does not allow for easy interpretation, especially given some of the existing literature and what one might intuitively expect to find on the basis of other evidence.

If one assumes that old-age expenditure directly affects health outcomes, one might expect to see better health outcomes in the United States than we saw in Chapter 1. One way of thinking about why this expectation is not met is to argue that the United States could be reaping some benefits of its increased focus on old-age spending, but that these are countered by much larger differences from other OECD countries in the remaining social spending categories. In other words, without the emphasis on old-age spending, the United States would be lagging even further behind other countries in terms of population health. A slightly different formulation

of this hypothesis is that the share of old-age spending relative to the overall social basket is less important than the absolute size of old-age spending. If that is the case, it is worth recalling that while old-age spending represents a much larger share of overall social spending in the United States than in the EU, in absolute terms as a share of GDP the United States spends slightly less on old age than the EU15 average.<sup>30</sup>

**Table 9. Share of gross total old-age spending as a percentage of all gross total social spending, for the United States, OECD and EU15, by year**

	United States	OECD average*	EU 15
1980	56.7%	46.1%	44.6%
1990	64.5%	45.9%	44.8%
2000	67.3%	48.7%	47.1%
2011	66.1%	50.4%	48.9%

\*Data on private spending before 2000 are not available for some non-EU15 OECD countries. Averages have been calculated on the basis of available data.

**Table 10. Share of private old-age expenditure as a percentage of all old-age expenditure, for the United States, OECD and EU15, by year**

	United States	OECD average	EU15
1980	19.9%	16.0%	9.3%
1990	34.3%	9.3%	11.3%
2000	42.7%	17.1%	13.4%
2011	42.6%	15.9%	14.2%

The finding of such a consistent relationship raises the question: What are the mechanisms through which old-age spending may influence or be associated with seemingly distant health outcomes such as child mortality? It is possible that greater financial stability (along with increased life expectancy and possibly quality of life) may allow older generations to assist with childcare and that this could be associated with better child survival, though the link is certainly not demonstrated? Of course, we recognise that a spurious association is a possibility, caused by a heretofore unobserved variable linked to both higher old-age spending and better health outcomes.<sup>31</sup>

An alternative explanation may lie in another characteristic of US old-age spending. As Table 10 demonstrates, the United States relies much more heavily on private sources than its OECD counterparts, and this reliance has grown much faster in the United States. This larger role of private spending may suggest that the benefits of old-age spending are not accrued evenly across the US population but may be disproportionately enjoyed by a subset of the overall elderly population. In this context, it is useful to recall that the private old-age spending consists primarily of employer-sponsored retirement schemes and tax-advantaged retirement financial products.<sup>32</sup> By extension, in order to benefit from these instruments, an individual must either have held a job that offered these schemes and products or have been able and knowledgeable enough to invest in them over her or his lifetime.<sup>33</sup> In fact, this may be another mechanism through which income inequality in the United States is manifesting itself. If that is indeed the case, it is possible that gains in health outcomes arising from social expenditure are primarily accrued by more affluent people.

**Table 11. Analysis of old-age spending as a share of total social spending**

Variable		Model 1	Model 2	Model 3	Model 4
		Life expectancy	Infant mortality (log)	% low birth weight	All-cause mortality
pctOAP*	b	0.03	-0.01	0.01	-2.37
	se	0.01	0.00	0.01	0.47
	p	0.00	0.00	0.01	0.00
Log GDP	b	9.54	-1.62	1.86	-662.10
	se	0.16	0.04	0.12	11.26
	p	0.00	0.00	0.00	0.00
Intercept	b	-20.04	18.47	-13.01	7777.00
	se	1.68	0.42	1.26	116.90
	P	0.00	0.00	0.00	0.00
<b>N</b>		<b>910</b>	<b>703</b>	<b>826</b>	<b>856</b>
<b>rho</b>		<b>0.76</b>	<b>0.78</b>	<b>0.79</b>	<b>0.81</b>

\*pctOAP captures the share of old-age spending as a proportion of all social spending.

### Is there a difference between public and private social expenditure?

We were keen to further explore the link between social spending and health outcomes, so we turned our attention to another way of disaggregating social spending data – separating public (i.e. provided by the government) from private spending. In addition, the focus on ‘public-only’ spending matches within–United States analysis presented later in this report. Accordingly, we also looked at the relationship between health outcomes and ‘public-only’ expenditure, i.e. government social spending data from OECD countries expressed as a proportion of GDP. There are several reasons for conducting this analysis. One reason is that available data on public spending are much more robust than those on private spending. Public expenditure is distinguished from private expenditure by the OECD as follows:

*The distinction between public and private social protection is made on the basis of whoever controls the relevant financial flows; public institutions or private bodies.... All social benefits not provided by general government are considered ‘private’.* (Adema et al. 2011, p.93)

Looking only at public expenditure means we focused on an area amenable to policy intervention, since public spending is a direct result of policymaking processes (aside from mandating private social programmes, the ability of policymakers to influence private spending is limited).<sup>34</sup> Finally, this analysis is of interest given the higher relative reliance on private social spending in the United States in comparison with other countries. The heavier emphasis on private social spending might mean that the United States is ‘missing out’ on some benefits accrued through greater public expenditure.

When we looked at this, we found that the effect of removing private contributions to social expenditure (Table 12) was to *strengthen* the association between social expenditure and health outcomes. For example, the relationship between total public social expenditure and life expectancy was *four times as strong* as that for the combined public/private social expenditure. This adds further support for the notion that shifting the spending balance towards public social expenditure may be beneficial for health.

If the relationship to health outcomes is stronger for social spending originating from

**Table 12. Analysis of public-only social expenditure and health outcomes**

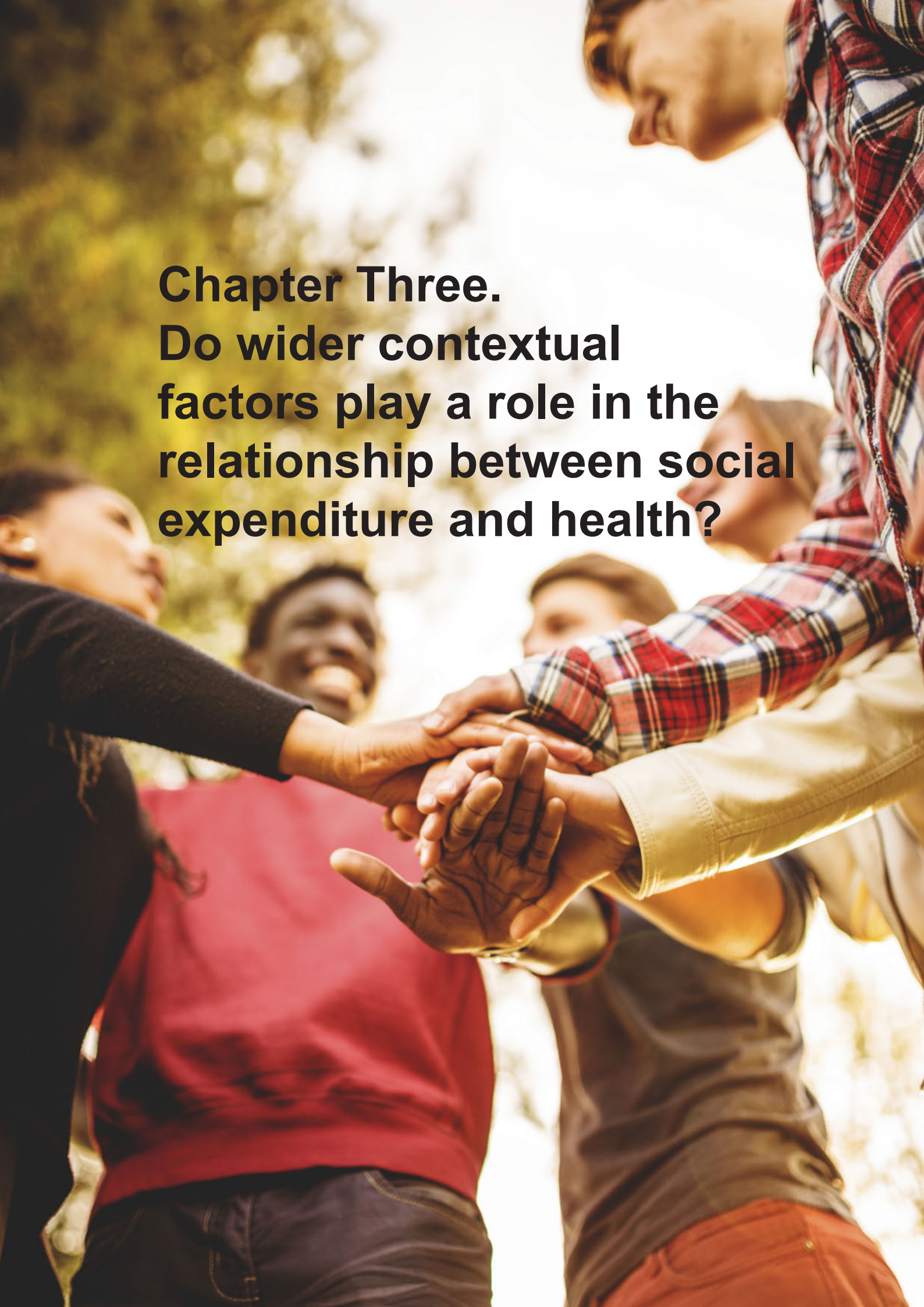
		Life expectancy	Infant mortality (log)	% low birth weight	All-cause mortality
Public social spending (%GDP)	b	0.23	-0.04	0.12	-12.77
	se	0.01	0.00	0.01	0.91
	p	0.00	0.00	0.00	0.00
Log GDP	b	8.40	-1.49	1.26	-607.10
	se	0.16	0.04	0.12	10.98
	p	0.00	0.00	0.00	0.00
Intercept	b	-11.87	17.51	-8.81	7384.00
	se	1.51	0.38	1.20	107.80
	p	0.00	0.00	0.00	0.00
<b>N</b>		<b>911</b>	<b>704</b>	<b>827</b>	<b>857</b>
<b>rho</b>		<b>0.82</b>	<b>0.80</b>	<b>0.82</b>	<b>0.84</b>

governments rather than private entities, the United States, with its greater reliance on private financing of social protection, may again have comparatively worse health outcomes because of a possibly uneven concentration of benefits. As we put forward in the discussion on old-age spending, it may be that benefits from some private programmes and instruments are accrued disproportionately by more affluent groups, for instance, by requiring potential participants to hold a job or be aware of the programme's existence and able to take advantage of its offer.

### Summary

To summarise, our replication of the work of Bradley et al. (2011) suggests that their basic premise of an association between social expenditure and health outcomes holds. This was reinforced in models that went beyond the scope of the original work. In extending the scope, we uncovered some significant differences across different high-level types of social spending in terms of their relationship to health outcomes. However, we are far from being able to argue that this is a causal relationship. The one social spending category with the strongest association with health outcomes in our analysis was old age, and this association

was stronger than that for all other categories combined. We found these findings to be counterintuitive, as the literatures on the social determinants of health (Marmot and Wilkinson 2005), life course (Halfon et al. 2014; Pies et al. 2012) and early interventions (Allen 2011) all suggest that if social spending is associated with better health outcomes, it might be expected that social programmes that target the early stages of life would be most influential. Of course, we have found correlation, not causation. It would be important to better understand the mechanisms and the timeframes involved before this finding should be allowed to sway expenditure decisions. It would be important to understand the wider effects of those expenditures on areas not under consideration here, such as crime, education and more. For example, it may be that longer time lags would be needed to identify the relationship between earlier expenditure and later improvements in health outcomes. Finally, we also observed that the relationship between public social spending only and health outcomes appears to be stronger than that between combined public and private social spending and health outcomes. In light of this finding, the role and possible effects of an increasing reliance on private sources of social protection appears to merit further examination.

A group of diverse people, including a woman in a black top, a man in a red shirt, a man in a plaid shirt, and a man in a grey shirt, are holding hands in a circle. The background is a bright, outdoor setting with trees. The text is overlaid on the image.

**Chapter Three.**  
**Do wider contextual factors play a role in the relationship between social expenditure and health?**

### Summary

- Social capital appears to be strongly associated with social spending, and its addition to the models of the relationship between social spending and health outcomes partly moderates the association between social expenditure and health.
- The association of social spending with health outcomes may differ depending on the level of income inequality, with the role of social spending apparently larger in less equal contexts.

Bradley and Taylor's (2013) work highlighted, and our analyses confirm, that health outcomes are associated with levels of social spending. This supports the suggestion made by Bradley and Taylor (2013) to rebalance US expenditure towards social programmes to improve health outcomes. Contemplating such a shift raises questions about *why* countries have such different expenditure ratios in the first place and whether changing expenditure patterns would have the same effect in different countries.

It is worth considering that the history of countries that have much greater social expenditure may have shaped and affected the potential to make significant changes in spending commitments. Further, this wider context and sets of conditions may not only mitigate the potential to make such changes in spending commitments, but may also in themselves be part of the story of why given countries have better health outcomes in the first place. In other words, we cannot assume that shifting expenditure so that it is more aligned with other countries' expenditure profiles would necessarily bring about the desired health improvements. Rather, there may be underlying drivers of both a nation's spending priorities and that nation's health outcomes which, if not understood, may undermine the success of important policy and expenditure decisions. This section is a first step towards understanding the potential interplay among social spending, health outcomes and wider social factors.

In this study, we raise the question of whether major aspects of social life and social outcomes may be related in important ways to a country's

spending priorities and to that country's population's health. Within the confines of this study, it is not possible to examine the potential influence of all social factors that may influence the relationship between the health and social spending ratio and health outcomes. We opted to examine two factors in more depth to understand how wider social factors could affect this relationship, focusing on social capital and income inequality. These two factors were chosen because they each have been shown to be associated to population health in separate (extensive) literatures and because both factors are central in current debates about the social determinants of health. In addition, both social capital and inequality capture something about the wider social environment within which expenditure decisions are made. If there proves to be an observed relationship, this could tell us something about why social or health expenditures seem to have a stronger effect on health outcomes in one country than another. Through the inclusion of these factors, we can broaden the scope to include some, although admittedly not all, elements of the wider social environment that may influence the relationship.

The health and social capital literature is now substantial. Despite this, Rostila (2013) observed that discussions of social capital and health have been isolated from other socio-political factors:

*Although previous studies show that social capital is strongly related to health and well-being (for a review, see Islam, Merlo, Kawachi, Lindström, & Gerdtham, 2006), most previous research in the field of social capital and health*



*has focused on pure associations and ignored the significance of the broader institutional and political context for the creation and maintenance of social capital and its potential health consequences. (Rostila 2013, p.278)*

We believe it is worthwhile to try, at least to some extent, to bring these strands of research together, in order to understand how they might affect one another. In what follows, we give a brief overview of the literature on social capital and health, and of how social capital is operationalised in this study. We then assess the relationships among social capital, social expenditure and health. These steps are then mirrored with two measures of inequality, and we conclude by examining the effect on health of the interaction between inequality and social expenditure.

### 3.1. Social capital

#### 3.1.1. Definition of social capital and its operationalisation

There is no single definitive and universally accepted definition of social capital, though as Halpern (2005) points out, a widely quoted definition of social capital was put forward by Robert Putnam.<sup>35</sup> Putnam (1995) suggested that social capital revolves around three interconnected dimensions, namely, social connections (or networks), norms and trust. These three categories have since been frequently used in the existing literature, though some variation exists in terms of their concrete operationalisation. For instance, social networks may capture individuals' civic engagement (e.g. membership in various organisations) or attachment to community (volunteer work, number of friends).<sup>36</sup> Social norms may revolve around rules of societal functioning (e.g. opinions on the justifiability of certain behaviours) or perceptions of reciprocity and cooperation.<sup>37</sup> Finally, social trust may take the form of trust in other people (interpersonal trust) or trust in various institutions (both governmental, e.g. government, police, judicial system, and

non-governmental, e.g. church).<sup>38</sup> Individual dimensions of social capital can, of course, be combined to produce a composite measure. For instance, Putnam (2001) constructed a social capital index based on 14 input variables.<sup>39</sup>

However, there remains a practical problem with identifying a suitable measurement of social capital, particularly one that can be applied in cross-national comparisons. As Halpern (2005) observed, there are inherent limitations and challenges stemming from cultural differences and how they affect the expression of social capital. For instance, some measures may simply not exist or be readily available in certain countries. Alternatively, some measures may be subject to outside influence of local context and may therefore not be well comparable.

Having said that, Halpern (2005) suggested that there is one 'rough-and-ready' measure of social capital, namely, social trust. Social trust has several advantages in that it is simple, reliable (in that it is consistently measured over time across countries) and appears to be valid (in that it yields similar results to more sophisticated measures).<sup>40</sup> For these reasons, our study used social trust as its measure of social capital.

#### 3.1.2. What is the evidence on the relationship between health and social capital?

Portes (1998) observed that in the later decades of the twentieth century the term 'social capital' gained prominence in the work of sociologists such as Bourdieu and Coleman.<sup>41</sup> In these writings, social capital is defined as an asset that individual actors have, or seek to gain, in order to derive further benefits, often economic in nature. Social capital is therefore defined as a resource on which those who have it can draw. In the 1990s, a new focus was given to the concept of social capital by political scientists who conceptualized social capital not only as a feature of individuals, but as a property of both communities and nations (Portes 1998). Most prominent among these re-conceptualisations

has been Robert Putnam's, notably in his book *Bowling Alone*, in which social capital is part of the social organisation of a community or country and is expressed in the presence of networks, norms and trust (Putnam 1995; 2001).

The literature on social capital and health has surged in the past two decades, with research examining the relationship between the two at the level of the individual, residential communities and workplaces, states, regions, and even countries (Kawachi et al. 2008). According to some, individuals' health can be affected by levels of social influence, social engagement and social support (Berkman and Glass 2000; Cohen et al. 2006; Dietz and Gortmaker 2001). Other researchers propose that, at the community level, social cohesion affects health through collective socialisation,<sup>42</sup> informal social control,<sup>43</sup> and collective efficacy<sup>44</sup> (Coutts and Kawachi 2006).

Recent work on the social determinants of health emphasizes 'social contextual factors including social capital as fundamental causes of health and disease' (Kim et al. 2011, p.1696). However, systematic reviews of the literature are equivocal on the relationship between social capital and physical health. For example, Murayama et al. (2012) found mixed results in a review of prospective multilevel studies. Some positive associations were identified, but overall the evidence was limited. In another example, Choi et al. (2014) did not find an association between social capital and either all-cause mortality, cardiovascular disease or cancer. In contrast, a meta-analysis of the relationships between social capital, self-reported health and all-cause mortality by Gilbert et al. (2013) found a strong positive association between social capital and good health (see Appendix F for a detailed discussion).

There are some important caveats to consider when examining the literature as a whole. Empirical researchers have conceptualized social capital as an individual attribute, group attribute (ecological studies), or both (multilevel

studies), resulting in limited comparability among studies. Another methodological difference across studies is that the inclusion of covariates as potential confounders varied substantially, and there may be omitted variable bias. In addition, community cohesion can benefit some groups while causing harm to others (Papachristos et al. 2012; Subramanian et al. 2002).

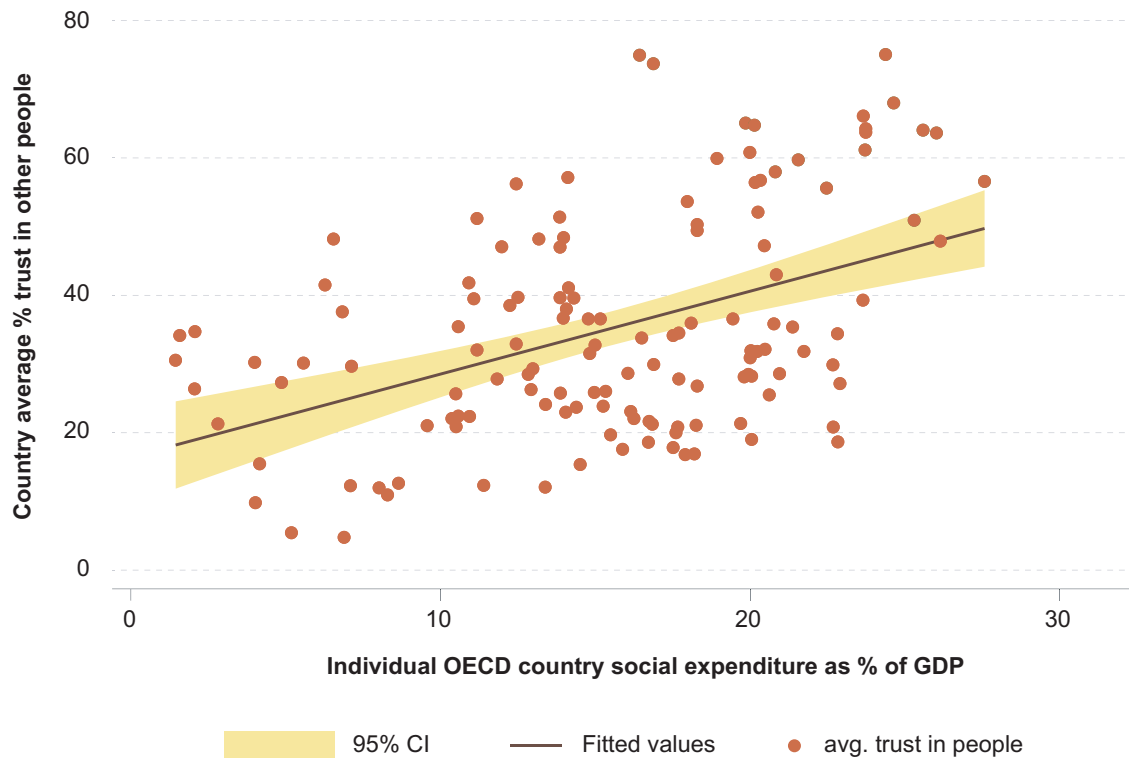
While research relates social capital to a range of health and social outcomes, there appears to have been little attention given to the idea that social capital might play a role in moderating how governments spend on social programmes (or how social spending may moderate the relationship between social capital and health outcomes). Even less attention appears to have been given to the potential interplay among social capital, social expenditure and health outcomes, despite the emphasis placed on them as distinct facets of social life.<sup>45</sup> We turn to bringing these elements together in our empirical analysis.

### 3.1.3. The associations among social capital, social expenditure and health

#### Defining social capital

David Halpern's (2005) work on social capital provides a useful guide to understanding this concept. He showed that when assessed empirically, interpersonal trust appears to do most of the 'heavy lifting' in the relationship between social capital and many or most other outcomes. That is, of the various dimensions of social capital proposed, interpersonal trust appears to have the strongest relationship with many of the kinds of outcomes relevant to this study.<sup>46</sup> We therefore focus this analysis on the relationship among trust, rather than the other measures of social capital, and social expenditure and health outcomes.

Trust as the main facet of social capital examined here is operationalised using a question from the World Values Survey and its European subpart, the European Value Study, which asked respondents to indicate whether, in general, 'Other people can be trusted', or



**Figure 2. Correlation between interpersonal trust and social expenditure, OECD countries**

*Note: Pooled data with multiple years per country.*

whether they cannot, as in ‘You can’t be too careful’. Responses for ‘Other people can be trusted’ were coded as ‘1’, and these were aggregated by country-year to give proportions in each country-year reporting that other people can be trusted (which is commonly used in other studies, see, e.g. Kim et al. 2011).<sup>47</sup>

### The relationship between social capital and social expenditure

Across countries, we observe a correlation between social expenditure and country-level averages of interpersonal trust. As social expenditure increases, so does interpersonal trust (Figure 2).

### Does social capital matter for health outcomes alongside social expenditure?

Here we look at the relationships among trust, health outcomes and social expenditure. The first step was to run analyses with just social

expenditure measures included. The results of this are given in Panel I of Table 13 and show, as discussed in Chapter 2, that there is an association between social expenditure and health outcomes. In Panel II, we include the country-level average of trust in others, with trust scaled so that a one-unit increase represents a one-percentage-point increase in the proportion trusting others. So does adding trust affect these associations? In short, while there are some relatively minor shifts in the relationships for social spending, associations remain very similar.<sup>48</sup> Beyond this, we can still see that trust, net of social expenditure, is associated with health, as reported in other studies (Schneider et al. 2011; Subramanian et al. 2002).

Finally, we add GDP per capita to the models, again in log form (Table 14). Trust and social expenditure are both related to GDP ( $r$  .55,  $p$ .000), so it should not be surprising that when

**Table 13. Multilevel linear models for trust, social expenditure and health outcomes**

		Life expectancy	Infant mortality (log)	% low birth weight	All-cause mortality
<b>PANEL I: SOCX</b>					
Social spending (%GDP)	b	0.38	-0.07	0.08	-19.56
	se	0.05	0.02	0.06	4.01
	p	0.00	0.00	0.13	0.00
Intercept	b	71.33	2.71	4.84	1324.00
	se	0.87	0.27	0.87	73.67
	p	0.00	0.00	0.00	0.00
<b>N</b>		<b>134</b>	<b>117</b>	<b>118</b>	<b>125</b>
<b>Rho</b>		<b>0.49</b>	<b>0.42</b>	<b>0.78</b>	<b>0.49</b>
<b>PANEL II: SOCX and trust</b>					
Social expenditure (%GDP)	b	0.35	-0.06	0.09	-18.79
	se	0.06	0.02	0.05	4.29
	p	0.00	0.00	0.11	0.00
Trust in others	b	0.04	-0.01	-0.03	-1.43
	se	0.02	0.00	0.01	1.65
	p	0.08	0.09	0.01	0.39
Intercept	b	70.44	2.82	5.78	1362.00
	se	1.02	0.27	0.83	93.39
	p	0.00	0.00	0.00	0.00
<b>N</b>		<b>134</b>	<b>117</b>	<b>118</b>	<b>125</b>
<b>Rho</b>		<b>0.48</b>	<b>0.42</b>	<b>0.72</b>	<b>0.49</b>

GDP is added, some associations with health become non-significant or are attenuated. Taken at face value, the models in Table 14 suggest that in comparison to GDP, social trust and social expenditure have smaller associations with health outcomes. But there are good arguments for moving beyond GDP. First, it is not clear what GDP actually measures (see Coyle 2015; Deaton 2013; Stiglitz et al. 2010). Second, finding that GDP is related to health tells us little about what to do to improve health, because 'raise GDP' is not a realistic idea for policy intervention. Third, and perhaps most importantly, there are substantial differences in how gains from economic growth are distributed across the general population. For instance, Saez and Piketty (2003, series updated to 2013), have demonstrated that 59% of all income

growth in the United States between 1993 and 2003 went to the top 1% of US families. As a result, discussions on the role of GDP have been supplanted to a large extent by the role played by income inequality, a factor to which we now turn.

### 3.2. Income inequality

A growing body of evidence points to the pervasive role of income inequality in health and social outcomes (Pickett and Wilkinson 2015), national economies (OECD 2014b) and the allocation of public resources (Esteban and Ray 2006). The effects of such decisions for the wider public are pressing policy issues, pertinent to thinking about shifting public expenditure (Piketty 2014).

**Table 14: Multilevel linear models for trust, social expenditure, GDP and health outcomes**

		Life expectancy	Infant mortality (log)	% low birth weight	All-cause mortality
Trust	b	-0.004	0.005	-0.033	0.772
	rse	0.016	0.002	0.012	1.203
	p	0.799	0.043	0.004	0.521
Social spending (%GDP)	b	0.160	-0.035	0.060	-8.629
	rse	0.042	0.008	0.050	3.402
	p	0.000	0.000	0.230	0.011
Log GDP	b	7.914	-1.353	1.056	-544.700
	rse	0.576	0.142	0.382	39.060
	p	0.000	0.000	0.006	0.000
Intercept	b	-4.713	15.720	-4.307	6605.000
	rse	5.340	1.382	4.062	403.900
	p	0.377	0.000	0.289	0.000
<b>N</b>		<b>134</b>	<b>117</b>	<b>118</b>	<b>125</b>
<b>Rho</b>		<b>0.78</b>	<b>0.71</b>	<b>0.76</b>	<b>0.80</b>

Note: Three decimal points are used throughout the table because two decimal points would be insufficient to display some of the results in a meaningful way.

rse = Robust SEs

### 3.2.1. What is the evidence on the relationship between inequality and health?

While earlier reviews and studies found more mixed evidence on the relationship between income inequality and health (Deaton 2003; Lynch et al. 2004; Subramanian and Kawachi 2004), a recent review (Wilkinson and Pickett 2006) reported that most studies had found a significant negative relationship between income equality and health. That is, higher levels of income inequality appear to be associated with poorer health outcomes. Moreover, an updated review (Pickett and Wilkinson 2015) noted that studies conducted since 2006 have provided additional substantial evidence, which further supports the conclusion of an association between greater inequality and worse health. What is more, having applied an epidemiological causal framework,<sup>49</sup> the authors argue that income inequality *causes* worse health outcomes. In addition to showing a direct relationship with health outcomes, this

association may extend to wider societal issues and risk behaviours that are also related to health outcomes, such as incidence of violence, rates of teenage pregnancy and levels of obesity (Hsieh and Pugh 1993; Pickett et al. 2005).

However, several qualifications should be noted. First, Pickett and Wilkinson found that findings on the relationship between income inequality and health outcomes vary notably depending on the geographical level of analysis. The share of studies finding that higher levels of inequality are associated with poorer health outcomes was greatest at the level of international comparative research and decreased as the geographical unit of analysis shrank (e.g. at the level of regions, states, cities). A similar observation was made in an earlier review by Subramanian and Kawachi (2004, 81), who stated that ‘the geographic scale at which income inequality is assessed seems to matter’.

In addition, there may be a substantial time lag with which any effects of income inequality may manifest themselves. A review specifically

focused on the long-term impact of inequality (Zheng 2012) found that income inequality began to show its effect after 5 years, peaked at 7 years and subsequently began to fade at 12 years. This may complicate the interpretation of analyses that examine the association between income inequality and health outcomes using data from the same year.

### 3.2.2. The associations among inequality, social expenditure and health

As discussed above, many studies have focused on the role that inequality plays in our social and cultural lives, but few have considered the interplay between inequality and the state's willingness or ability to spend money on different areas of citizens' lives. We begin with a simple reflection on the association between different measures of inequality and social expenditure.

#### Inequality measures

In our analysis, we use two income inequality measures – the Gini coefficient and the Palma ratio. The Gini coefficient measures income inequality on a scale ranging from 0 (perfect equality, i.e. everyone has the same income) to 1 (perfect inequality, i.e. all income goes to one person).<sup>50</sup> It can be expressed in two variations: 'gross Gini' captures inequality before taxation and transfers, while 'net Gini' expresses the level of inequality once the effects of taxation and transfers are taken into account. The difference between these two variants is sometimes used as a measure of income redistribution in a given society (e.g. Ostry et al. 2014; Plotnick 1981). In our analysis, we use the net Gini coefficient because it expresses inequalities in people's disposable incomes. We recognize that social expenditure is endogenous to net Gini, which captures income inequality after taxation and transfers, but we nevertheless opted for this measure because we are interested in the role of households' material conditions rather than that of pure market outcomes, which would be expressed by gross Gini. When it comes to measuring income inequality, we are mindful of existing criticisms levelled against the Gini coefficient. Therefore, we include the Palma

ratio (Palma 2011) as an alternative measure of income inequality.<sup>51</sup>

#### Findings on the role of social expenditure in the relationship between income inequality and health outcomes

First we look at the relationship between the net Gini measure and social expenditure relationship using data 'pooled' across all the countries and years we have information for in Figure 3. This figure shows that with increasing expenditure on social programmes (as a share of GDP) inequality is lower.<sup>52</sup>

When using the Palma ratio, we see a similar strength of association. But we also see much tighter clustering of data in the middle of the graph, and larger outliers that subdue the strength of relationship (Figure 4).<sup>53</sup>

Before looking at the relationships among inequality, social expenditure and health, we first step back and look at the inequality–health relationship directly to give us an idea of how the two relate before adding social expenditure (Table 15, Panel I). The two questions asked here are: What is the basic association between inequality and health outcomes over time? And does adding social expenditure affect any relationship that does exist? The results are presented in Table 15 below.

To ensure comparable results, we restricted the sample to those country-years where both Gini and Palma ratios were available. The two panels (I and II) are differentiated by the inclusion of social expenditure. Columns relate to different outcomes. For each outcome there are four models (A–D). Models A and C relate to results for the Gini ratio, and models B and D relate to results for the Palma ratio. Setting out the results in this way means that comparisons can be made between models for the same outcome and for different specifications: with Gini or Palma, and with or without social expenditure.

What is immediately striking, and in contrast with some existing literature on the relationship between income inequality and health outcomes presented above, is that: (a) greater

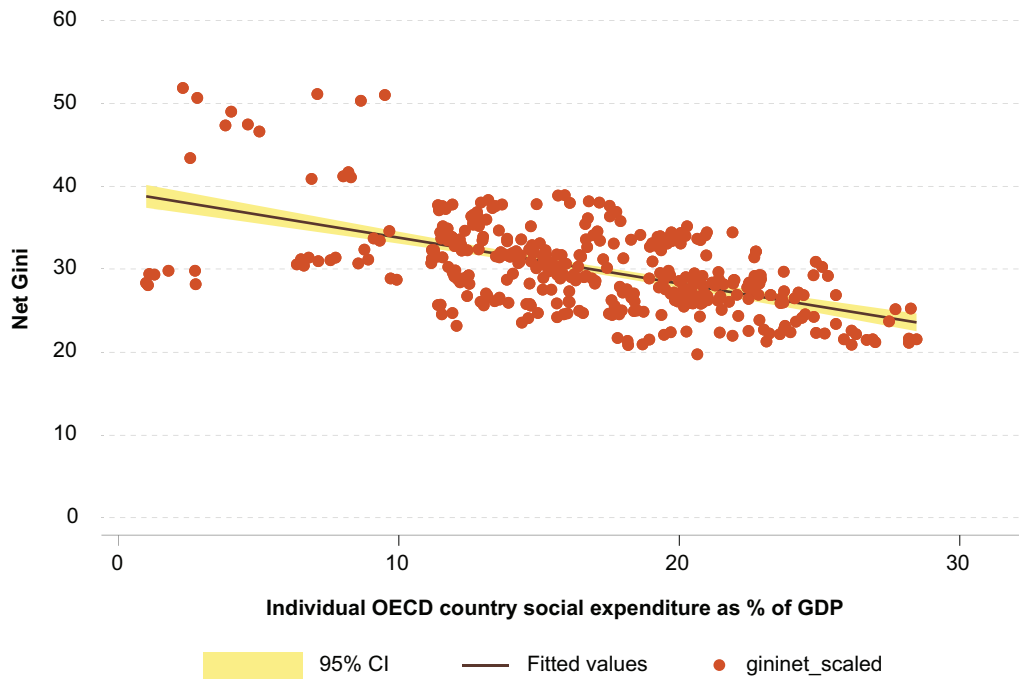


Figure 3. Correlation between net Gini coefficient and social expenditure (pooled data), OECD countries

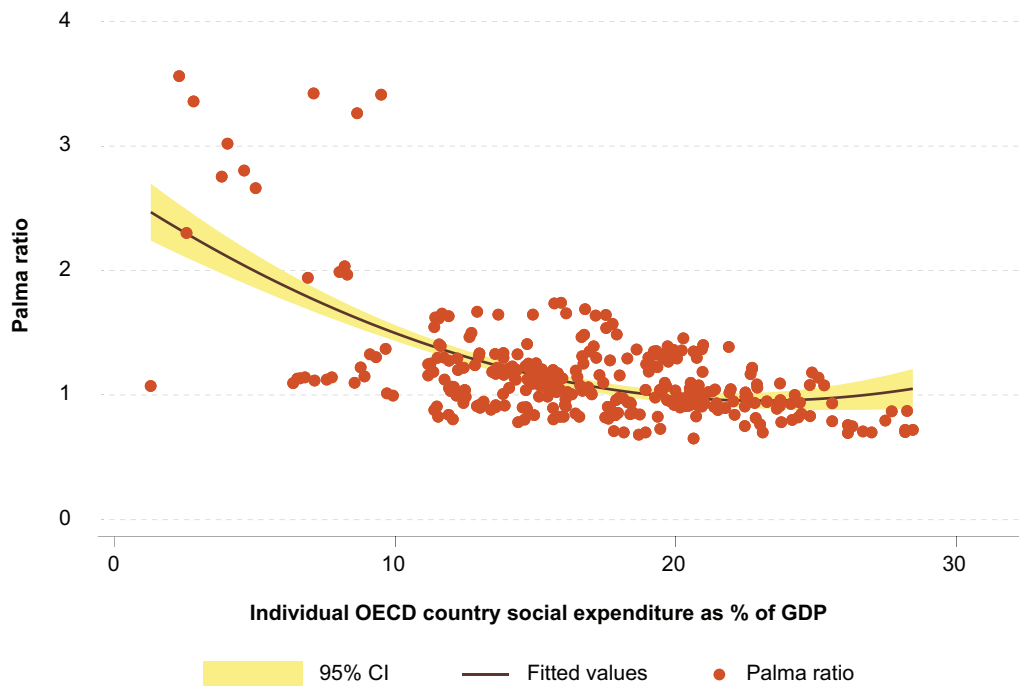


Figure 4. Correlation between Palma ratio and social expenditure (pooled data), OECD countries

**Table 15. Inequality, health and social expenditure in OECD countries (n=34)**

		Life expectancy		Infant Mortality (log)		% low birth weight		All-cause mortality	
PANEL I: Inequality and health									
		A	B	A	B	A	B	A	B
Gini (net)	b	0.25		0.02		0.09		-25.81	
	se	0.13		0.02		0.02		7.96	
	p	0.06		0.39		0.00		0.00	
Palma ratio	b		1.16		0.41		1.23		-210.10
	se		1.63		0.20		0.43		118.10
	p		0.48		0.04		0.00		0.08
Intercept	b	70.62	76.91	0.96	0.99	3.61	4.87	1734.00	1193.00
	se	3.72	1.81	0.60	0.23	0.74	0.55	231.60	134.30
	p	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00
<b>n</b>		<b>315</b>	<b>315</b>	<b>292</b>	<b>292</b>	<b>307</b>	<b>307</b>	<b>294</b>	<b>294</b>
<b>rho</b>		<b>0.72</b>	<b>0.69</b>	<b>0.57</b>	<b>0.56</b>	<b>0.83</b>	<b>0.84</b>	<b>0.7</b>	<b>0.66</b>
PANEL II: Inequality, health and social expenditure									
		C	D	C	D	C	D	C	D
Gini (net)	b	0.32		0.00		0.10		-30.73	
	se	0.11		0.02		0.02		7.16	
	p	0.00		0.98		0.00		0.00	
Social expenditure	b	0.38	0.36	-0.04	-0.03	0.09	0.09	-23.25	-22.18
	se	0.07	0.07	0.01	0.01	0.03	0.03	3.92	4.35
	p	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00
Palma ratio	b		2.14		0.28		1.46		-283.90
	se		1.44		0.19		0.46		108.10
	p		0.14		0.13		0.00		0.01
Intercept	b	62.23	70.01	2.07	1.58	1.86	3.12	2259.00	1639.00
	se	2.95	1.75	0.56	0.28	0.87	0.72	212.60	140.40
	P	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
<b>n</b>		<b>309</b>	<b>309</b>	<b>285</b>	<b>285</b>	<b>299</b>	<b>299</b>	<b>290</b>	<b>290</b>
<b>rho</b>		<b>0.75</b>	<b>0.71</b>	<b>0.61</b>	<b>0.58</b>	<b>0.85</b>	<b>0.86</b>	<b>0.72</b>	<b>0.69</b>

inequality measures appear to be associated with *higher* life expectancy and lower all-cause mortality; (b) the two inequality measures are related to different outcomes; and (c) the magnitude of relationships is quite different. For example, the Palma ratio is associated with infant mortality but Gini is not, whereas Gini is associated with life expectancy and all-cause mortality but Palma is not. Both measures are associated with low birth weight, but the strength

of the two relationships is quite different, with Palma being much more strongly associated than Gini.<sup>54</sup> Adding the social expenditure measure substantially shifts these results, again in contradiction to the existing literature, as the associations between inequality and health outcomes get stronger.<sup>55</sup>

Three possible contributing factors to this discrepancy may be put forward. First, unlike



**Table 16. Interactions among inequality, social expenditure and health outcomes**

		Life expectancy	Infant mortality (log)	% low birth weight	All-cause mortality	Life expectancy	Infant mortality (log)	% low birth weight	All-cause mortality
		A	B	C	D	E	F	G	H
Gini (net)	b	-0.18	0.08	0.06	-5.65				
	se	0.13	0.02	0.10	6.07				
	p	0.14	0.00	0.56	0.35				
Gini * SOCX	b	0.04	-0.01	0.00	-1.76				
	se	0.01	0.00	0.01	0.40				
	p	0.00	0.00	0.67	0.00				
SOCX	b	-0.71	0.15	0.02	28.20	-0.30	0.06	0.07	15.80
	se	0.19	0.03	0.15	11.71	0.14	0.02	0.10	9.77
	p	0.00	0.00	0.91	0.02	0.03	0.01	0.50	0.11
Palma ratio	b					-2.99	0.93	1.20	45.92
	se					1.32	0.22	1.45	63.77
	p					0.02	0.00	0.41	0.47
Palma * SOCX	b					0.60	-0.08	0.02	-35.58
	se					0.13	0.02	0.09	9.07
	p					0.00	0.00	0.83	0.00
Intercept	b	77.98	-0.49	3.05	1495.00	76.02	0.93	3.43	1269.00
	se	3.71	0.61	3.01	205.80	1.68	0.29	1.69	107.00
	p	0.00	0.42	0.31	0.00	0.00	0.00	0.04	0.00
<b>N</b>		<b>309</b>	<b>285</b>	<b>299</b>	<b>290</b>	<b>309</b>	<b>285</b>	<b>299</b>	<b>290</b>
<b>rho</b>		<b>0.77</b>	<b>0.63</b>	<b>0.83</b>	<b>0.74</b>	<b>0.76</b>	<b>0.63</b>	<b>0.85</b>	<b>0.72</b>

the majority of other literature, we look at the relationship between health and net Gini, rather than gross Gini. Second, our analysis does not include any time lags. And, third, our analysis focuses exclusively on a group of advanced countries with a relatively homogeneously high level of income, which would contrast with studies that incorporate non-OECD countries.

So far these results tell us about the *independent* association between social expenditure and health when taking different measures of inequality into account. They also hint at possible mediating/moderating effects that social expenditure may have on relationships between income inequality and health outcomes. To assess this further, we ran a final set of models that interacted inequality and social expenditure. The question being

asked was: Can social expenditure ameliorate the worst effects of inequality on health? In other words, can highly unequal societies dampen the negative effects of 'the equality gap' by spending on social systems? Table 16 shows the results from these models. Focusing on the interaction terms, we see that there is a significant interaction between Gini and social expenditure and between Palma and social expenditure for life expectancy, infant mortality and all-cause mortality, respectively.

To look further at these interactions, we calculated the predicted outcomes at different levels of Gini/Palma and different levels of social expenditure. For example, what association would we expect between social expenditure and all-cause mortality if Gini was zero, or Palma was very high?<sup>56</sup> Figure 5 graphically represents the

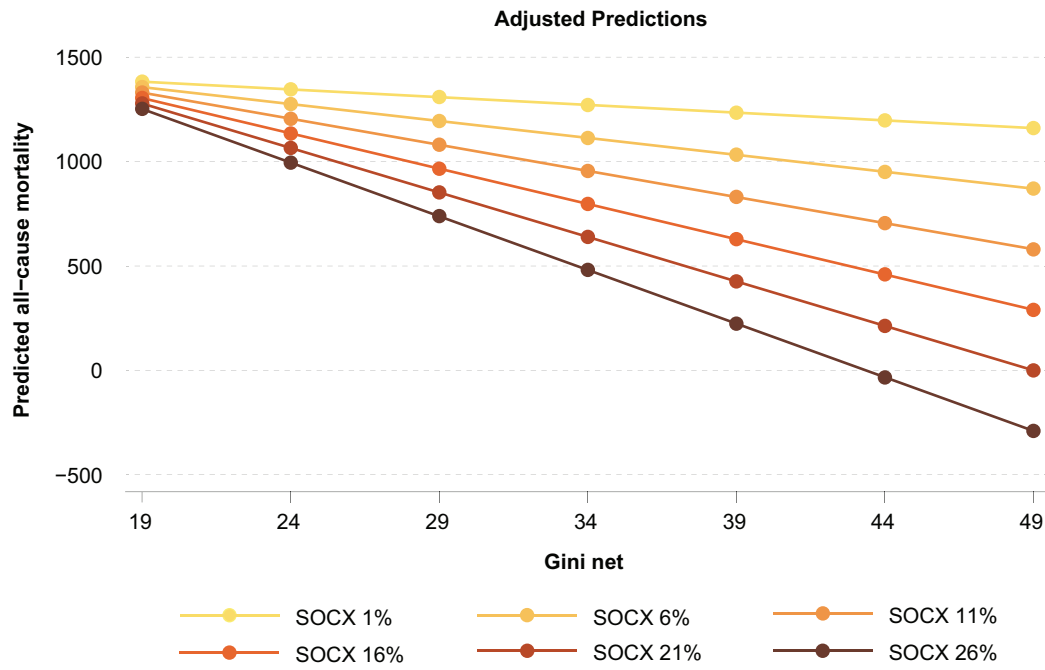


Figure 5. Interaction between Gini inequality index and social expenditure on all-cause mortality

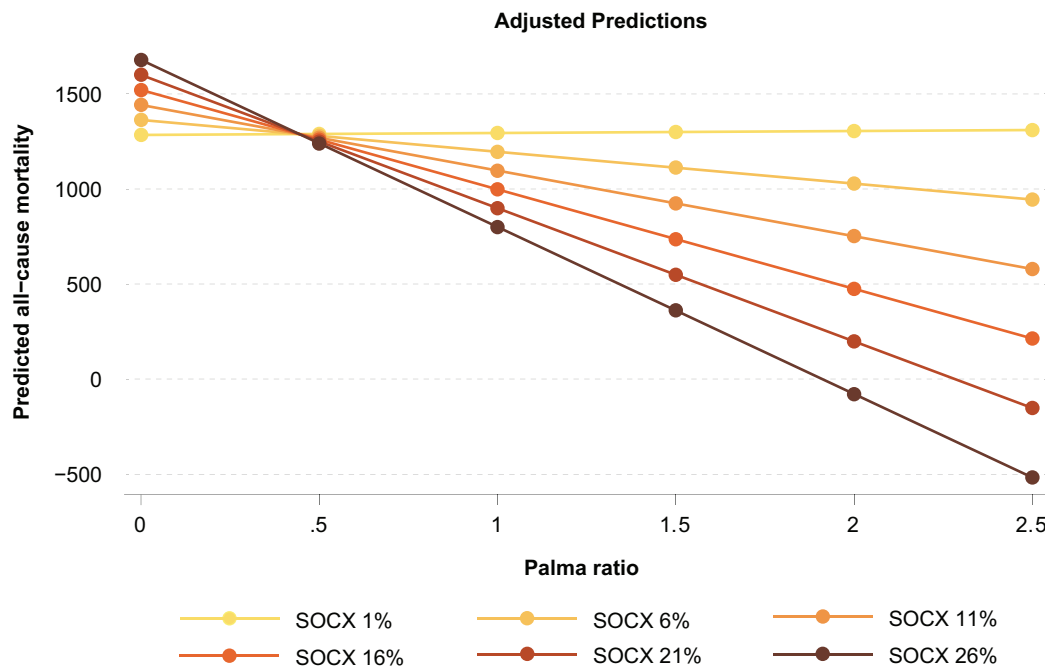


Figure 6. Interaction between Palma inequality index and social expenditure on all-cause mortality

relationships among Gini, social expenditure and all-cause mortality. Figure 6 does the same for Palma and all-cause mortality. The figures show that greater social expenditure is associated with lower all-cause mortality at many levels of inequality, but that at high levels of inequality, relatively little social expenditure may have larger impacts. In Figure 6, for example, at low levels of inequality, where the Palma ratio is 1, only the highest levels of social expenditure are associated with real reductions in all-cause mortality. As inequality increases, lower levels of social expenditure are associated with 'gains' in terms of all-cause mortality (i.e. all-cause mortality is lower). The same is also true of inequality measured using Gini (Figure 5). There is a marginal gain to additional social spending when Gini is low, but as Gini increases, the same level of social expenditure has a stronger and stronger association. These results suggest that social expenditure may be most beneficial (or needed) when inequality levels are highest.<sup>57</sup>

### 3.3. Summary

The results of our analysis suggest that both of contextual factors that we selected – social capital and income inequality – have an important role to play in the interaction between health outcomes and social expenditure. Both social capital and income inequality are related to health outcomes on their own. When added to models of social spending and health outcomes, they have a moderating effect, though to a varying degree. The introduction of social capital to our models modifies slightly the strength of association but does not fundamentally change the picture. With respect to income inequality, our models suggest that social expenditure may be able to moderate any effects of income inequality. This is perhaps not surprising, as

there is a close relationship between income inequality and social spending. In fact, the former is directly influenced by the latter, and, in turn, income distribution has been found to influence the level of social spending (Lindert 1996; Moene and Wallerstein 2001). In addition, the moderating effect appears to vary with differing levels of income inequality. This would seem to raise a question about whether there is a threshold effect with respect to income inequality. In other words, it is possible that a certain level of inequality needs to be reached for any role of social spending to be noticeable.<sup>58</sup>

An additional observation on the role and mutual relationship between contextual factors can be made here. The role of social capital in contributing to positive health outcomes is not uniform across communities and countries and depends on other contextual factors. As Islam et al. (2006) found, income inequality is one such factor. The relationship between social capital and physical health was observed to be much stronger in unequal societies, whereas in their more equal counterparts, the links were either much weaker or non-existent. And yet, unequal societies may be associated with lower levels of social capital (Elgar 2010; Jordahl 2007). This suggests a potentially vicious cycle (and a corresponding potentially virtuous counterpart) in which societies and communities that would benefit most from the existence of beneficial contextual factors are the ones where these factors are least likely to occur. In fact, a similar argument may be put forth with respect to social capital and social spending. If either factor is able to compensate for the lack of the other, at least to some extent,<sup>59</sup> this mechanism is undermined by the fact that the existence of either one of these factors, instead, tends to reinforce the other one.



**Chapter Four.  
Do the same  
relationships  
hold within the  
United States?**



### Summary

- Using data at the US state level, we assess whether the positive relationships between social spending and health outcomes found across countries hold at the US state level as well. That is, we answer the question: Do states that spend more on social than health have better health outcomes?
- Our findings from the state-level analyses are broadly consistent with those from the cross-national analyses. There is an association between social spending and better outcomes, though not a uniform one.
- As was the case with the cross-national analyses, within the United States, the associations differ depending on the type of social spending.

While there is much to learn from cross-national studies, the United States is in many respects quite different from its peer countries in terms of population size; demographics; political institutions; and, as we have seen above, important social factors, such as inequality. In addition, the United States is also internally heterogeneous, with substantial differences in health and social outcomes among states, regions, ethnic groups and socioeconomic groups. In short, there are ‘many Americas’ (Murray et al. 2006).

The work in this chapter aims to exploit this variation by testing out the analyses presented in the preceding chapters on US states. Conducting a sub-national analysis in the United States enabled us to test whether the relationship between social spending and health outcomes holds within the United States, and, compared with the cross-national analyses, it allowed us to achieve a substantially increased sample size, consisting of 50 states.<sup>60</sup> Health outcomes covered by the analyses are life expectancy (all, male, female), crude infant mortality rate (per 1,000 live births),<sup>61</sup> low birth weight (less than 2,500 grams) and crude death rate (per 1,000 people). Before turning to the results of our analyses, in the next section we present a brief discussion of the sub-national variation in US health outcomes.

## 4.1. Variation in health outcomes in the United States

Within the United States, health outcomes vary on a number of dimensions. This variation

underscores the statement made by Olshansky et al. (2012) that a single estimate can mask important differences in outcomes, whether by gender, race/ethnicity, income, education or geography. In this particular case, the variation is related in part to the fact that the leading causes of death in the United States have changed over time for men and women and for whites and blacks. For many of the health indicators we worked with in this report, there is variation in health outcomes across these different dimensions.<sup>62</sup>

Taking life expectancy as an example, we note that in 2010, white females had an average life expectancy at birth of 81.3 years, compared with 78.0 years for black females.<sup>63</sup> Life expectancy also varies by income, and the relationship between life expectancy and income also varies by race/ethnicity. In the United States, blacks overall tend to have a lower life expectancy at each household income level than do Hispanics and whites (Woolf and Braveman 2011). Further, life expectancy varies by educational attainment. When race and education are combined, the disparity is even more striking. These results led Olshansky and colleagues (2012) to conclude: ‘These gaps have widened over time and have led to at least two “Americas,” if not multiple others, in terms of life expectancy, demarcated by level of education and racial-group membership.’

Geographical variation in health outcomes in the United States is also well established (Murray et al. 2006). In general, individuals in the southern states tend to have a lower life expectancy than

individuals living in other parts of the United States, such as in parts of the West, the Midwest, or the Northeast. A detailed review of US variation in health outcomes is provided in Appendix E.

## 4.2. State-level analysis results

As noted above there are differences in how the international data and the within-United States data on social spending was collected and what it relates to, meaning that it was not possible to precisely replicate the earlier analysis. However, it was possible to assess the basic premise set out in Bradley and Taylor (2013) and Bradley et al. (2011), namely, that expenditure on social programmes is associated with better health outcomes. (The exception to Bradley et al. [2011] being the proportion of children born underweight.) The most important difference is that we were only able to capture a proportion of the overall expenditure in a given area. To truly mirror the cross-national analysis, we would require a complete picture of public and private expenditure in the different areas covered by these transfer payments.

As with the cross-national analyses, we approached this analysis in stages. We wanted to assess longitudinally, net of state-level demographic data, whether:

1. US government transfer payments to individuals were associated with health outcomes.
2. Different types of expenditure were associated with health outcomes.
3. As with the OECD, social capital moderates the relationship between social expenditure and health outcomes.

### Results for within-United States analysis: Overall non-medical cash transfers

In Table 17 below we present the results assessing the relationship between the per-capita US value of conditional cash transfers

on a range of health outcomes, taking into account state demographics. (As with previous analyses, these are multilevel linear models. See Appendix A for model details.) The results show that there is: (i) a positive association between cash transfers and life expectancy [b 0.0002; se 0.0001; p.000]; (ii) a negative association between cash transfers and infant death rate [b -0.0007; se 0.0002; p.001]; and (iii) no association between cash transfers and the percentage of low birth weight babies or the state death rate (our proxy for all-cause mortality). The first result, for life expectancy, is in line with that found in the cross-national analysis presented earlier, and that of other research (e.g. Bradley et al. 2011). The second, for infant death rate, is also in the same direction as in the cross-national analysis.<sup>64</sup> The relationship between these measures appears very small (e.g. for infant death rate, b -0.0007), but we should not forget this is on a *dollar per capita* basis, so this represents the relationship for an additional dollar per person, whereas the cross-national results were for percentage of GDP.<sup>65</sup>

We also explored whether there were differential impacts for male and female life expectancy, because previous research highlights the gaps between genders in many health outcomes (Read and Gorman 2010). The results from this analysis, presented in Table 17, show that there is a stronger association between cash transfers and male life expectancy than female life expectancy. In fact, the relationship between cash transfers and male life expectancy is roughly twice that for the pooled estimate (b .0003962 vs .0002177). We found the same direction and relative magnitude of association when we looked purely at within-state variation over time (not shown). Finally, we also looked at lags for public expenditure and life expectancy. The results (available from the authors) again show that even with lags of up to ten years, public expenditure on social programmes was positively associated with life expectancy. In fact, the association between these measures nearly doubles as the lag exceeds five years.

**Table 17. Relationship between non-medical cash transfers and health outcomes, within-United States**

		Life expectancy	Low birth weight	Death rate
Social expenditure	b	0.0002	-0.0001	-0.0084
	se	0.0001	0.0001	0.0055
	p	0.0001	0.2196	0.1239
State population	b	0.0000	0.0000	0.0000
	se	0.0000	0.0000	0.0000
	p	0.4868	0.0892	0.0303
% white	b	-0.1324	-0.0433	-0.5311
	se	0.0333	0.0173	1.3870
	p	0.0001	0.0124	0.7017
% female	b	-0.0262	0.3838	3.6060
	se	0.0973	0.1180	14.4000
	p	0.7873	0.0011	0.8023
State median HHI	b	0.00003	-0.00003	-0.0054
	se	0.0000	0.0000	0.0011
	p	0.0000	0.0005	0.0000
% 20–69 yrs	b	0.1733	-0.2669	-0.8544
	se	0.0412	0.1010	7.3780
	p	0.0000	0.0082	0.9078
% 70+ yrs	b	0.2635	-0.2223	58.3600
	se	0.1169	0.1140	10.8800
	p	0.0242	0.0511	0.0000
Intercept	b	74.6600	12.1900	512.8000
	se	2.5910	0.8321	682.4000
	p	0.0000	0.0000	0.4524
<b>N</b>		<b>500</b>	<b>300</b>	<b>100</b>

**Table 18. Relationship between type of social programme expenditure and health outcomes, within-United States (intercept omitted)**

		Life expectancy	Low birth weight	Death rate
Education/training	b	0.0010	-0.0011	-0.2832
	se	0.0007	0.0009	0.1127
	p	0.1150	0.1887	0.0119
Income maintenance	b	0.0003	0.0011	0.1288
	se	0.0002	0.0004	0.0512
	p	0.0936	0.0167	0.0119
Other	b	-0.0001	-0.0001	0.0873
	se	0.0000	0.0001	0.0370
	p	0.0000	0.1830	0.0185
Retirement	b	0.0007	-0.0002	0.0038
	se	0.0002	0.0003	0.0304
	p	0.0000	0.5175	0.9011
Unemployment	b	0.0003	0.0001	-0.0919
	se	0.0001	0.0002	0.0257
	p	0.0064	0.6704	0.0004
Veterans	b	-0.0049	-0.0017	-0.1011
	se	0.0015	0.0010	0.1250
	p	0.0013	0.0698	0.4184
State population	b	0.0000	0.0000	0.0000
	se	0.0000	0.0000	0.0000
	p	0.0523	0.0338	0.0216
% white	b	-0.1027	-0.0411	0.4163
	se	0.0267	0.0185	1.1710
	p	0.0001	0.0265	0.7222
% female	b	-0.0590	0.4265	16.8900
	se	0.0741	0.1309	12.5700
	p	0.4260	0.0011	0.1788
State median HHI	b	0.0000	0.0000	-0.0034
	se	0.0000	0.0000	0.0009
	p	0.0000	0.0302	0.0002
% 20–69 yrs	b	0.1699	-0.3290	-8.5660
	se	0.0408	0.1091	8.0910
	p	0.0000	0.0026	0.2897
% 70+ yrs	b	0.3047	-0.1012	55.6900
	se	0.1078	0.1698	11.2800
	p	0.0047	0.5513	0.0000
<b>N</b>		<b>500</b>	<b>300</b>	<b>100</b>



**Table 19. BEA social spending categories and examples of corresponding social programmes**

Category	Example
Retirement and disability	Social Security, survivors' benefits
Medical	Medicare, Medicaid
Income maintenance	Supplemental Security Income, Supplemental Nutrition Assistance Program
Unemployment	Unemployment compensation
Veteran	Veteran pension and disability, veteran readjustment assistance
Federal education and training assistance	Pell grants
Other	Disaster relief payments, Bureau of Indian Affairs benefits

Source: Bureau of Economic Analysis (USA) (2006)

### Results for within–United States analysis: Type of cash transfer

Similar to what we did for the international analysis, we looked at whether the composition of US transfer payments matters. As we mentioned in the overview of data used in this project, the Bureau of Economic Analysis (BEA) classification is different from that used by SOCX. Individual BEA categories are presented in Table 19, along with examples of programmes that would fall under each heading.

In Table 18 we set out the results from analyses relating to the different types of cash transfer. We can see from the results in Table 18 that these associations are broadly consistent with expectations. For example, expenditure on retirement and unemployment benefits were positively associated with life expectancy, whereas transfers relating to veterans' benefits were negatively associated with life expectancy.<sup>66</sup> We see that only education and training expenditure is associated with a reduction in the infant death rate (b -0.0057; se 0.0024; p .023). Spending on 'other' social programmes is associated with a higher rate of infant death (b 0.0041), but this might be explained by the mixture of programmes under this heading.<sup>67</sup>

For low birth weight, only 'other' types of cash transfers were associated at all, and these were

associated with a greater percentage of babies born underweight. The state death rate provided a more complex set of associations (again assessed via first-differenced models because of limited data). Increases in income transfers were associated with increases in the death rate, whereas retirement transfers were associated with decreases (not shown). However, the limited data available for this analysis means that these results are less secure.

Given the different results for male vs female life expectancy reported above, we also reassessed those outcomes here as well. The results show very similar patterns for both males and females. For example, for both men and women education and training transfers are not related to life expectancy, but income and retirement transfers are positively related (in that, as transfers increased, so did life expectancy).

### 4.3. Summary


The findings from our within–United States analysis are consistent with observations made in the cross-national comparison, namely, that there is indeed an association between social spending and health outcomes. We acknowledge that the data sources used in the within–United States analysis differ from those used earlier. However, our results suggest that at the very least it would be worth investigating the relationship between

public spending in the United States and health outcomes in more detail.

Several additional comments should be made here. First, while our within–United States analysis was confined to individual states, individual US counties and county equivalents also represent a possible level of analysis. While we considered conducting our research at the county level as well, we ultimately chose US states due to their political ability to directly affect at least some of transfer programmes covered by the BEA data. That said, we recognise that local governments have a role to play in the implementation of social programmes as well, for instance, by enabling access to public services or by working to increase awareness of available social protection. As such, we believe there is much more potential for the county-level analyses. However, uncovering the contribution of local authorities to the impact of social spending might require introducing more qualitative approaches, which were beyond the scope of this large dataset study.

Finally, it is worth noting that regardless of how we approached our analysis, and taking into account state GDP and other measures, median household income was consistently

*positively associated* with life expectancy. This is perhaps to be expected, but we read this as supporting the view that direct cash transfers aimed at supplementing incomes could have beneficial impacts on public health. It should be clear that these results highlight the ‘black box’ of statistical association we are dealing with. For example, one has to take several leaps to think about how public expenditure might be associated with a given outcome, particularly something like low birth weight. However, limitations notwithstanding, what *all* the results for the expenditure–health associations tell us is that assessing this relationship further may provide insights into how public programmes may be influencing population health. These results may reflect a cascade of causal steps or they may simply be associations. If they are simple associations, it may still be possible to look for underlying drivers of both that would in themselves be informative. Whatever the character of the relationship, given the kinds of important life outcomes and expenditure decisions that may be affected by and affect these associations, we believe that further attention is warranted. The risk of dismissing these associations is to miss an opportunity for several policy levers that may be affecting population health.



**Chapter Five.**  
**What do the results mean?**  
**Summary of findings and**  
**concluding discussion**

Previous studies have observed that social spending and the ratio of social to health spending are associated with better health outcomes in OECD countries. This study built on that finding by widening the scope of analysis, incorporating other societal factors, such as social capital and income inequality, and by assessing these relationships not only cross-nationally but also at the state level within the United States. Our analysis brought together externally validated health outcomes (as opposed to self-reported measures) and a range of otherwise disparate data sources to assess what seemed to be associated with better health outcomes where they were found across OECD countries. In doing so, we build on rich literatures on a range of policy areas, including social protection, social capital, inequality and health.

Our central findings and a discussion of their implications are set out below, briefly followed by considerations and questions for further research.

## 5.1. Findings

**While the United States spends significantly more on healthcare than its high-income counterparts, this has not always been the case. The trajectory of rising US health spending relative to social spending stands out for its clear divergence from other OECD countries' spending patterns.** In contrast to the health expenditure trajectory, the United States has consistently spent much less on social programmes than the majority of its high-income counterparts, meaning that the gap between health and social expenditure in the United States has widened.

**Our extensive cross-national analyses found that the relationship between social expenditure and health outcomes holds, even when tested in many different ways.** These tests consisted of including additional countries, more health indicators, a wider time-span, and of looking at trends within individual countries. We also found the same relationship when we excluded the United States,

demonstrating that the relationships were not driven by the United States.

**The social spending–health relationship also holds when we disaggregated social spending into public and private expenditure.** Notably, the association with better outcomes was stronger when we looked only at public social spending (i.e. that provided by government). This is particularly important given the fact that the United States relies on private social service provision to a much larger extent than the majority of other OECD countries.

**In addition, the strength (and at times direction) of the relationship with better outcomes varies depending on the area of social expenditure (e.g. unemployment, family programmes).** The majority of observed associations between health outcomes and each of the nine social spending categories were positive, although there were several exceptions. The most consistent relationships were found for old-age spending. This applied even to health outcomes not intuitively related to retirement welfare, such as infant mortality and low birth weight.

**The association between expenditure and better health outcomes remains after the introduction of time lags that take into account the time it takes for social expenditure to translate into better outcomes.** We tested time lags of various lengths and found that the associations get slightly stronger with lags greater than seven years.

**Expanding the analysis to incorporate wider contextual factors, we found that social capital – measured by trust in others – is associated with both social spending and health outcomes.** Adding social capital produces notable, albeit relatively minor, shifts in strength to the relationship between social spending and health outcomes.

**Our analysis also shows that the association between social spending and health outcomes may differ depending on the level of income**

**inequality in a given country.** The association of health outcomes with social spending is stronger in less equal contexts, meaning that social protection may be more important for health outcomes in more unequal societies.

**Finally, our results from the sub-national US analysis at the state level were broadly consistent with the cross-national results.**

That is, we found associations between social spending – measured by public cash transfers – and better health outcomes. As with our cross-national analysis, the associations differed depending on the type of expenditure, with the strongest results for unemployment and income maintenance payments.

### 5.1.1. Study limitations

Several limitations of our approach need to be acknowledged or reiterated. First, at best, the relationships observed are correlations, not causal effects. Therefore, while statistical models employed in this study enable us to comment on the existence of associations and their strength, we do not comment on the direction of the relationship. However, we do discuss possible pathways for causal mechanisms where appropriate, emphasizing that in some instances it is plausible that causal mechanisms exist in multiple directions or in a dynamic interplay, possibly with a mutually reinforcing effect.

Second, our analysis is limited by uncertainty around time lags. It is conceivable that the effect of key predictors, such as social spending and social capital, may have an impact on outcomes only after a period of time (with the specific amount of time unclear). For instance, some of the mechanisms of interest might require shifts in social norms, which tend not to exhibit abrupt changes and which take time to materialise.<sup>68</sup> Regrettably, there is a dearth of available evidence regarding appropriate time lags,<sup>69</sup> so in this respect at least, we hope that our analytical approach, while exploratory, has helped to advance knowledge.

Third, the results presented here are wholly the product of ecological analyses of comparative population outcomes at the national or state levels. We know from a wealth of research that correlations at the aggregate level might not be replicated at the individual level, or, indeed, that they could be the opposite (see, e.g. Snijders and Bosker 2012). But evidence also suggests that it is difficult to demonstrate the effects of, for example, income support and direct transfers to the poor on individual health (Lucas et al. 2008; Pega et al. 2012). We believe that in order to understand how social spending may be related to health outcomes, further work ‘on the ground’ with policymakers and practitioners is needed.

Fourth, while every effort was made to collect the best available data, we had to make a series of pragmatic choices, as highlighted in the relevant sections of the report and appendices. As part of our work with longitudinal datasets, we used multiple data points for the same country in the same model. But these are only snapshots in time – of trends that started before and continue after the data available for this study. As a result, we must be mindful that associations are dynamic in nature and therefore require revisiting. Finally, we reiterate that the aim of this study was not to establish causal relationships. The intention from the start was to explore an area between two areas of research that, hitherto, had existed in isolation.

## 5.2. Policy implications

Evidence is building for a causal relationship between inequality and poorer health (Marmot et al. 2012; Wilkinson and Pickett 2015). Similarly, wide disparities among countries in terms of health outcomes are also driven by differences in approaches to welfare provision beyond healthcare. Our analyses reinforce both of these ideas and, for the first time, bring them together. On the basis of the associations we have identified, we propose a number of policy implications.

First, given that the balance of spending may affect health outcomes, it seems sensible that US policymakers consider rebalancing health and social spending. Further, the evidence may provide an imperative to explore variation within the United States in the balance between social and health spending to understand how social programs influence health. The existing variation could, for example, potentially act as a natural experiment. Second, considerations of the balance of social and health spending and of the *types* of social spending may be particularly important in societies with high inequality and low social capital. We found that the association of health outcomes with social spending is stronger in less equal contexts. This suggests that social spending may be of particular importance in countries with greater income inequality. Investments in social spending could therefore yield substantial results in terms of health outcomes, particularly in societies with greater inequality.

We are aware that these implications and proposals are bound by the limitations of the evidence. In the absence of causal evidence, however, they risk not being bold enough to deal with the scale of the issues at hand or to tackle the structural differences that may prevent implementation. To take our policy implications one step further, we therefore engage in a thought experiment below. For a moment, we imagine what our thinking would be if the associations we found could be shown to be causal; we do this to sharpen our thinking on what our findings might mean for policy.

If the relationships can be shown to be causal, the main policy implication would be that expenditure on social programmes should be increased relative to health spending. This would be of particular relevance in the current political context, with a growing health burden and increasing concern about rising income inequality, particularly in the US political debate, and in a context in which health funding tends to be more likely to be protected than its social counterparts.

Further, if the relationships can be shown to be causal, then the beneficial effects of social spending would appear to be greater in more unequal societies. By extension, expenditure on social protection systems might then mitigate *some* of the adverse impacts of income inequality.

Finally, again, only if the relationships can be shown to be causal, our findings of stronger association with better health outcomes for *public* social spending than for *private* social spending would also lend support to the policy of continued and enhanced governmental provision of social protection. This would be of importance particularly in light of an increasing reliance on privatised welfare protection and/or privatised social risks, especially in the United States (Hacker 2004; Johnston et al. 2011).

The results from our study open up questions of political feasibility and policy context. As Deaton (2013) and others point out, decisions about public spending priorities, inevitably involving trade-offs between outcomes for different groups, are frequently ill-informed and encumbered by special interests (Fafard 2015). In turn, decisions under such conditions may not yield socially optimal results. For instance, Bartels (2015) observed that government responses that are skewed to accommodate the preferences of more affluent citizens (who tend to be less supportive of the welfare state) are a significant contributor to social welfare deficits.

While some of these findings may create tensions for policy in other OECD countries, several characteristics of the US policy context may be worth highlighting due to their particular constraining effect on policy choices. In American policy discourse, substantial attention is paid to the need for 'individual responsibility' and 'limited government'. As an extension of this sentiment, policy suggestions perceived as calling for the expansion of government's role, and for social spending or the welfare state in particular, may be met with ideological resistance. Some of this resistance may be overcome by careful framing of policy arguments and a strong evidence base

underpinning them, but it nevertheless remains a potential barrier. In addition, discrepancies in the relative political power of various demographic and social groups need to be acknowledged. For instance, Deaton (2013) observed that in the 2000s, transfers to politically powerful groups grew faster relative to transfers to weaker groups. This power imbalance may prove problematic because it is disadvantaged (i.e. less politically powerful) groups who would stand to benefit most from any rebalancing of social expenditure.

But resistance to government involvement in the everyday lives of US citizens, wherever that resistance comes from, likely depends on the level of government people have in mind. For one, numerous observers have commented on the perceived gridlock at the federal level of the US government, suggesting that the room for a substantial policy change at the national level may be very limited (e.g. Andris et al. 2015). Local levels of government may be in a better position to act, as exemplified by recent programmes undertaken at the municipal level (see, e.g. Tavernise 2012). Alternative funding mechanisms, such as social impact bonds (MDRC 2015; Rubin and Disley 2013), may also be part of the answer to obstacles at the political level.

### 5.3. How do we progress further?

Our research raises new questions, some of which are driven by limitations in the study's scope, and which would require extending the analysis presented here to take it both broader and deeper, and some of which stem from our results and touch on the practical implications of our findings.

#### 5.3.1. Broadening the analysis

One area of uncertainty relates to factors and areas not covered by our analyses. Just as we found that social capital and income inequality apparently play a significant role, there are likely to be other contextual factors that can shed further light on, and which influence, the

relationship between social spending and health outcomes. Education is one such area that may be worth exploring in greater detail, although, as is the case with any of the factors covered by this analysis, education should not be viewed as likely to be the sole or main driver of observed differences in outcomes.<sup>70</sup>

Another area that may merit further investigation is the area of the relationship between particular demographic and economic factors and health outcomes, for example, immigration, ethnicity, race and poverty.<sup>71</sup> These areas are often so complexly related that unpicking the causal relationships running between areas, such as employment status and/or prospects, inequality, health outcomes and immigration status, is extremely challenging (see, e.g. Koya and Egede 2007; Popkin and Udry 1998; Rubin et al. 2008). However, we should reiterate that the associations found in our report held also in models that excluded the United States. This suggests that any potential exceptional aspects of American demographics, whether associated with race, immigration status or ethnicity, would not seem to explain the relationships between health outcomes and social spending found here.

The treatment of lifestyle factors and health risk behaviours, such as smoking, alcohol intake or obesity, is also challenging as these factors and behaviours could feature on 'both sides of the equation'. On the one hand they represent predictors of worse outcomes; on the other hand they are also things that can be addressed and countered through social policies. In our analysis, we looked at these factors as alternative outcome measures, in addition to the original set of health indicators under consideration by Bradley and Taylor (2013). However, treating them as alternative outcome measures leaves room for additional analyses, particularly in relation to a potential focus on individuals' social contexts, as discussed below.

In addition, in line with previous cross-national studies, and partially driven by data limitations, our research used geographical areas (OECD

countries and US states) as units of analysis. This approach does not enable us to unpick differences between population groups *within* these units. Analyses focusing explicitly on socioeconomic and ethnic factors may also shed important light on the interplay among expenditure on social programmes, social contextual factors and health outcomes.

### 5.3.2. Deepening the analysis

#### Role of social programmes

Our analyses relied on high-level data on overall spend in each programmatic area, which obscures differences at the level of geography (i.e. across countries and US locales) and programme (i.e. programmes within each social spending category), as well as whether (and if so, how effectively) that money achieves its objectives. Furthermore, differences in the design and operationalisation of social programmes may produce different results in terms of health outcomes, particularly when combined with effects from such factors as social capital and inequality.<sup>72</sup> A related aspect worthy of attention is the administrative capacity of agencies tasked with the execution of social protection programmes, which may also influence the outcomes achieved. Therefore, the design of social programmes merits further exploration. In particular, it will be interesting to understand how US-based programmes work in practice in comparison with programmes in other OECD countries.<sup>73</sup>

#### Pathways and mechanisms from social spending to health outcomes

The current study has explored correlations and patterns between these phenomena. In the next step, individual actions could be examined that translate inequality or expenditure into health outcomes. Future research would deepen our analysis by examining the individual actions that link macro-phenomena, such as inequality and health outcomes, with social expenditure. Different subfields of sociology and economics have already examined such mechanisms to

understand the individual actions that yield different health outcomes in different contexts. An example is the work of Shah et al. (2012) and Mullainathan and Shafir (2013) on scarcity. Through experiments, they found that people living in scarcity, be it scarcity of money or of time, make different choices than do people not facing scarcity. The former often focus on short-term, pressing needs rather than long-term solutions. This, they argue, explains why people with low incomes borrow too much, but also why they disregard their future health. As such, the choices point towards a 'mindset' that explains such macro-outcomes as the poorer health of people in poverty.<sup>74</sup>

Finally, this area of study could be deepened through thinking about how an individual's circumstances and social context link to that individual's health outcomes. Studies have shown, for example, that unemployment is related to poorer health outcomes (Roelfs et al. 2011), and recent research suggests that, among other factors, inflammation caused by increased stress may be a mediating factor (Hughes et al. 2015; Matthews and Gallo 2011). Other research has begun to unpick how changes in medicine, diet and hygiene have been reducing bacterial variation in the gut, and how this variation is important in fighting off immune disorders, including diabetes, and other health challenges (Spector 2015). These other kinds of studies would allow for a more precise and systematic assessment of the role played by social contexts in health. In doing so, they thereby would provide firmer evidence on the pathways by which social contexts can translate into health outcomes.

### 5.3.3. Practical implications

Practical questions are raised by the possibility that social spending could lead to better outcomes and the observation that the strength of this association may differ depending on the type of social programme. In particular, this raises questions about how further research could inform potential investments in social policy as well as how to prioritise them.



Examples of pertinent questions include:

- What policy areas/social risks (expressed by SOCX categories) would most benefit from increased focus?
- Is there any target population group/geographical area that could be prioritised to greatest effect?
- What administrative or geographical level can or should be involved? (e.g. If national governmental intervention is not desired or possible, what can local government do?)
- Is there an optimal ratio of public to private social spending? (e.g. At what point does the balance between public and private become associated with worse health outcomes?)
- Is there an optimal balance of cash vs in-kind benefits?

Policy choices are stark when a country is faced with economic difficulties or when spending trade-offs are otherwise pressing. And social spending is under particular scrutiny in some countries with a need for budget

cuts. However, the subject of the present research – the relationship between social and health expenditure and population-level health outcomes (which in turn are associated with future health costs) – merits attention, whether cuts are being contemplated or whether decisionmakers are simply seeking to make best use of public funds. The broadening gap between levels of expenditure on health in the United States on the one hand and health outcomes in the United States on the other hand, as well as the contrast between this trajectory and better health outcomes in other OECD countries, are noteworthy. Also noteworthy is the clear relationship between higher proportionate social expenditure and better health outcomes across the countries and most of the health outcomes considered in this research.

Our work provides fertile ground for those contemplating decisions about where to focus budgets; arguably, social protection should be seen in both policymaking and health research as an important link between welfare states and population health.



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# Appendix A: Detailed description of analytical models

In our analyses of OECD data, countries are the unit of analysis, with observations nested within countries. With the later models that use United States–only data, states are the unit of analysis, with observations clustered by state. Clustered data – of which longitudinal data are just a special case – increase the risk of Type II errors (falsely rejecting the null hypothesis), so this was accounted for by running these as multilevel models (typically linear models). We used two modelling approaches depending on the question being answered. The first is standard multilevel models that combine within and between variation. A general formalisation of the models used here, namely, a random intercept multilevel model, is:

$$Y_{it} = \alpha_0 + b_1 x_{1it} + b_2 z_{2i} + \mu_{0i} + \varepsilon_{it} \quad (1)$$

where  $Y_{it}$  is a continuous outcome measure for country  $i$  at time  $t$ .  $\alpha_0$  is the intercept for time (one for every  $t$  observed),  $b_1 x_{1it}$  is a country-level measure for country  $i$  at time  $t$  (time-varying) and  $b_2 z_{2i}$  is a time-constant country-level variable.  $\varepsilon_{it}$  and  $\mu_{0i}$  are, respectively, the residuals for

a country in a given year and the residual of country-level intercepts. (A way of thinking about residuals is that they represent the unobserved variables that affect the outcome.)

The second type of model exclusively focuses on within-country variation and takes the form:

$$\Delta Y_{it} = \alpha_0 + \Delta b_1 x_{1it} + \Delta \varepsilon_{it} \quad (2)$$

where changes in the outcome ( $\Delta Y$ ) are a function of changes in the independent variables ( $\Delta x$ ). This is what is termed a ‘time de-meaned’ model (Tarling 2009). The benefit of this approach is that any time-constant, or slow-to-change, factors relating to a specific country are accounted for in the model. Put another way, by focusing on changes within countries, between-country idiosyncrasies are ignored so one can talk about ‘for countries where X changed by one unit, Y changed by z units’. This approach is sometimes referred to as a ‘fixed-effects’ panel model (e.g. Allison 2009). The terminology of fixed and random effects can be confusing, so we focus on discussing the source of variation as within and/or between countries.





# Appendix B: Technical details on social expenditure and SOCX data

## Approach

We downloaded the latest available data from the OECD SOCX database<sup>75</sup> disaggregated by all nine categories (Old age, Survivors, Incapacity-related, Health, Family, Active labour market policies, Unemployment, Housing, Other) and by all five sources (Public, Mandatory private, Voluntary private, Net public, Net total) from 1980 onwards, where available. The data were crosschecked for any inconsistencies and omissions using detailed national breakdowns and corresponding reference series. The following calculations were made:

1. Total spending for each category = Public + Mandatory private + Voluntary private
2. Total social spending = totals for all categories with the exception of Health

## SOCX overview

The OECD SOCX database was developed in the 1990s as a tool to enable cross-national comparative social policy analysis. It traces national social spending with individual 'social expenditure programmes' as the unit of analysis. The benefit of this data granularity is twofold. First, it permits greater flexibility and depth in analysing available data. Second, through increased transparency, it reduces the scope for incorrect recording of individual spending items. The OECD SOCX database uses the following definition of social expenditures:

*The provision by public and private institutions of benefits to, and financial contributions targeted at, households and individuals in order to provide support during circumstances*

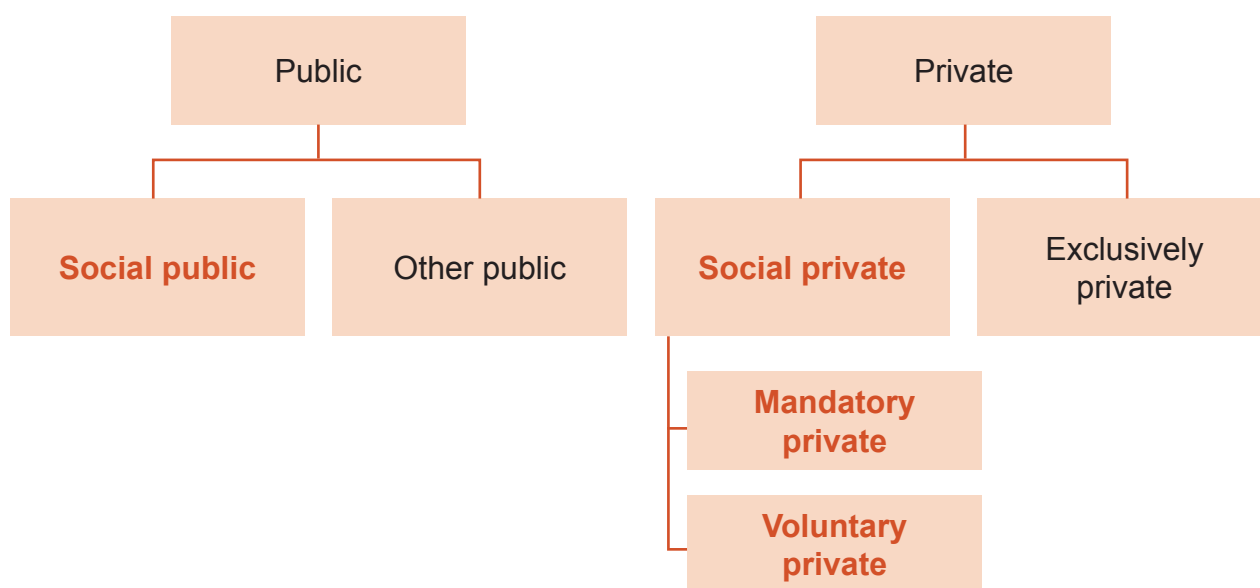
*which adversely affect their welfare, provided that the provision of the benefits and financial contributions constitutes neither a direct payment for a particular good or service nor an individual contract or transfer. (Adema et al. 2011, 90)*

In addition, in order to be included, programmes must meet at least one of the following two conditions: (a) they have to feature some element of inter-personal redistribution (most commonly community-based and/or tax-advantaged programmes) and/or (b) be compulsory to participate in.

This definition and its operationalisation have several practical implications. First, transfers between households are excluded from the datasets. Only transfers originating from institutions count. Second, benefits included in this definition can take the form of cash benefits, social services or tax breaks. In the US context, the inclusion of tax breaks means that social spending data incorporate instruments such as employer-sponsored health insurance plans and tax-advantaged individual retirement plans. Programmes covered by the definition are assigned to one of nine categories: Old age, Survivors, Incapacity-related, Health, Family, Active labour market policies, Unemployment, Housing and Other.

## Typology of spending sources

In its classification of programmes, OECD distinguishes multiple types of spending, which determines whether they are included in the SOCX database. The most fundamental dichotomy is public vs private spending, in which benefits that are not provided by the government



**Figure 7. Typology of spending as operationalised by SOCX**

*Note: Components in orange are included in SOCX.*

(regardless of its level) are considered private.<sup>76</sup> Private spending is further subdivided into private social spending, which needs to fit the definition of social spending presented above, and exclusively private spending, which does not. Finally, private social spending is divided between mandatory and voluntary. Mandatory private social spending is required by law and includes, for instance, sick leave paid by private employers to their staff. Voluntary private spending refers to benefits accrued from privately operated programmes.

The classification of various types of social spending is presented in Figure 7. Items that are included in the SOCX database are marked in orange letters. It should be noted, however, that while information on private social spending is covered by the OECD, its quality is considered inferior to that of information on public budgetary expenditures on social programmes.

### Summarizing potential noteworthy issues

This section summarises the most noteworthy limitations of SOCX data, with the aim to clarify

any possible issues that arose during the interpretation of our analysis.

### Limitations pertaining to scope and quality of data

First, the very scope of SOCX is limited; therefore this database might not express the totality of existing spend on social programmes and social risk protection. Some of the items that SOCX classifies as ‘exclusively private’, such as out-of-pocket health payments, could also conceivably be understood as social.<sup>77</sup> In addition, the (non-)inclusion of individual items in the SOCX database can at times be a result of a case-by-case pragmatic decision, quite often driven by data availability and/or by incompatibility of individual countries’ welfare states (Adema and Ladaique 2005). And sometimes the line between social and non-social programmes is unclear and is drawn between relatively related programmes.<sup>78</sup>

Similarly, the treatment and classification of old-age payments also gives rise to uncertainties, particularly when provided by a private party. As stated above, individual retirement plans

form part of SOCX in so far as they are tax-advantaged. However, it is not always possible to discern whether and which contributions have been made under favourable tax conditions. As a result, a decision whether to include pension instruments is made on a case-by-case basis (Adema et al. 2011).<sup>79</sup>

In addition, some entire areas of important public services fall completely outside the scope of the SOCX database. In connection with potentially achieving positive health outcomes, two areas stand out in particular, namely, education (other than early education services) and infrastructure.

And, finally, it should be reiterated that the quality of private spending data is lower and the collection much less systematic than that of public spending data. This fact may result in an underreporting of the actual extent of private expenditures, which may in turn disproportionately underestimate social spending in countries with greater reliance on private service provision, including charitable and philanthropic sources.<sup>80</sup>

### **Limitations pertaining to classification uncertainties**

In addition, even in instances where spending is unambiguously within the scope of SOCX, the classification of its source may not be straightforward. For instance, De Deken (2012) observed that occupational pensions in Switzerland are classified by SOCX as Mandatory private because there is a direct mandate embedded in Swiss law for workers to participate. By contrast, Dutch occupational pensions, organized by employers who signed up to a collective agreement, are considered voluntary for that very reason. However, the author points out that the Dutch government almost always uses its powers to get involved in these arrangements, rendering the outcome very similar to the Swiss situation.

Similarly, the category in which a particular programme should be counted is not always

clear and/or differs across countries. For instance, in some countries long-term care for the elderly falls predominantly under the category Health, whereas in others it falls under Old age or Incapacity. Another example of a possible classification mismatch is early child education and care (De Deken 2012).

### **Limitations pertaining to the treatment of taxation**

In addition to presenting gross data on social spending in OECD countries, the SOCX database also offers data on net public and net total spending. This enables a cross-national comparison of social spending that controls for differences in how three channels of taxation regimes (direct taxation, indirect taxation and tax expenditures) affect the extent of social programme provision across countries.

Regrettably, the effect of taxation is not broken down by the eight basic spending categories and is reported only in an aggregate way, for public spending and for all spending combined. This represents a complication for the purposes of our analysis as there is no way of isolating taxation effects in the health domain from the rest. This inability to isolate effects may be particularly problematic for an international comparison involving the United States because the effect of taxation appears to be much larger in European countries. This means that the United States ranks relatively higher when we compare net social spending than when we look at gross figures. On the other hand, this effect is to some extent mitigated by the fact that the large majority of the volume of relevant tax breaks in the United States can be found in the health domain.<sup>81</sup> Thus, they would not influence our analysis, which conceptualizes social spending as total SOCX less health.

### **Other technical limitations**

Idiosyncrasies across countries can also limit to some extent the validity of cross-national comparisons. We can illustrate this using, once

**Table 20. Definitions of health spending used in SOCX and by Bradley and Taylor**

Health spending (as reported in SOCX)	Health spending (as reported by Bradley and Taylor 2011)
HC.1–HC.9 Total current expenditure*	HC.1–HC.9 Total current expenditure HC.R.1 Gross capital formation HC.R.2 Education and training of health personnel HC.R.3 Research and development in health HC.R.6.1 Long-term care other than HC.3

\*Public expenditure is included in its entirety. Private social health expenditure is estimated based on private plans with an element of redistribution.

more, the example of pensions. Severance payments, if made upon retirement, are counted towards the SOCX Old age category. Their volume is particularly noteworthy in Italy, Korea and Japan and may therefore somewhat distort the analysis when we are working with the Old age totals in these three countries.

The fact that social programmes can be funded by different levels of government also poses a challenge. For instance, local governments may, at least partially, utilize block grants from the central government that have not been earmarked for a specific purpose, or their spending may not be properly reported.<sup>82</sup>

Finally, as a technical note, it should be noted that SOCX data are reported net of administrative costs. The exclusion of administrative costs is useful for an analysis of the effect on recipients' welfare, which is in line with the objectives of this study. By contrast, spending data that include administrative costs may be of greater value when assessing options and setting priorities from a policymaking perspective.

### **Brief note on SOCX Health vs OECD Health datasets (and on replicating Bradley et al. 2011)**

Health expenditure data included in the SOCX database are drawn from the OECD Health database. This raises the possibility that certain items recorded in other SOCX categories may have been double-counted, in particular, spending on elderly and/or disabled. Based on

available data, Adema et al. (2011) estimate that this overlap between the category Health and other SOCX categories exists in ten countries. In three of these, the spending in question is in excess of 1% of GDP.

In this context, it is worth recalling that the original Bradley and Taylor paper used a different, more expansive, definition of health expenditure (see Table 20). On one hand, this choice may better reflect the true extent of health spending; on the other it may exacerbate the double-counting challenge discussed above, particularly through the inclusion of HC.R.6.1, which consists of Long-term care other than HC.3.

## **US social spending data**

As we stated in Chapter 1, the classification of social spending data used for the US sub-national analysis (based on BEA data) differs from that used for our international analyses (based on OECD data). Table 21 below provides an overview of how individual categories in both data sources broadly correspond to each other.

Table 22 below presents basic descriptive statistics of BEA data on social spending used for the state-level analysis presented in Chapter 4.

**Table 21. Comparison of OECD and BEA social spending categories**

OECD category	Covered by BEA/RAND State Statistics category
Old age	Part of Retirement and disability Part of Veteran pension and disability Part of Supplemental security income
Survivors	Part of Old age, survivors, disability Veteran life insurance
Incapacity-related	Part of Old age, survivors, disability Part of Veteran pension and disability Part of Supplemental security income
Health	Medical Part of Veteran
Families	Family assistance under Income maintenance
Active labour market policies	Veteran readjustment Part of Other Part of Income maintenance
Unemployment	Unemployment
Housing	Part of Income maintenance Part of Other
Other	Part of Other Part of Income maintenance

**Table 22. Summary of BEA data on transfers**

Category	n	mean	SD	Min	Max
Education	72851	78.80	85.53	0	2734.30
Income	73958	445.34	326.10	0	3603.41
Medical	73986	1797.56	1060.00	0	9919.89
Other	48358	31.32	149.83	0	3020.83
Retirement	73996	1743.58	721.95	0	8708.69
Unemployment	73148	117.19	96.65	0	1289.27
Veterans	73688	134.28	101.78	0	1721.20



# Appendix C: Technical details on selection of health indicators

## Methodology for selecting indicators

### Conceptual framework and selection criteria

The selection of indicators was guided by two existing conceptual frameworks used to identify the leading indicators for Healthy People 2020,<sup>83</sup> namely, the life course perspective<sup>84</sup> (Berkman 2009) and the social determinants of health model<sup>85</sup> (Braveman and Gottlieb 2014; Gehlert et al. 2008). The life course perspective typically spans the following life stages: pregnancy and infancy, childhood, adolescence, adulthood and elderly. The social determinants of health model, as used by Healthy People 2020, includes five key areas: economic stability, education, social and community context, district and the built environment, and health and healthcare.<sup>86</sup>

We used the following selection criteria to identify a set of key indicators for our analysis:

1. Data availability for all OECD countries of interest (including the United States)
2. Indicators that span the different life stages
3. Indicators that span the social determinants of health

### Data sources and approach

To identify health indicators that are commonly used and available across OECD countries, we followed a three-step process. First, we reviewed major US and international reports and data sources to identify indicators most commonly used to measure population health. The following sources were consulted:

### US reports and databases

- The Institute of Medicine's *U.S. Health in International Perspective: Shorter Lives, Poorer Health* (Panel on Understanding Cross-National Health Differences Among High-Income Countries)<sup>87</sup>
- The Healthy People 2020 Leading Health Indicators<sup>88</sup>
- The National Center for Health Statistics Health Indicators Warehouse<sup>89</sup>
- The CDC Community Health Assessment for Population Health Improvement: Resource of Most Frequently Recommended Health Outcomes and Determinants<sup>90</sup>
- Jaffe and Frieden's 'Improving health in the USA: Progress and challenges'<sup>91</sup>

### International reports and databases

- OECD Health Status Indicators<sup>92</sup>
- WHO Global Health Indicators<sup>93</sup>
- Statistics Canada: Health Indicators framework<sup>94</sup>
- WHO Regional Office for Europe's *Health System Performance Comparison: An Agenda for Policy, Information and Research*<sup>95</sup>

Second, we then grouped the indicators located in these reports and data sources into two categories: health outcomes (mortality, e.g., age-adjusted death rates by leading causes of death, and morbidity, e.g., disease-specific prevalence rates, child health, injuries) and risk factors (social environment, physical environment, health behaviours). We then identified the indicators most commonly used to evaluate population health within each category across the reports and data sources reviewed.

Third, we mapped the indicators most frequently cited in the reports and data sources reviewed to the life stages framework and to the health determinants (risk factors and health outcomes). This mapping exercise highlighted the scarcity of health indicators that capture physical and social environmental risk factors. To identify additional indicators available for OECD countries in these two areas, we also consulted the following non-health databases:<sup>96</sup>

- Education at a Glance 2014: OECD Indicators<sup>97</sup>

- OECD International Road Traffic and Accident Database (IRTAD)<sup>98</sup>
- OECD StatExtracts and OECDiLibrary<sup>99</sup>

## Results

Table 23 summarizes the results of our three-step process and shows the resulting 38 indicators identified as commonly used measures of population health by life stage and data source. A '1' in a cell indicates that the indicator is included in the report or data source listed.

**Table 23. Summary of frequently cited health indicators from key sources relevant to the United States and OECD countries**

Indicator	US sources				International sources	
	Institute of Medicine	Health Indicators Warehouse	Healthy People 2020	CDC	OECD	WHO
Pregnancy and infancy						
Infant mortality	1	1	1	1	1	1
Neonatal mortality	0	1	0	0	1	1
Life expectancy	1	0	0	1	1	1
Low birth weight prevalence	1	1	0	1	1	1
Preterm births prevalence	1	0	1	0	0	0
Childhood						
Exposure to secondhand smoke prevalence (children aged 3–11)	0	0	1	0	0	1*
Immunisation rate (% of children of relevant age immunized against measles, diphtheria, tetanus and pertussis )	1	1	1	1	1	1
Obesity prevalence (children aged 6–11)	1	1	1	1	1	1
Adolescents						
Transportation-related accident rate	0	0	0	0	1	1
Students awarded a high school diploma 4 years after starting 9th grade	0	0	1	0	1	0
Youth unemployment	0	0	0	0	1	0
Fertility rate (girls aged 15–19)	1	1	1	0	1	1
Obesity prevalence (teens aged 12–19)	1	1	1	1	1	1
Use of alcohol or illicit drugs in past 30 days	0	0	1	1	0	0
Binge drinking in past 30 days	0	0	1	0	0	0
Cigarette smoking in past 30 days	0	0	1	0	0	1
Current tobacco use prevalence (teens aged 13–15)	1	0	1	1	0	1
Adults						
Air quality index†	0	0	1	0	1	1



Indicator	US sources				International sources	
	Institute of Medicine	Health Indicators Warehouse	Healthy People 2020	CDC	OECD	WHO
Poverty rate	0	0	0	0	1	1‡
Gini coefficient	0	0	0	0	1	0
Educational attainment – percentage of adults completed upper secondary education	0	0	0	1	1	0
Perceived health status	0	0	1	1	1	1
Tobacco and alcohol consumption	0	1	1	1	1	1
Fruits and vegetables consumption	0	0	1	1	1	0
Prevalence of obesity	1	1	1	1	1	1
Prevalence of cardiovascular disease	1	1	1	1	1	1
Prevalence of diabetes	1	1	1	1	1	1
Prevalence of chronic lung disease	1	1	1	1	1	1
Prevalence of hypertension	1	1	1	1	1	1
Prevalence of cancers – various types	1	1	1	1	1	1
Deaths from motor vehicle accidents	1	0	0	1	1	1
Deaths from injury	0	1	1	1	1	1
Firearm-related deaths	0	0	0	0	1	1
Homicides	1	1	1	1	1	1
Suicides	0	1	1	1	1	1
Age-adjusted death rates for the leading causes of death: heart disease, cancer, chronic respiratory diseases, hypertension and diabetes	1	1	0	1	1	1
Deaths from HIV/AIDS	1	1	0	1	1	1

**Notes:**

0 indicates not present in the report or data source listed, 1 indicates present in the report or data source listed.

\*The WHO indicator counts children under the age of 15 exposed to secondhand smoke.

† The Air Quality Index (AQI), which reports daily air quality as a value of 0 to 500, considers values greater than 100 to indicate unhealthy levels of air pollution (Healthy People 2020 n.d.a).

‡ The WHO website links to World Bank statistics for poverty.

Table 24 shows the same list of indicators but this time by life stage and health determinants categories (i.e. risk factors and health outcomes).

We then applied our three selection criteria (data availability across all OECD countries, indicators spanning the life stages and indicators spanning the determinants of health) to the list of indicators in Table 23 and Table 24 to select the final subset of the indicators to be used in our analyses. Table 25 shows the final selected set of indicators for consideration in our study.

Table 25 indicates that the resulting list of key indicators to be used in our analyses is more heavily weighted towards adults than the earlier life stages. One reason for this is that more indicators are available for adult health. Because risk factors tend to have cumulative health effects that build over an individual's lifetime, it makes sense for many of the measures of population health to be for the adult population.

Although we would ideally have liked to have indicators in each cell of the matrix in Table 25, we

**Table 24. Common indicators of population health by life stage and health determinants**

Life stage	Risk factor			Health outcome	
	Physical environment	Social environment	Health behaviours	Morbidity	Mortality
<b>Pregnancy and infancy</b>				Prevalence of low birth weight Prevalence of preterm births	Infant mortality Neonatal mortality
<b>Childhood</b>	Air pollution % of children exposed to secondhand smoke		Immunisation rate Fruits and vegetables consumption	Obesity prevalence	
<b>Adolescence</b>	Air pollution Transportation-related accident rates	Students awarded a high school diploma 4 years after starting 9th grade Poverty rate Youth unemployment	Pregnancy rate among adolescent females Adolescents using alcohol or illicit drugs in past 30 days Adolescents binge drinking in past 30 days Adolescent cigarette smoking in past 30 days	Obesity prevalence	
<b>Adulthood</b>	Air pollution Transportation-related accident rates	Percentage of adults achieving upper secondary education Poverty rate Gini coefficient	Tobacco and alcohol consumption Fruits and vegetables consumption (self-reported)	Perceived health status Obesity prevalence Prevalence rates for cardiovascular disease, diabetes, chronic lung disease, hypertension, cancers – various types	Life expectancy All-cause mortality Deaths from non-communicable diseases Deaths from motor vehicle accidents Deaths from injury Homicide rate Firearm-related deaths Suicide deaths Age-adjusted death rates for the leading causes of death: heart disease, cancer, chronic respiratory diseases, hypertension, diabetes and HIV/AIDS

are constrained by data availability. Mortality data are widely available for most countries; however, risk factors and morbidity data are less frequently reported (and often different measures are used). Thus, we selected mortality indicators as proxies when necessary. As transportation-related accident rates were not available in all countries, we selected motor vehicle deaths as a proxy for community safety related to transportation. Similarly, firearm-related deaths and homicide rate were selected as proxies for community safety and violence. Lastly, suicide rate was selected as a proxy for mental health status.

Ultimately, due to scope constraints, the analysis conducted for the purposes of this study utilised only a selection of the indicators presented below, as reported in section 1.2.2. We based the final selection of indicators for use in our analyses on completeness of available data and consistency with other literature used in the report, in particular the work by Bradley et al. (2011). For completeness, we report all health indicators as originally selected.

**Table 25. Key indicators of population health by health determinants and life stage**

Life stage	Risk factor			Health outcome	
	Physical environment	Social environment	Health behaviours	Morbidity	Mortality
<b>Pregnancy and infancy</b>				(1) Prevalence of low birth weight	(2) Infant mortality
<b>Childhood</b>	(3a) Air pollution		(4) Immunisation rate (5a) Fruits and vegetables consumption (self-reported)	(6a) Obesity prevalence	
<b>Adolescence</b>	(3b) Air pollution		(7) Pregnancy rate among adolescent females (8a) Tobacco use (9a) Alcohol consumption	(6b) Obesity prevalence	
<b>Adulthood</b>	(3c) Air pollution	(10) Percentage of adults achieving upper secondary education	(8b) Tobacco use (9b) Alcohol consumption (5b) Fruits and vegetables consumption	(6c) Obesity prevalence (11) Perceived health status	(12) Life expectancy (13) Deaths from non-communicable diseases (14) Deaths from motor vehicle accidents (15) Firearm-related deaths (16) Homicides (17) Suicides

## Health indicator definitions and data sources

### Physical environment

#### 1. Air pollution

<b>Indicator</b>	Particulates (PM10) total emissions index
<b>Description</b>	An index of suspended particulate matter with diameter 10 microns or less, referenced to 1990 (index reference year 1990=100)
<b>Data source</b>	OECD.Stat, Environment – Air and Climate, <a href="http://stats.oecd.org/">http://stats.oecd.org/</a>
<b>Background</b>	Air pollution is a top cause of premature deaths often related to chronic respiratory diseases and lung cancer (Brunekreef and Holgate 2002) and infant mortality (Ezziane 2013). Particulate matter (PM) has been shown to exacerbate morbidity among people with respiratory disease and to increase mortality from cardiovascular and respiratory disease among the elderly (Seaton et al. 1995). Expanding social capital (for example, public participation and activism) has been used to incentivize environmental protection (Rydin and Pennington 2000).

### Social environment

#### 2. Educational attainment

<b>Indicator</b>	Percentage of persons aged 25–64 having at least an upper secondary education
<b>Description</b>	The share of the population aged 25–64 years who have successfully completed upper secondary or post-secondary, non-tertiary or tertiary education (ISCED 3–6)
<b>Data source</b>	OECD.Stat, Education, <a href="http://stats.oecd.org/">http://stats.oecd.org/</a>
<b>Background</b>	Education is a proxy for socioeconomic status. Higher levels of education have been shown to be associated with lower risk factors for cardiovascular disease (smoking, high blood pressure, high cholesterol) (El-Sayed and Galea 2012; Winkleby et al. 1992). Less educated individuals generally have poorer health as measured by a range of health outcomes, including life expectancy, heart disease, diabetes and obesity (Braveman et al. 2010). Maternal education has been linked to immunisation rates among children (Basu and Stephenson 2005).

### Health behaviours

#### 3. Immunisation rates

<b>Indicator</b>	Diphtheria, Tetanus, Pertussis (DTP) coverage among 1-year-olds
<b>Description</b>	Childhood vaccination rates reflect the percentage of children who receive the respective vaccination in the recommended timeframe.
<b>Data source</b>	OECD.Stat, Health – Immunisation, <a href="http://stats.oecd.org/">http://stats.oecd.org/</a>
<b>Background</b>	There is strong evidence that vaccines provide safe and effective protection against such diseases as diphtheria, tetanus, pertussis (whooping cough) and measles (Shann 2013). Vaccines for diphtheria, pertussis and tetanus have been part of the WHO-recommended vaccination series since 1974 and have prevented millions of child deaths since that time.* Social capital (measured by participation and membership in organisations) has been shown to have a positive impact on immunisation rates of children (Cassell et al. 2006).

#### 4. Pregnancy rate among adolescent females

<b>Indicator</b>	Adolescent fertility rate
<b>Description</b>	Births per 1,000 women aged 15–19 years
<b>Data source</b>	World Bank, <a href="http://data.worldbank.org/indicator/">http://data.worldbank.org/indicator/</a>
<b>Background</b>	Teenage pregnancy affects the health of both the teen mother and the infant due to the truncation of education for the mother, which results in reduced prospects for employment and other related ills, such as increased risk of living in poverty. Social support during and after the pregnancy is known to positively impact the health of infants born to teenage mothers (Turner et al. 1990). Social capital also has a protective effect against teen pregnancy (Crosby and Holtgrave 2006).

#### 5. Smoking

<b>Indicator</b>	Daily smokers aged 15+
<b>Description</b>	The percentage of the population aged 15 years and over who are reporting to smoke every day
<b>Data source</b>	OECD.Stat, Health – Tobacco consumption, <a href="http://stats.oecd.org/">http://stats.oecd.org/</a>
<b>Background</b>	Smoking is a major risk factor for circulatory disease and cancer, increasing the risk of heart attack, stroke, lung cancer and cancers of the larynx and mouth. Smoking is also an important contributory factor for respiratory diseases. Social capital (measured by trust and social participation) has been positively associated with smoking cessation, while lack of active social participation has been associated with smoking initiation (Giordano and Lindström 2010).

#### 6. Alcohol consumption

<b>Indicator</b>	Sales of pure alcohol in litres per person aged 15 years and over
<b>Description</b>	Annual sales of pure alcohol to persons aged 15 years and older, measured in litres per capita
<b>Data source</b>	OECD.Stat, Health – Alcohol consumption, <a href="http://stats.oecd.org/">http://stats.oecd.org/</a>
<b>Background</b>	Alcohol use is associated with numerous harmful health and social consequences, including an increased risk of a range of cancers, stroke and liver cirrhosis. Alcohol also contributes to death and disability through accidents and injuries, assault, violence, homicide and suicide, as well illicit drug use. Social capital (measured by trust) is protective against alcohol use, smoking and use of illicit drugs (Aslund and Nilsson 2013).

#### 7. Fruits and vegetables consumption

<b>Indicator</b>	Fruit and vegetable consumption among adults
<b>Description</b>	Survey responses to 'How often do you eat fruit (excluding juice)?' and 'How often do you eat vegetables or salad (excluding juice and potatoes)?'
<b>Data source</b>	OECD, Health at a Glance: Europe 2012 (OECD 2012b)
<b>Background</b>	Inclusion of fruit and vegetables in the daily diet has been associated with reduced risk for chronic non-communicable diseases, including cancer, diabetes and heart disease (Johnson et al. 2010). Stronger social networks, neighbourhood social cohesion, social support and community garden participation have been found to improve fruit and vegetable consumption (Sorensen et al. 2007).

## Morbidity

### 8. Overweight or obesity

<b>Indicator</b>	Population overweight or obese (15+)
<b>Description</b>	Percentage of the population aged 15 years and older who are overweight or obese. Adults with a BMI from 25 to 30 are defined as overweight, and those with a BMI of 30 or over, as obese.
<b>Data source</b>	OECD.Stat, Health – Body weight, <a href="http://stats.oecd.org/">http://stats.oecd.org/</a>
<b>Background</b>	Obesity is a risk factor for cardiovascular disease – the leading cause of mortality in OECD countries. Low social capital is associated with a high risk of being obese, even after adjustment of the socioeconomic status and lifestyle factors. <sup>†,‡</sup>

### 9. Low birth weight

<b>Indicator</b>	Low birth weight
<b>Description</b>	Number of live births weighing less than 2,500 grams as a percentage of total number of live births
<b>Data source</b>	OECD.Stat, Health – Infant health, <a href="http://stats.oecd.org/">http://stats.oecd.org/</a>
<b>Background</b>	Birth weight is the leading indicator of infant health because of the close relationship between low birth weight and infant mortality and health issues later in life. Low birth weight has also been associated with low levels of social capital (Kim and Saada 2013; Nkansah-Amankra et al. 2010).

## Mortality

### 10. Infant mortality rate

<b>Indicator</b>	Infant mortality rate
<b>Description</b>	Number of deaths of children under one year of age, expressed per 1,000 live births
<b>Data source</b>	OECD.Stat, Health – Maternal and infant mortality, <a href="http://stats.oecd.org/">http://stats.oecd.org/</a>
<b>Background</b>	Infant mortality is a key indicator of population health and has been shown to be sensitive to total government spending and government spending on non-health factors (Kim and Saada 2013) as well as social capital (Yang et al. 2009).

### 11. Life expectancy at birth

<b>Indicator</b>	Life expectancy at birth
<b>Description</b>	Average number of years a newborn is expected to live, given current death rates
<b>Data source</b>	OECD.Stat, Health – Life expectancy, <a href="http://stats.oecd.org/">http://stats.oecd.org/</a>
<b>Background</b>	Life expectancy at birth is the most frequently cited health indicator and has been shown to be responsive to social expenditure and social capital (Kennely et al. 2003).

## 12. Life expectancy at age 65

<b>Indicator</b>	Life expectancy at age 65
<b>Description</b>	Average number of years that a 65-year-old person is expected to live, assuming that age-specific mortality levels remain constant
<b>Data source</b>	OECD.Stat, Health – Life expectancy, <a href="http://stats.oecd.org/">http://stats.oecd.org/</a>
<b>Background</b>	Income inequality (which has been shown to be inversely related to levels of social capital) has not been shown to be related to life expectancy at 65 years, although the two do appear to be associated among lower age groups (Lynch et al. 2001).

## 13. Cardiovascular mortality rate

<b>Indicator</b>	Ischaemic heart disease mortality rate
<b>Description</b>	Age-standardised deaths from ischaemic heart diseases per 100,000 population
<b>Data source</b>	OECD.Stat, Health – Causes of mortality: Ischaemic heart diseases, <a href="http://stats.oecd.org/">http://stats.oecd.org/</a>
<b>Background</b>	Low social capital has been linked to increased risk of cardiovascular disease (Whitley and McKenzie 2005).

## 14. Cancer mortality rate

<b>Indicator</b>	Cancer mortality rate
<b>Description</b>	Age-standardised deaths from malignant neoplasms per 100,000 population
<b>Data source</b>	OECD.Stat, Health – Causes of mortality: Malignant neoplasms, <a href="http://stats.oecd.org/">http://stats.oecd.org/</a>
<b>Background</b>	Cancer is a leading cause of mortality among adults. A recent systematic review found limited support for an association between social capital and cancer mortality (Choi et al. 2014); however, social capital was found to be associated with cancer survival and screening adherence (Moudatsou et al. 2014).

## 15. Transport accident mortality rate

<b>Indicator</b>	Transport accident mortality rate
<b>Description</b>	Age-standardised deaths from transport accidents per 100,000 population; deaths from transport accidents are classified to ICD-10 codes V01-V89
<b>Data source</b>	OECD.Stat, Health – Causes of mortality: Transport accidents, <a href="http://stats.oecd.org/">http://stats.oecd.org/</a>
<b>Background</b>	Road accidents are the leading cause of death among children and young people. The main causes are speeding, drunk driving, and not wearing seatbelts (Peden et al. 2004). Recent studies have shown evidence that social capital reduces traffic accidents, deaths and injuries (Nagler 2013).

## 16. Homicide rate

<b>Indicator</b>	Homicide rate
<b>Description</b>	Age-standardised deaths from assault per 100,000 population
<b>Data source</b>	OECD.Stat, Health – Causes of mortality: Assault, <a href="http://stats.oecd.org/">http://stats.oecd.org/</a>
<b>Background</b>	Although homicide captures only the most extreme form of violence, it is reliable because, unlike other crimes, murders are not generally underreported. Homicide and violence are important indicators because of the direct impact on mortality. Violence is correlated with income inequality. The literature suggests that inequality erodes social capital and trust and inhibits investment into public services and infrastructure (Elgar and Aitken 2010).

## 17. Suicide rate

<b>Indicator</b>	Suicide rate
<b>Description</b>	Age-standardised deaths from intentional self-harm per 100,000 population
<b>Data source</b>	OECD.Stat, Health – Causes of mortality: Intentional self-harm, <a href="http://stats.oecd.org/">http://stats.oecd.org/</a>
<b>Background</b>	The suicide rate has been used as an indicator of mental health of a population (Windfuhr and Kapur 2011), especially because it has been linked to alcohol and illicit drug use (Ganz and Sher 2009). Non-psychological factors, such as neighbourhood safety and neighbourhood connections, have been shown to be related to mental health outcomes (De Silva et al. 2005; Ziersch et al. 2005).

\* CDC (2006)

† Muckenhuber et al. (2015)

‡ Holtgrave and Crosby (2006)



# Appendix D: Additional model results

## Additional results from Chapter 2

Below follows a series of additional results from our analyses pertaining to the discussion in Chapter 2 of the evolution of public and health spending in OECD countries:

- Health spending in the United States and peer countries (Figure 8)
- Social spending in the United States and peer countries (Figure 9)
- Public social spending in the United States and peer countries (Figure 10)

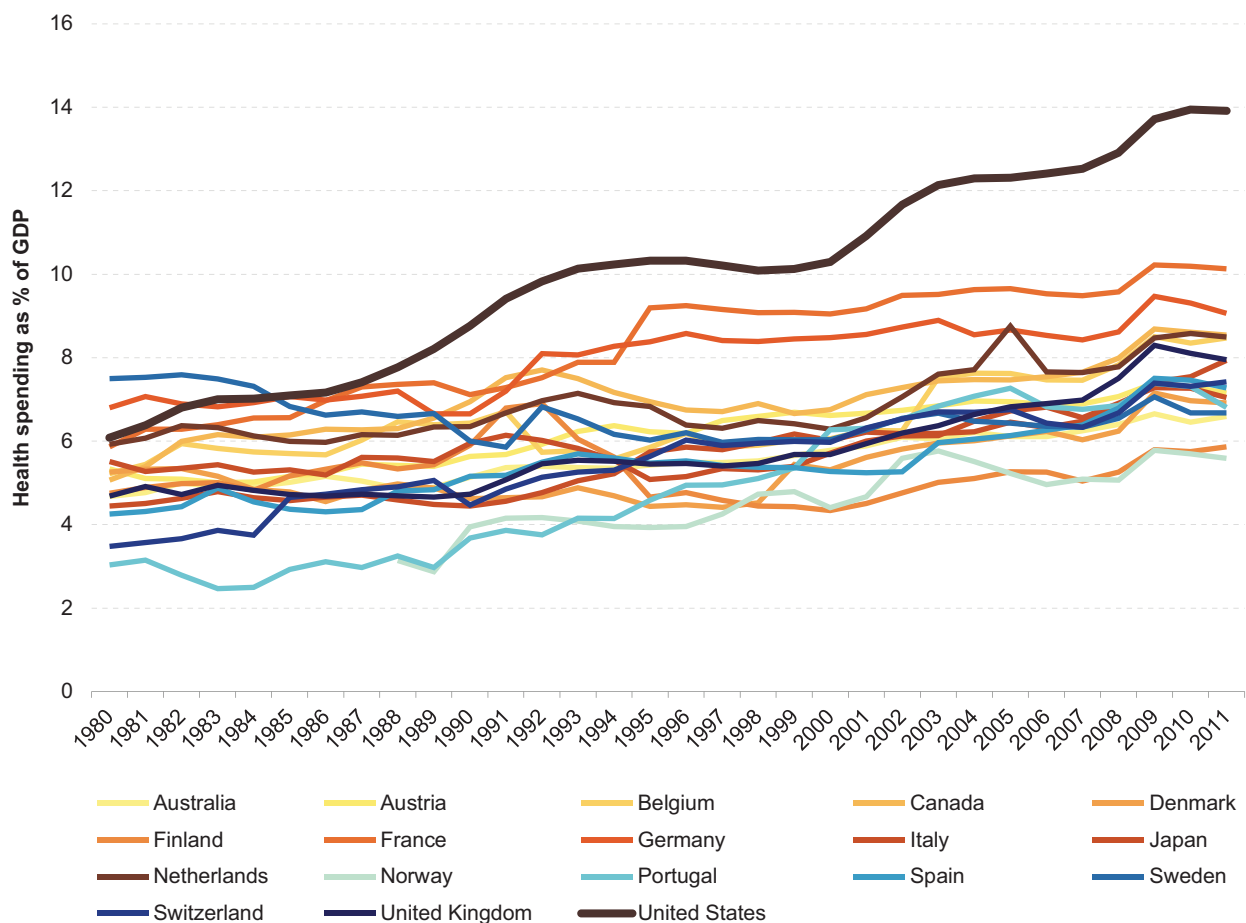
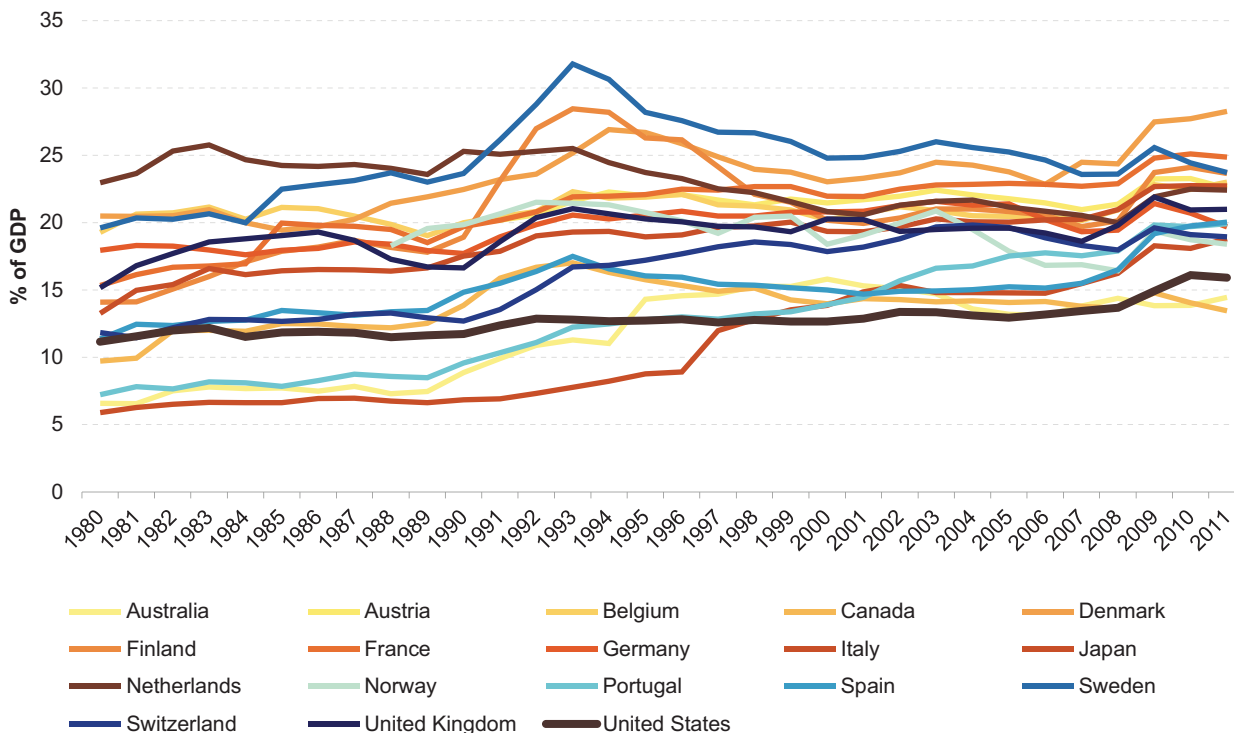


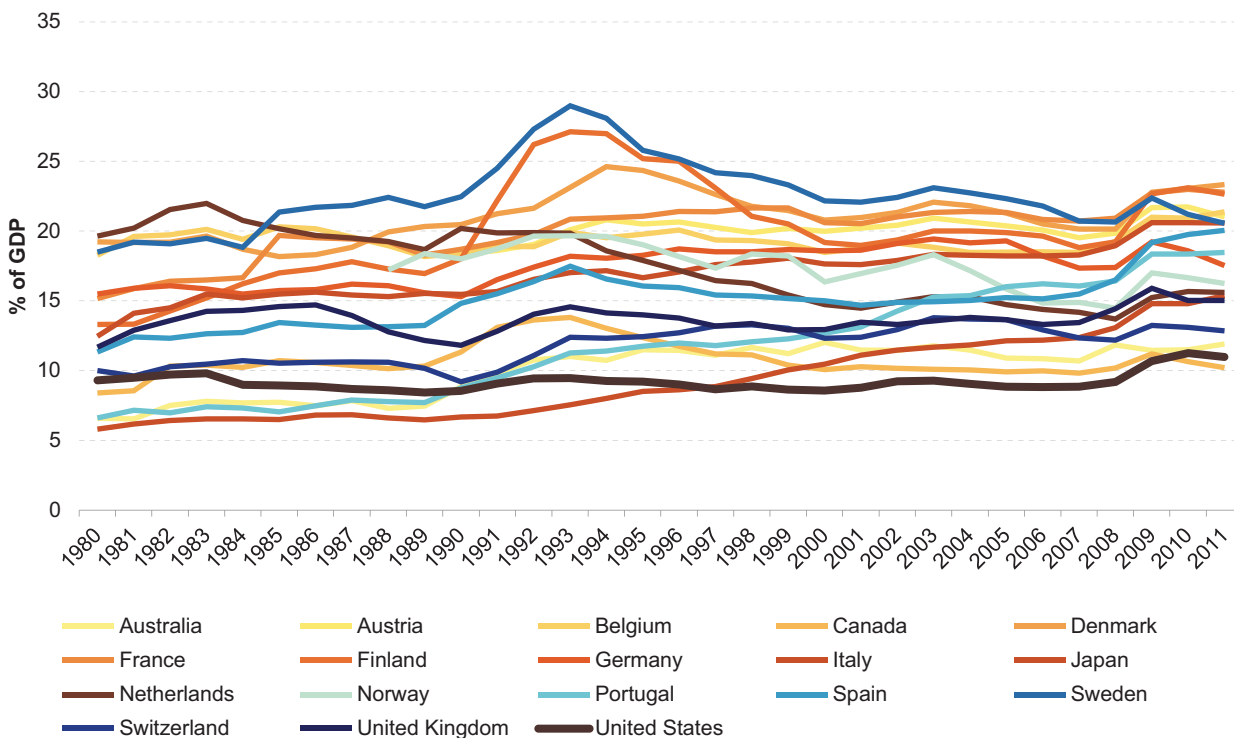
Figure 8. Health spending in the United States and peer countries, 1980–2011

Source: OECD SOCX database



**Figure 9. Social spending in the United States and peer countries, 1980–2011**

Source: OECD SOCX database



**Figure 10. Public social spending in the United States and peer countries, 1980–2011**

Source: OECD SOCX database

**Table 26. Multilevel linear model of OECD data using all years/countries**

Variable		Model 1	Model 2	Model 3	Model 4
		Life expectancy	Log infant mortality	% low birth weight	All-cause mortality
Social spending	b	0.17	-0.03	0.09	-9.98
	se	0.01	0.00	0.01	0.89
	p	0.00	0.00	0.00	0.00
Log GDP	b	8.75	-1.52	1.40	-619.70
	se	0.16	0.04	0.12	11.26
	p	0.00	0.00	0.00	0.00
Intercept	b	-13.62	17.55	-9.22	7421.00
	se	1.60	0.39	1.23	111.80
	p	0.00	0.00	0.00	0.00
<b>N</b>		<b>918</b>	<b>711</b>	<b>834</b>	<b>864</b>
<b>rho</b>		<b>0.7951</b>	<b>0.787</b>	<b>0.804</b>	<b>0.8367</b>

Note: Sample sizes change because of missingness for outcome data, in particular infant mortality.

With respect to the analysis of the relationship between social expenditure and health outcomes, the following additional data are presented below:

- Results from an analysis including all years and countries (Table 26)
- Results from an analysis including additional health outcomes (Table 27)

Following Gould (2011), we also assessed this using a Poisson specification, because infant mortality is non-linear. The pattern of results was the same, but the result itself was one-tenth as strong and non-significant (b -0.014; se 0.009; p.118; 95% CI -0.032 – 0.004). Bootstrapping the standard errors led to the result for SOCX becoming significant (p.000), but the magnitude is still one-tenth of that in the linear model, suggesting a much weaker relationship than reported by Bradley et al. (2011). However, differences in the data used should be borne in mind.

**Table 27. Multilevel linear models for other health outcomes**

Variable		Model 1	Model 2	Model 3
		Obesity	Alcohol	Tobacco
Social spending	b	0.47	-0.16	-0.26
	se	0.10	0.02	0.07
	p	0.00	0.00	0.00
Log GDP	b	26.23	-0.58	-20.51
	se	1.50	0.19	0.94
	p	0.00	0.00	0.00
Intercept	b	-233.60	17.98	237.50
	se	16.43	1.93	9.25
	p	0.00	0.00	0.00
<b>N</b>		<b>138</b>	<b>913</b>	<b>466</b>
<b>rho</b>		<b>0.97</b>	<b>0.88</b>	<b>0.72</b>

Note: Sample sizes change because of missingness for outcome data, in particular obesity, which is typically only measured from 2000 onwards.

Assessing these results with t-1 dummies for years as per Wooldridge (2003), we note the same effects on coefficients as reported in section 2.1.1. That is, we note attenuation of coefficients for log(GDP) for both life expectancy and log(infant mortality), and a reversal of association between log(GDP) and percentage of children born underweight (from positive to negative). The social expenditure–outcome relationship is also attenuated in all models. For all-cause mortality, the log(GDP) association was again substantially reduced and the social

expenditure–all-cause-mortality association was reduced by 75%.

Finally, with respect to analyses disaggregating overall social spending into individual spending categories, we present the following additional data:

- Correlations between individual social spending categories and overall social spending (Table 28)
- Relationship between individual spending categories and health outcomes (Table 29)

**Table 28. Pair-wise correlations between total social spending (as %GDP) and subcategories**

SOCX category		Total social	SOCX category		Total social
Old age	r	0.84	Housing	r	0.18
	p	0.00		p	0.00
Survivors	r	0.31	Family	r	0.63
	p	0.00		p	0.00
Incapacity-related	r	0.71	Other	r	0.20
	p	0.00		p	0.00
Active labour market policies	r	0.67	Health	r	0.71
	p	0.00		p	0.00
Unemployment	r	0.52			
	p	0.00			

**Table 29. Relationship between individual SOCX categories and health outcomes**

Variable		Model 1	Model 2	Model 3	Model 4
		Life	(log) infant	% low	All-cause
		expectancy	mortality	birth weight	mortality
Old age	b	0.31	-0.06	0.17	-21.00
	se	0.02	0.01	0.02	1.74
	p	0.00	0.00	0.00	0.00
Survivors	b	0.51	-0.14	0.41	-22.75
	se	0.09	0.02	0.07	7.49
	p	0.00	0.00	0.00	0.00
Incapacity-related	b	0.11	-0.01	-0.03	-3.53
	se	0.06	0.01	0.04	4.32
	p	0.05	0.29	0.49	0.41

Table 29. (continued)

Variable		Model 1	Model 2	Model 3	Model 4
		Life	(log) infant	% low	All-cause
		expectancy	mortality	birth weight	mortality
Active labour market policies	b	-0.46	-0.01	0.01	37.33
	se	0.14	0.03	0.11	9.98
	p	0.00	0.82	0.89	0.00
Unemployment	b	0.02	-0.04	-0.09	-9.87
	se	0.07	0.01	0.05	4.84
	p	0.82	0.01	0.08	0.04
Housing	b	1.36	-0.21	0.15	-78.32
	se	0.18	0.05	0.13	14.48
	p	0.00	0.00	0.27	0.00
Family	b	0.32	0.02	0.15	-22.80
	se	0.08	0.02	0.06	6.10
	p	0.00	0.24	0.02	0.00
Other	b	-0.15	0.00	0.23	20.07
	se	0.14	0.04	0.11	10.76
	p	0.29	0.98	0.04	0.06
Log GDP	b	7.94	-1.55	1.03	-611.50
	se	0.22	0.05	0.16	16.38
	p	0.00	0.00	0.00	0.00
Intercept	b	-6.96	18.12	-6.29	7460.00
	se	2.19	0.53	1.59	162.10
	p	0.00	0.00	0.00	0.00
<b>N</b>		<b>697</b>	<b>601</b>	<b>658</b>	<b>663</b>
<b>Rho</b>		<b>0.88</b>	<b>0.90</b>	<b>0.84</b>	<b>0.88</b>

### Additional results from Chapter 3

Correlations pertaining to social capital are reported below (Table 30), together with a further breakdown by category of expenditure (Table 31). These tables show that on a bivariate basis, trust is associated with health outcomes, such as life expectancy ( $r = .39$ ;  $p = .000$ ) and infant mortality ( $r = -.42$ ;  $p = .000$ ), but also that trust is positively associated with social expenditure.

Table 30. Correlations between social trust, health outcomes and social expenditure

Variable	Correlation with social trust
Life expectancy	$r = 0.39$ $p = .000$
Infant mortality (log)	$r = -0.42$ $p = .000$
Low birth weight	$r = -0.45$ $p = .000$
All-cause mortality	$r = -0.22$ $p = .015$
Social expenditure	$r = 0.45$ $p = .000$

**Table 31. Correlations between categories of social expenditure and social trust**

Variable	Correlation with social trust
Old age	r = 0.22 p.009
Survivors	r = -0.39 p.000
Incapacity-related	r = 0.60 p.000
Active labour market policies	r = 0.56 p.000
Unemployment	r = 0.23 p.009
Housing	r = 0.196 p.04
Family	r = 0.499 p.000
Other	r = 0.183 p.04

### Comments on institutional trust as a measure of social capital

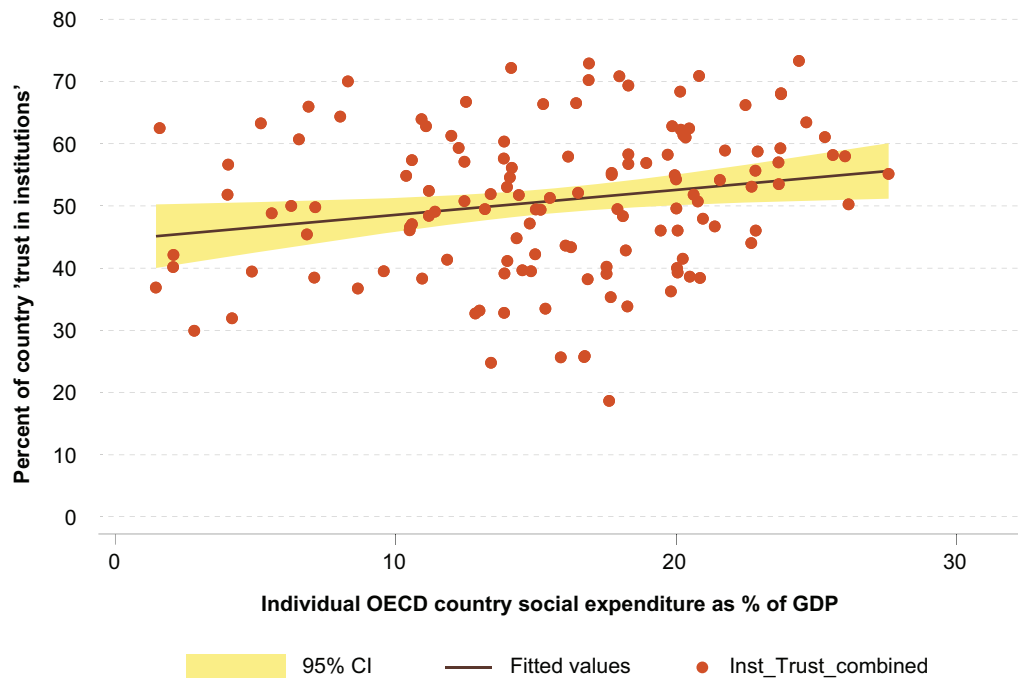
We also considered another dimension of trust, namely, trust in institutions, because we believed that this might also affect the relationship between social expenditure and health outcomes. This consideration is also reflected in the existing literature, which comments on strong associations among confidence in public institutions, social capital and democratic performance (see, e.g. Newton and Norris 2000; Rothstein and Stolle 2002; Twenge et al. 2014). Let us consider one example of how this might matter. If individuals do not trust institutions (such as government or social services), they might be less willing to access services and instead rely on friends and family or other informal networks to help them in times of need. If we relate this directly to healthcare, it might be that individuals do not seek medical care until their condition worsens. This was operationalised by using questions that asked about the level of confidence that individuals have in different institutions, such as the police and government. These responses were then

averaged by country-year to give an overall indication of how much confidence the population has in different institutions.<sup>100</sup> For later analyses we use separate measures of trust in specific institutions, such as social services.<sup>101</sup> The main result from this analysis, typified by Figure 11, was that there was little to no relationship between measures of 'social capital' (as so defined) and state social expenditure.

## Additional results from Chapter 4

### Results for within–United States analysis: Social capital, social expenditure and health

As part of our sub-national analyses of US states, we turned to exploring the relationships among social capital, social expenditures and health outcomes. We used a different measure of social capital for this analysis, developed by researchers at the Pennsylvania State University (Rupasingha and Goetz 2008) and modelled on Putnam's social capital index (2001). The measure includes such variables as the number of various civic organisations and participation rates in civic events (such as elections and censuses).<sup>102</sup> As such, it captures a mixture of both 'bonding capital' (i.e. linking up similar people, e.g. in a country-club) and 'bridging capital' (i.e. linking up different people, e.g. in the civil rights movement), but does not contain a direct measure of trust. This means we are capturing different aspects of social capital than the international comparison – mainly around the linking up of people through formal organisations or events, rather than around general trust among community members.<sup>103</sup> The dataset covers the years 1990, 1997, 2005 and 2009, but incompatibility between the 1990 indicators and the rest of the dataset and missing data for other measures typically meant that we used only two years of data – 2005 and 2009. It was possible to use data from the General Social Survey (GSS) disaggregated at the state level, which contains a question about trust. However, the sample size of each GSS wave has historically ranged



**Figure 11. Correlation between institutional trust and social expenditure, OECD countries**

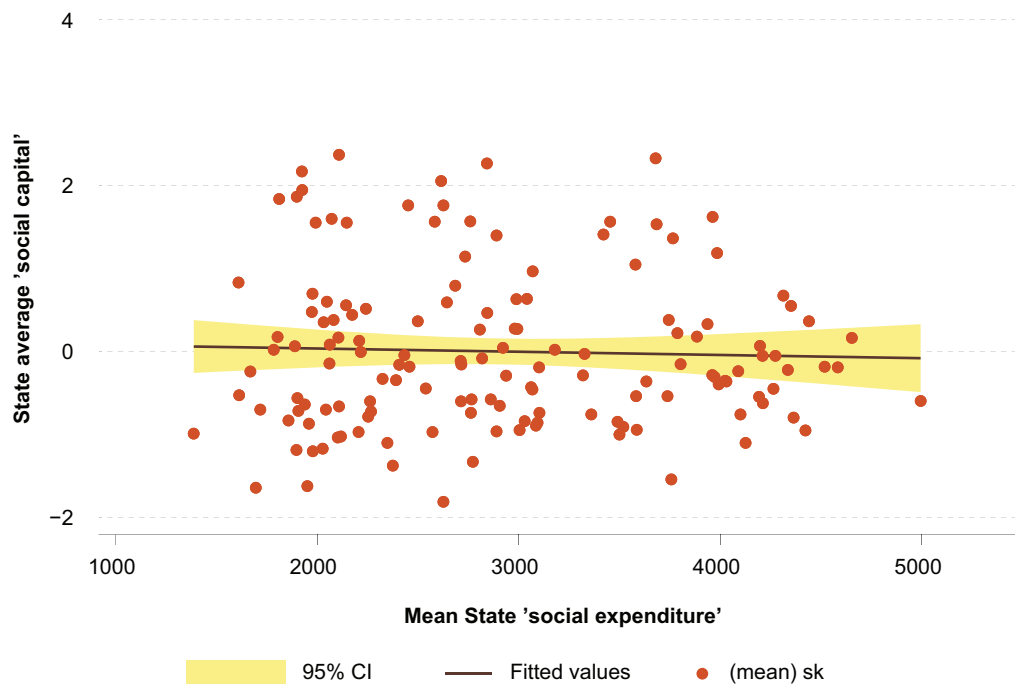
*Note: Multiple years per country shown*

between 1,400 and 3,000, which equals to an average of fewer than 60 respondents per state (though sample sizes differ across individual states to reflect differences in population size). In this situation, even combining multiple adjacent GSS waves (as has been done in other studies)<sup>104</sup> would have produced relatively small sample sizes with uneven and possibly incomplete state coverage. Therefore, we took the decision to use the data compiled by Rupasingha and Goetz (2008).

Our intention was to repeat the earlier analysis, adding public spending first, then seeing what difference, if any, adding social capital made. As a starting point, we looked at whether the measure of social capital we had was related to overall public expenditure. The result is shown in Figure 12. In short, we found no relationship between public expenditure and levels of 'bridging' social capital in US states. It is worth reiterating that the Penn State measure of social capital is primarily based on measures of relative

differences in the number of various types of organisations in the United States. As such, it is conceptually different from the measure used in the international analysis.

Having said that, one might imagine, for example, that communities with low levels of cash transfers would have been much higher on cohesion (perhaps standing for a lack of 'dependence on the state'?). Or one might imagine that such communities were richer and therefore do not need support. So one might expect some relationship between the number of civic organisations in a state and a state's public expenditure. The fact that there is almost no patterning at all seemed counter-intuitive, so we looked at the measures used to create the overall social capital scale. When we did that, we found that each of these was, at best, weakly correlated to public spending.<sup>105</sup> We then thought there might be some sort of 'cancelling out' effect among the different measures, but we were unable to identify patterns in the relationships. One final point might



**Figure 12. Correlation between social spending and 'social capital', US states**

be that these results purely reflect how small 'the state' in the United States really is – and the heavy reliance on private wealth/contributions for basic social welfare systems.

We start with the state control measures and the measure of public expenditure for each outcome. We then introduce the social capital measure we have available to us to assess what effect, if any, it has on the relationships already noted. As before, we limit the sample to those county-years with social capital data for each outcome. Estimation problems with the models for low birth weight and infant mortality mean these results could not be reported. This comparison highlights that measures of social cohesion – approximated by membership of community groups – are associated with life expectancy, but do not affect the relationship between social expenditure and health outcomes within US states.

The lack of bivariate association is puzzling, even more so given the apparent independence of these measures when we account for population demographics. We know that cash transfers are not evenly distributed across US states and that the strength of social ties also varies by geography (Putnam 2001). The almost total lack of overlap between variation in public spending and variation in bridging capital is puzzling, but perhaps the reasons are more straightforward. The Penn State measure captures slow-moving aspects of social life, for example, the number and membership of civic organisations such as neighbourhood associations. One might expect both the number of such organisations and membership in them to move quite slowly over time.



# Appendix E: Variation in health outcomes within the United States

Within the United States, health outcomes vary on a number of dimensions, underscoring the fact that a single estimate can mask importance differences in outcomes, whether by gender, race/ethnicity, income, education or geography. Related to this variation is that the leading causes of death in the United States have changed over time for men and women and for whites and blacks. For many of the indicators we identified in Appendix C, there is variation in health outcomes by these different dimensions. We use life expectancy here to illustrate how that variation plays out within the United States and to underscore the point aptly made by Christopher Murray and colleagues (2006) that, when considering the health of the US population, it is important to understand that there are ‘multiple Americas’. Thus, in identifying policy options to improve the health of the US population, it is important to take into account this variation and the underlying causes of it.

## Life expectancy

In 2010, overall life expectancy in the United States was 78.7 years, but it varies by race/ethnicity and by gender (Table 32). It was higher

for women compared with men, and whites had a higher average life expectancy compared with blacks. This latter difference held true by gender; that is, in 2010, white females had a higher average life expectancy at birth compared with black females.

The Hispanic population is a growing segment of the US population, representing 17.1% in 2013.<sup>106</sup> Table 33 illustrates how the differences in life expectancy in 2010 compare when Hispanic origin<sup>107</sup> is taken into account. The estimates for whites remain about the same as shown in Table 33. However, the estimates for blacks decrease somewhat in all categories when Hispanic origin is taken into account, illustrating that the higher life expectancy of Hispanics inflates the life expectancies estimates for both black males and females. In general, Hispanics have a somewhat higher life expectancy than whites and blacks.

Figure 13, Figure 14 and Figure 15 show the trends in life expectancy between 1970 and 2010 by gender and by race. Overall, life expectancy increased from 70.8 years in 1970 to 78.7 years in 2010, and it increased for both males and females (Figure 13). However, the discrepancy

**Table 32. Life expectancy at birth (years) in 2010, by gender, race**

	All races	Whites	Black or African Americans
Overall	78.7	78.9	75.1
By Gender			
Female	81.0	81.3	78.0
Male	76.2	76.5	71.8

Source: NCHS (2014), Table 18, ‘Life expectancy at birth, at age 65, and at age 75, by sex, race, and Hispanic origin, United States, selected years 1900–2010’.

**Table 33. Life expectancy at birth (years) in 2010, by gender, race/Hispanic origin**

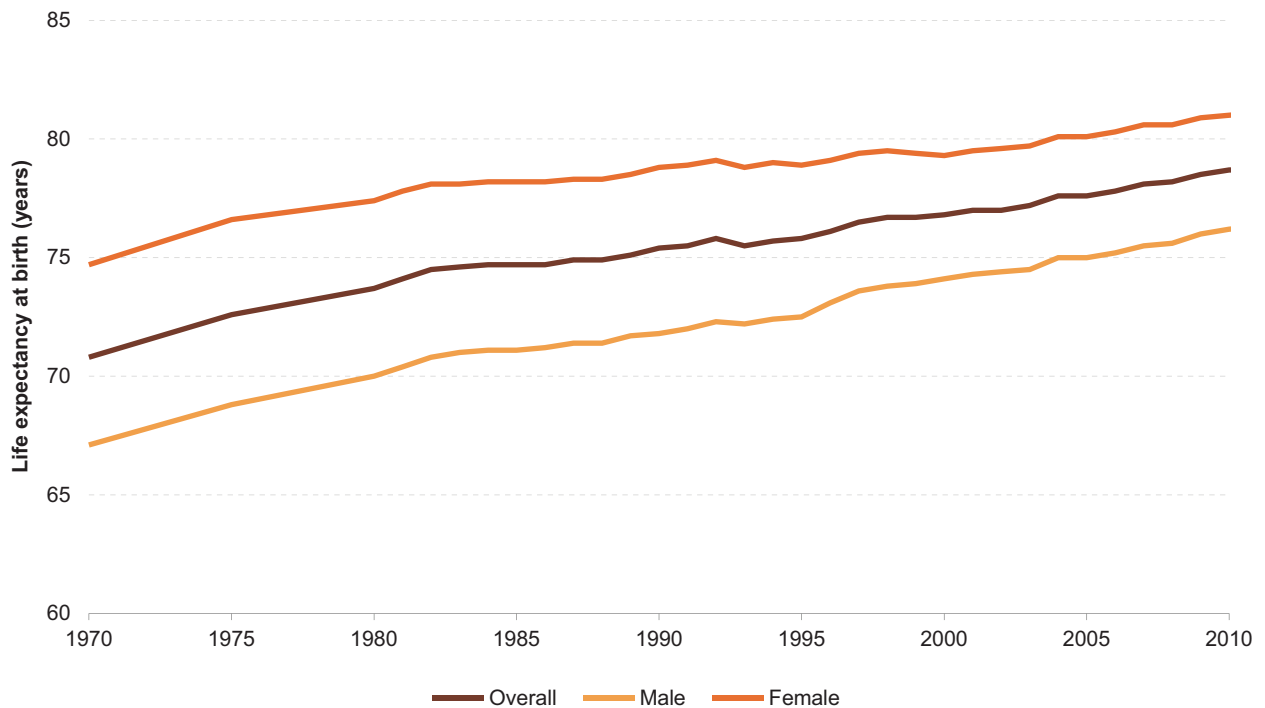
	White (non-Hispanic)	Black (non-Hispanic)	Hispanic
Overall	78.8	74.7	81.2
Female	81.1	77.7	83.8
Male	76.4	71.4	78.5

Source: NCHS (2014), Table 18, 'Life expectancy at birth, at age 65, and at age 75, by sex, race, and Hispanic origin, United States, selected years 1900–2010'.

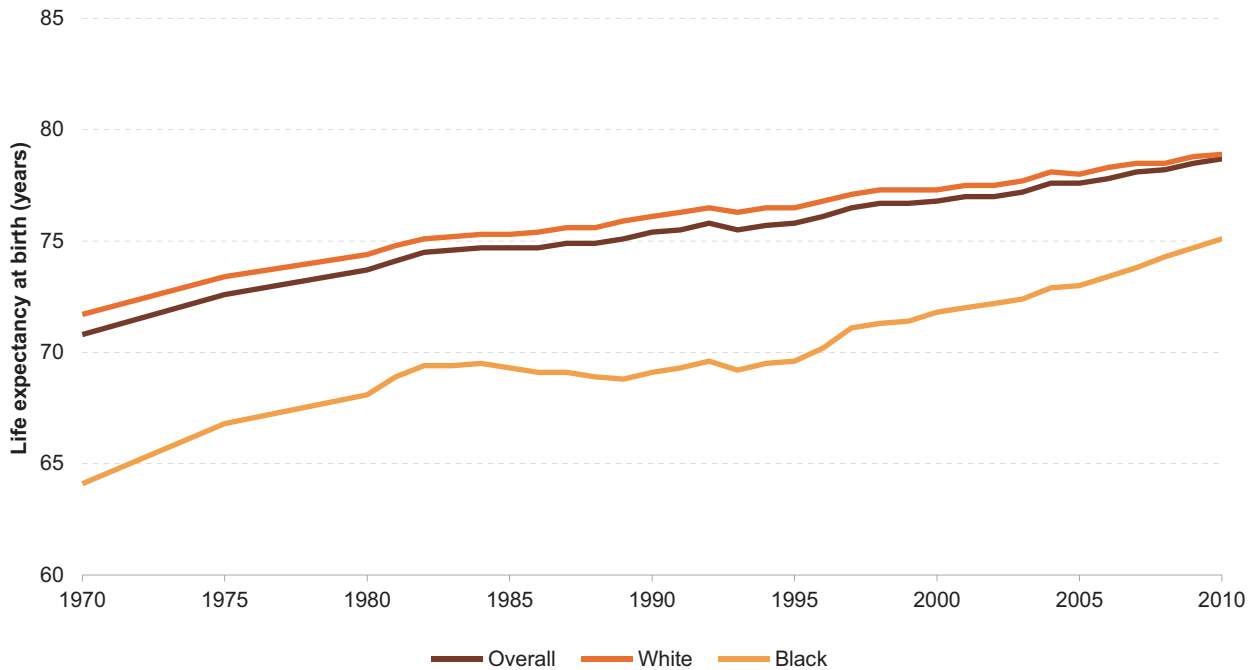
in life expectancy persisted over time by gender. With respect to gender, male average life expectancy in 1970 was 67.1, compared with 74.7 for females – a difference of 7.6 years – which narrowed somewhat, to a difference of 4.8 years, by 2010.

Figure 14 shows the trend in life expectancy by race. In 1970, blacks had an average life expectancy of 64.1 years, which increased to

75.1 years in 2010 (an increase of 11 years on average). Whites had an average life expectancy of 71.7 years and 78.9 years, respectively, in 1970 and 2010 (an increase of 7.2 years on average). The difference between whites and blacks narrowed somewhat over time. In 1970, the difference in average life expectancy between the two groups was 7.6 years, and in 2010 it was 3.8.



**Figure 13. Life expectancy (at birth) by gender, United States, 1970–2010**



**Figure 14. Life expectancy (at birth) by race, United States, 1970–2010**

However, Figure 15 illustrates that despite gains over time, disparities in the life expectancy of black men have persisted. In 1970, black men had an average life expectancy at birth of 60, as compared with 68 years for white men. In 2010, black men's average life expectancy increased to 71.8 years (a gain of nearly 12 years on average), but still remained below that of white men, at 76.5 years. The difference in life expectancy between white and black females narrowed somewhat over time. In 1970, the difference was 7.3 years, and in 2010 it was 3.3 years.

### **Variation in life expectancy in the United States by income and by race/ethnicity**

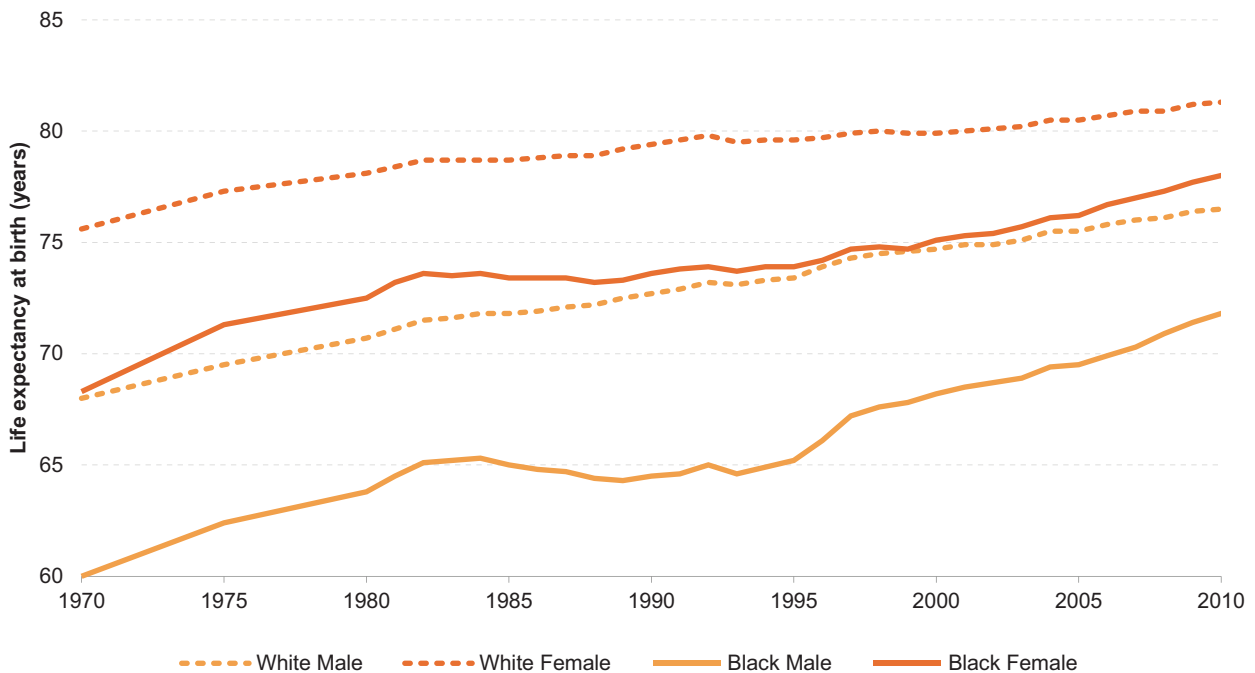
The relationship between income and health has been examined by various researchers. Braveman and Egerter (2008), for example, showed that in the United States, adults living in poverty (i.e., with incomes below the federal poverty level [FPL]) were more than five times as likely to report being in fair or poor health than adults with incomes at least four times the FPL.

In terms of the relationship between life expectancy and income, at age 25, individuals whose family income was less than 100% of the US federal poverty level in 1998 had a lower life expectancy (49 years) compared with those whose family income was greater than 400% of the FPL (approximately 55 years) (Woolf and Braveman 2011).

The relationship between life expectancy and income also varies by race/ethnicity. In the United States, blacks overall tend to have a lower life expectancy at each household income level than Hispanics and whites (Woolf and Braveman 2011). Within each race/ethnic group, the relationship between family income and life expectancy holds – that is, those with higher family incomes, on average, tend to have a greater life expectancy.

### **Variation in life expectancy in the United States by education and by race/ethnicity**

In the United States, the returns on education have grown over the past two decades: in 2006



**Figure 15. Life expectancy (at birth) by gender and by race, United States, 1970–2010**

the median earnings of male year-round, full-time workers with a bachelor's degree were \$66,930. For those with a high school degree they were \$37,030, and for those with some high school they were \$27,650 (National Center for Education Statistics 2007). In addition to accounting for earnings differences, high school graduation status is also linked to improvements in health status (Smith 2005).

With respect to life expectancy, adults without a high school diploma or equivalent are three times as likely as those with a college (i.e. post-secondary) education to die before age 65 (Woolf and Braveman 2011). Babies born to mothers who did not finish high school are nearly twice as likely to die before their first birthday as are babies born to college graduates (Braveman and Egerter 2008).

Olshansky et al. (2012) point out that 'It has long been known that despite well-documented improvements in longevity for most Americans, alarming disparities persist among racial groups

and between the well-educated and those with less education' (p.1803). Olshansky and colleagues estimated the impact of race and education on past and present life expectancy and examined trends in disparities from 1990 through 2008. They analysed life expectancy at birth over time by years of education at age 25 by gender and race/ethnicity and found that for both white females and males, life expectancy increases with educational attainment. For black females and males, the greatest increase in life expectancy occurs with educational attainment between 12 years to 13–15 years. Hispanic females and males show a similar trend, although the reported higher life expectancy for this racial/ethnic category should be interpreted with caution. In all instances, the effect of educational attainment on life expectancy levels off or increases more gradually between 13 and 15 years and 16 years and over.

Looking at trends in life expectancy and educational attainment over time, Olshansky et al. (2012) found that in 2008, US adult men and

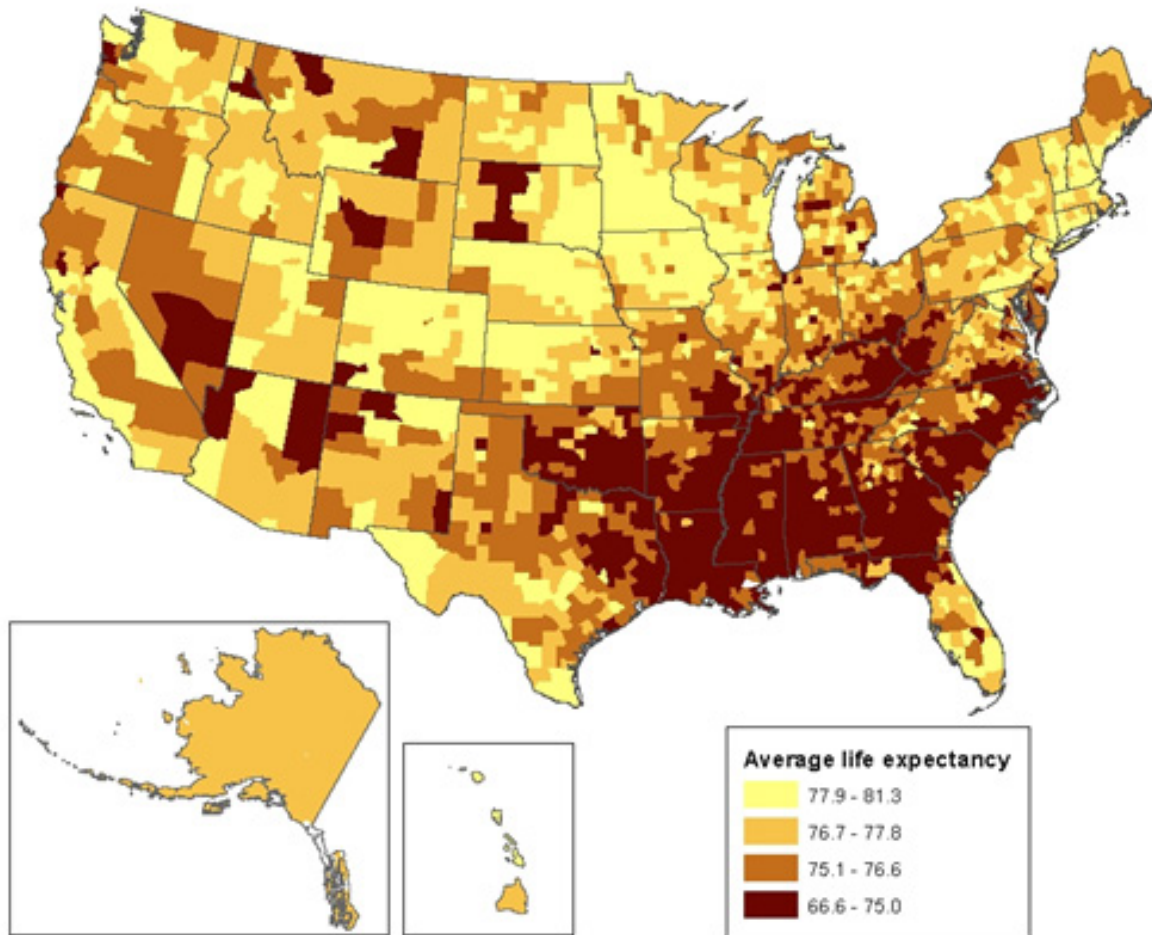


Figure 16. Average life expectancy, US counties<sup>108</sup>

women with fewer than 12 years of education had life expectancies not much better than those of all adults in the 1950s and 1960s (Olshansky et al. 2012). When race and education were combined, the disparity was even more striking. In 2008, white men and women with 16 years or more of schooling had life expectancies far greater than black Americans with fewer than 12 years of education – 14.2 years more for white men than black men, and 10.3 years more for white women than black women. ‘These gaps have widened over time and have led to at least two “Americas,” if not multiple others, in terms of life expectancy, demarcated by level of education and racial-group membership’ (Olshansky et al. 2012, 1803).

### Geographic variation in life expectancy in the United States

Geographic variation in health outcomes in the United States is also well known. Figure 16 illustrates that variation with respect to life expectancy (at birth) at the county level. The darker shading indicates those counties that have lower life expectancy on average than the counties with the lighter shading. In general, individuals in US southern states tend to have a lower life expectancy than individuals living in other parts of the United States, such as in parts of the West, the Midwest, or Northeast. A detailed review of US variation in health outcomes is provided in Appendix D.

Ezzati et al. (2008) examined trends in life expectancy for US counties between 1961 and 1999 (overall and by gender).<sup>109</sup> They concluded that although, overall, average life expectancy in the United States increased by more than seven years for men and more than six years for women, these gains in life expectancy were not reaching many parts of the United States. Instead, life expectancy for a significant segment of the US population actually declined during this time period (Ezzati et al. 2008):

- Beginning in the 1980s, the best-off counties continued to improve, but there was a stagnation or worsening of life expectancy in the worst-off counties.
- Beginning in the 1980s, 4% of the male population and 19% of the female population experienced either decline or stagnation in mortality.
- The majority of the counties that had the worst downward swings in life expectancy were in the 'Deep South', along the Mississippi River, and in the Appalachia region, extending into the southern portion of the Midwest and into Texas.

### **Diseases contributing to differences in life expectancy**

Ezzati et al.'s (2008) analysis indicates that the diseases responsible for the decline in life expectancy for a significant segment of the US population between 1960 and 2000 were mostly related to smoking, high blood pressure and obesity. Their analyses of disease-specific mortality data suggested that the stagnation and worsening mortality beginning in the 1980s was primarily a result of an increase in diabetes, cancers and chronic obstructive pulmonary disease, combined with a slowdown or halt in improvements in cardiovascular mortality (Ezzati et al. 2008). They also noted that an increase in HIV/AIDS and homicides also played a role for men.

Wong et al. (2002) looked at the contribution of different diseases in potential years lost and

potential gains in life expectancy by education and by race. To do so, they estimated cause-specific risks of death among adults in the United States. They then used these estimates in a simulation model to calculate the differences according to level of education and race in potential years of life lost and potential gains in life expectancy.

First, looking at educational disparities in potential years of life lost, after adjusting for age, sex and race, the number of potential life-years lost from all causes of death was 3.5 times as great for persons with less education than for persons with more education (Wong et al. 2002). Less educated persons lost more potential life-years than more educated persons for every specific cause they examined, though not all differences were statistically significant. The top six contributors to the educational disparity in mortality were ischemic heart disease, lung cancer, stroke, pneumonia, congestive heart failure and lung disease, which together contributed 40.4% to the total disparity according to educational level in potential life-years lost (Wong et al. 2002). The authors point out that all six are smoking-related diseases, suggesting that interventions to prevent smoking could have an enormous impact.

Second, looking at race disparities in potential years of life lost, after adjusting for age, sex and level of education, Wong et al. (2002) estimated that the number of potential life-years lost from all causes of death was 35% greater for blacks than for whites. Black persons and white persons lost 7.0 and 5.2 potential life-years per person before the age of 75, respectively, a difference of 1.8 years. Death from hypertension contributed most to the racial disparity in potential life-years lost (15.0%), followed by HIV disease (11.2%), diabetes (8.5%) and homicide (8.5%).<sup>110</sup>

In examining the disparity in potential years of life lost by education and race, Wong and colleagues concluded that the level of education and race each appear to have strong, independent effects that persist after adjustment

for the other, and that the patterns of racial and educational disparity are markedly different, which suggests that different sets of factors may explain these patterns. Based on their analyses, they recommended that targeting ischemic heart disease and lung cancer would be most useful in reducing the educational disparity in mortality, whereas targeting hypertension, HIV, trauma and diabetes would have the greatest effect on the racial disparity in potential years of life lost.

### **Variation in healthcare within the United States**

In addition to variation in health outcomes, variation in access to and utilisation of healthcare also has been well documented. Inequalities in insurance coverage; healthcare access and utilisation; and, more recently, in quality of care have been examined. For example, the Institute of Medicine's (IOM) landmark 2002 report, *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care*, examined in-depth disparities in healthcare. To do so, the IOM study committee reviewed more than 100 studies that assessed the quality of healthcare for various racial and ethnic minority groups, while holding constant variations in insurance status, patient income and other access-related factors.<sup>111</sup> Even among the better-controlled studies, the IOM study found that the majority of published research indicated that minorities are less likely than whites to receive needed services, including clinically necessary procedures, even after correcting for access-related factors, such as insurance status. For example, African Americans and Hispanics tend to receive a lower quality of healthcare across a range of disease areas (including cancer, cardiovascular disease, HIV/AIDS, diabetes, mental health, and other chronic and infectious diseases) and clinical services. Disparities are

found even when clinical factors, such as stage of disease presentation, co-morbidities, age and severity of disease are taken into account. Disparities in care were associated with higher mortality among minorities, who do not receive the same services as whites (e.g., surgical treatment for small-cell lung cancer). The IOM study concluded that lack of insurance was a key factor underlying many of these healthcare disparities.

Another key effort examining disparities in healthcare within the United States is the U.S. Agency for Healthcare Research and Quality's (AHRQ) tracking of disparities in healthcare (e.g., access to care, preventive medicine), starting in 2002, through its National Healthcare Disparities Reports (NHDRs). In its most recent report (2013), AHRQ reported that the trend has continued of blacks or African-Americans having poorer quality of care and worse access to care than whites for many measures tracked over time. Among all measures of healthcare quality and access that are tracked in the NHDRs and support trends over time, blacks or African-Americans had worse care than whites in the most recent year for 78 measures. Most of these measures showed no significant change in disparity over time.<sup>112</sup> However, for three measures (maternal deaths, diabetic care, and breast cancer diagnosis), the gap grew larger, indicating worsening disparities.

In the HHS Action Plan to reduce race and ethnic disparities, the authors concluded, 'The leading health indicators have demonstrated little improvement in disparities over the past decade, according to recent analyses of progress on Healthy People 2010 objectives. Significant racial and ethnic health disparities continue to permeate the major dimensions of health care, the health care workforce, population health, and data collection and research.'





# Appendix F: Relationship between social capital and health

The literature on social capital and health has surged in the last two decades, with research examining the relationship at the level of the individual, residential communities and workplaces, states, regions and even countries (Kawachi et al. (2008). According to the social network school of thought, the health of an individual can be affected by levels of social influence, social engagement and social support (Berkman and Glass 2000; Cohen et al. 2000; Dietz and Gortmaker 2001). Meanwhile, proponents of the social cohesion school posit that, at the community level, social cohesion affects health through collective socialisation,<sup>113</sup> informal social control<sup>114</sup> and collective efficacy<sup>115</sup> (Kawachi et al. 2004). Moreover, bonding and bridging capital may influence outcomes through different mechanisms, and may have either positive or negative effects on health.

The most commonly cited indicator of social capital in the literature is trust (ascertained by such questions as ‘Do you agree that most people can be trusted?’). Although some health psychology research (Kubzansky and Kawachi 2000) has argued that individual trust is not a legitimate indicator of social capital at the individual level, because it may be confounded with personality traits, such as hostility, that have shown to be a cardiovascular risk factor, aggregate measures of trust are unlikely to be similarly affected.

## Social capital and physical health

Several mechanisms linking social capital and physical health have been hypothesized. Two broad categorisations for hypothesized mechanisms are (a) local behaviourally

mediated mechanisms, including the diffusion of knowledge about health promotion and maintenance of healthy behavioural norms through informal social control and (b) more upstream, policy-mediated mechanisms of promotion of access to local services and amenities (Berkman and Kawachi 2000).

Studies on social capital and physical health have used measures of social cohesion at the individual level, at the ecological level and at multiple levels. A systematic literature review of the relationship between social capital (including trust, reciprocity, civic engagement and social participation) and physical health (measured by life expectancy, mortality, cardiovascular disease, cancer, diabetes, obesity and infectious diseases) found that better social cohesion was associated with better mortality outcomes at the state, regional and neighbourhood levels in the United States, Russia and Hungary (Kim et al. 2008). In contrast, the relationships were statistically non-significant in Canada, Australia and New Zealand and in cross-national studies. In multilevel studies, authors reported mixed findings on the relationship between social capital and all-cause mortality. Measures of social capital at the individual level were generally statistically significantly associated with better self-rated health in multilevel studies, but mixed results were found for area-level measures of social capital. Some studies found that the relationship between area-level social capital and self-rated health was attenuated by the adjustment for individual covariates. Studies have found a marginally significant association between higher social capital and lower risk of individual obesity at the state level, but no association at the county level (measured by

trust, voluntary association or a composite index) (Kim et al. 2008). Many behavioural risk factors that have been established for chronic diseases, such as cardiovascular diseases, cancers and diabetes, which include dietary intakes, smoking and physical inactivity, have been linked to social cohesion (Kim et al. 2008).

More recent systematic reviews of the literature do not provide definitive evidence of the relationship between social capital and physical health. Murayama et al. (2012) found mixed results in a review of prospective multilevel studies. Some positive associations were identified, but overall the evidence was found to be limited. In a meta-analysis of the relationships between social capital and self-reported health and all-cause mortality, Gilbert et al. (2013) found a strong positive association between social capital and good health. By contrast, using pooled estimates, Choi et al. (2014) did not find an association between social capital and either all-cause mortality, cardiovascular disease or cancer.

## Social capital and mental health

The mechanism through which social cohesion and social ties affect mental health is hypothesized to be related to community safety and wellbeing, which may in turn be associated with anxiety, stress and depression (Kawachi and Berkman 2001). This potential mechanism may be especially important for families, women, children and older adults. Empirical studies of social capital in relation to mental health have been explored, but the literature is less developed than that for physical health (Almedom and Glandon 2008). A review of studies published between 1998 and 2006 found that the research spanned mental health and wellbeing across the life stages, from child and youth to adults and older adults (Almedom and Glandon 2008). Similar to the analyses of physical health, studies used a variety of measures and scales and were analysed at various geographic and conceptual levels.

Almedom (2005) found that social capital can have both positive and negative associations with mental health, a finding consistent with Kawachi et al.'s literature review of social capital and physical health. A recent review of the relationship between social capital and mental wellbeing in older populations by Nyqvist et al. (2014) found that, depending on the operationalisation of social capital and the aspect of mental health, positive associations do exist. Focusing on children and adolescents, McPherson et al. (2014) found that what they define as 'family and community social capital' was associated with mental health and behavioural problems, whereas 'positive parent-child relations, extended family support, social support networks, religiosity, neighbourhood and school quality' seemed to be especially salient for mental health.

## Social capital and health behaviours

Relationships between social capital and various health-related behaviours, including alcohol consumption, smoking, physical activity, diet, drug use and sexual behaviours, have been explored in the literature (Lindstrom 2008). Hypothesized mechanisms of impact include norms influencing positive behaviour and social support, psychosocial mechanisms leading to self-efficacy, and access to resources.

Most studies have reported that higher levels of social capital are associated with healthy behaviours (Lindstrom 2008). Notable exceptions include sexually transmitted diseases among adolescents with high social participation and the association between behavioural and mental health issues and low community attachment among residents of poor neighbourhoods (Caughy et al. 2003). A more recent review found significant relationships between 'family and community social capital' and alcohol use, smoking, illicit drug use and sexual health among young people (McPherson et al. 2014). However, the strength of the relationship depended on

the concept and measure of social capital applied. Thus, although numerous mechanisms have been hypothesized and associations have been reported, the lack of consensus on social capital definitions and the varied levels of analyses remain a challenge for studies aiming to establish the relationship to determine the influence of social capital on health behaviours (Mohseni and Lindstrom 2008).

### **Social capital and aging-related outcomes**

Studies on community social capital and health of older adults at the neighbourhood level found mixed results (Cagney and Wen 2008). For example, Wen et al. (2005) found that collective efficacy was negatively associated with mortality among Medicare beneficiaries who were hospitalized for serious disease. However, the authors also reported that community social network density was negatively associated with mortality. Interestingly, Browning et al. (2006) reported that the relationships between social interaction/exchange and collective efficacy with heat-related mortality were positive during average heat conditions but were not associated with heat-related mortality during heat waves. These nuanced findings show once again that the type of social capital measure is important, and that other contextual factors interact with the relationship between social capital and health.

### **Social capital, inequality and health**

Researchers have hypothesized that social capital has a less significant relationship with health in egalitarian societies due to substantial public spending and more robust safety nets. A number of empirical studies have examined the association between state- and country-level indicators of social cohesion and population health outcomes and have found that variations in social cohesion by geographic area have similar patterns as compared with income inequality (Kawachi et al. 1997; Putnam 2001).

Kawachi et al. (1997) found that income inequality in the United States was strongly associated with lower social cohesion, as measured by the degree to which people agree with the statements 'Most people can be trusted' and 'Most people are helpful'. States with more inequality and lower social cohesion are more often less generous in the provision of public goods, a factor which may contribute to worse health outcomes. A systematic review by Islam and colleagues also found that countries with greater economic inequality had more consistent reports of a relationship between social capital and health, while there were null or weaker associations in more egalitarian societies (Islam et al. 2006). Kawachi et al. (2008) agree that null findings tended to be in countries with greater degrees of egalitarianism.

### **Caveats and limitations**

There are some important caveats to consider when examining the literature as a whole (Kawachi et al. 2008). Empirical studies have conceptualized social capital as either an individual attribute, a group attribute (ecological studies) or both (multilevel studies), resulting in limited comparability across studies. In addition, the fact that social capital is conceptualized and defined differently by the two leading schools – social cohesion and social networks – further adds to the difficulty of comparing studies. Ecological studies may capture both aggregate effects of community social capital and health and heterogeneous effects of different communities.

Few studies use direct measures of social cohesion obtained from national surveys that explicitly seek to examine the relationship between health and social cohesion by applying carefully specified scales of measurement and distinguishing between bonding vs bridging capital. Most studies focused on a single measure of social capital and represented aggregated survey responses. Kawachi et al. (2008) suggested that single measures may introduce measurement error that attenuates

the effects on health. Some studies have used composite indices, such as the Putnam social capital index, which is based on 14 state-level social capital indicators (Mellor and Milyo 2003).

In addition, many studies have not examined the negative consequences of social cohesion, although it is widely known that community cohesion can benefit some groups while causing harm to others (Subramanian et al. 2002), and few have explored the possibility of reverse

causation of health influencing social capital (Cagney et al. 2006). For example, Kawachi and Berkman (2001) suggest that women with few resources may provide substantial social support to others and be prone to mental health symptoms. Almedom and Glandon (2008) suggest that there is a need for more mixed-method studies that employ both qualitative and quantitative analyses to better explain the underlying mechanisms and relationships.

# Notes

- 1 It is well established that the United States spends disproportionately more on health care compared with other high-income countries (Baicker and Skinner 2011; Bipartisan Policy Center 2012; Kaiser Family Foundation 2011). In 2012, the United States spent 16.9% of its GDP on health, which is almost double the EU28 average of 8.7%. By contrast, the largest health expenditure in Europe in 2012 as a share of economic output was recorded in the Netherlands, at 11.8%, which is well below the US figures (OECD 2014a). The United States is an outlier even when accounting for its relatively high income per capita (Anderson et al. 2007). Given limited public and individual funds and numerous competing demands on those funds, this high level of health expenditure has important implications for the US government and US citizens. For instance, health cost increases between 1999 and 2009 were found to have erased the vast majority of an average family's real income growth over that period (Auerbach and Kellermann 2011). On a similar note, the proportion of American families who reported having issues with paying medical bills rose between 2003 and 2010 from 15% to 21% (Sommers and Cunningham 2011).
- 2 It should be noted, as the authors stress, that the results remain complex and need to be interpreted in light of the underlying study's limitations and possible confounding factors. Among these is the fact that the authors did not control for political ideology or lifestyle factors.
- 3 OECD (n.d.). While SOCX has certain limitations, as we note below (in Appendix B), its coverage for the purposes of this study is strong and allows good cross-national comparisons that take account of national differences to the extent possible.
- 4 Regardless of methodological sophistication, reliance on self-reported health is a fundamental weakness in previous research. The reason, typically, is that this approach allows for the use of a single survey dataset, such as the world-values survey, followed by 'making a leap' from self-reported health to all-cause mortality. More sophisticated analysis of health outcomes data will be possible with individual medical records being linked to rich survey data to allow for controls for individual-level confounders.
- 5 We recall that the problem of US health care costs was succinctly summarized over a decade ago by Gerard Anderson and others under the title 'It's the prices, stupid' (Anderson et al. 2003). The Institute of Medicine identified the following contributors to excess costs in American health care (estimated values offered in brackets): unnecessary services (\$210bn); inefficiently delivered services (\$130bn); excess administrative costs (\$190bn); excessive, i.e. beyond competitive benchmarks, prices (\$105bn); missed prevention opportunities (\$55bn); and fraud (\$75bn) (2013a, based on IOM [2010]). Similar aspects are discussed by Berwick and Hackbarth (2012) in their analysis of waste in the US health care system. They identified the following six areas for improvement: (1) failures of care delivery, (2) failures of care coordination, (3) overtreatment, (4) administrative complexity, (5) pricing failures, and (6) fraud and abuse. In comparison with other countries, Americans pay substantially more for comparable health care interventions (Anderson et al. 2012), although it is important to note that there is large variation with respect to health care unit costs within the United States across geographical areas, providers and insurance programmes (Institute of Medicine 2013a; Hussey et al. 2015). In this context it is also worth noting that higher health care costs have not been found to be associated with higher quality of care (Hussey et al. 2013). It is possible that unit costs is an area where greater efficiencies could be achieved, for instance, by improving data sharing, ensuring greater coordination of care and introducing alternatives to the traditional fee-for-service payment models (Guterman et al. 2011; Institute of Medicine 2013b; Shih et al. 2008). These areas have also been a focus of the Affordable Care Act, and emerging evidence suggests that the reforms may have contributed to the recent slow-down of the rise in American health care costs (Executive Office of the President of the United States 2013; Schoen et al. 2015).
- 6 American overall health spending is also partly driven by comparatively higher levels of consumption of some health care services (OECD 2011). Suggested contributors include systemic factors, such as: failures of care delivery, including lack of preventive care practices (Bernard and Encinosa 2004; Delaune and Everett 2008); gaps in coordination of care (Berwick and Hackbarth 2012); overtreatment (Brownlee 2007); and personal health choices and lifestyle factors (Bipartisan Policy Center, 2012; CDC 2015). As with health care unit costs, possible ways to reduce the level of health care consumption, and unnecessary care in particular, have been suggested in the literature (Frisse et al. 2012; Keyhani et al. 2013; Moynihan et al. 2012; Saef et al. 2014) and have featured prominently in the design of Affordable Care Act.
- 7 Lack of access to medical care, attributed to such factors as lack of health insurance coverage and lack of affordable health care (Collins et al. 2015), is one potentially important driver of inferior health outcomes in the United States. Interventions to expand health coverage and health care affordability (such as the Affordable Care Act) may result in improvements in this area (Baicker et al. 2013; Paradise 2014; Van Der Wees et al. 2013).
- 8 Even for countries with better health outcomes than the United States, there is inconsistent evidence about the degree to which their healthcare systems perform better. Relevant data may be retrieved from, for instance, OECD Health indicators and Commonwealth Fund surveys.

- 9 This suggestion is consistent with observations made by Marmot and Wilkinson (2005) in their work on the wider determinants of health.
- 10 This is sometimes referred to as a 'fixed effects' panel model (e.g. Allison 2009). The terminology of fixed and random effects can be confusing, so we focus on discussing the source of variation as within and/or between countries.
- 11 For a discussion of the relative competencies of the federal and state governments with respect to the welfare system in the USA, see, for instance, Scruggs (2007a).
- 12 Available from RAND State Statistics (n.d.)
- 13 The reason we apply the per capita approach is that applying either a national or state GDP as a denominator would not be meaningful. Using national GDP would give the impression of large states spending much more on social programmes, while applying state GDP would lead to substantial distortion since a large proportion of transfer payments originate at the federal level.
- 14 Clasen and Siegel (2007, 8) have called the SOCX database 'probably the best source for social expenditure figures ever available for comparative welfare state research'.
- 15 Some benefits from US health spending, such as research or education, also accrue outside of the United States (Global Health Technologies Coalition 2012). As such, these areas may be viewed as a global public good (Bradley et al. 2011). However, the size of these spending categories is small compared with the overall volume of US health spending.
- 16 Of course, there are multiple factors driving the level of US health spending, such as volume of demand for health services. We return to these factors in section 1.1.
- 17 Squires (2014) observed that in the 1980s, the excess health spending growth (i.e. the degree to which health spending grows faster than the economy) in the United States was much larger than the OECD median. Similarly, White (2007) found that US excess health spending growth between 1985 and 2002 was approximately three times higher than the OECD average (2% and 0.6%, respectively).
- 18 Health spending in the UK as a proportion of GDP in the first half of the 2000s went from slightly below the EU average to above average (OECD n.d.). At the same time, while there were notable improvements in health outcomes in the United Kingdom, these did not translate to a notable improvement in the UK's rank in international league tables. As Vizard and Obolenskaya (2013) concluded, at the end of the 2000s, the 'UK's position on international health league tables relative to other comparator countries remained disappointing'. At a more general level, an OECD (2010) paper on the efficiency of national health systems observed that one third of OECD countries could improve health outcomes as much as they recorded during the past decade through efficiency gains, without the need to increase their health spending. Alongside the USA, UK and other countries, this group included the Slovak Republic, Greece and Luxembourg, all of which between 1997 and 2007 saw an above-average growth in health spending but achieved below-average gains in life expectancy.
- 19 There are some differences between the data used in Bradley et al. (2011) and that drawn upon in the early phases of this work. We used data from the SOCX database and the compiled health statistics from OECD and WHO sources, matching the years of data to those used in Bradley et al. (that is, 1995–2005). However, whereas Bradley et al. built on OECD health category data, combining several categories, we used the health category strictly as reported in the SOCX database. One might ask why we used a different dataset. The main reason is that our initial review of SOCX data highlighted that there is an inherent risk of double-counting some expenditures, which risks biasing the relationship between social expenditure and health outcomes. The double-counting relates primarily to the classification of long-term care (discussed in greater detail in Appendix B). Bradley et al. may have increased the scope for double counting by relying on OECD health category data (as opposed to our use of the health category in SOCX) and also including, among other items, long-term care services (HC.R.6.1). It should be stressed that this is by no means a criticism of Bradley et al.'s approach. Their inclusion of HC.R.6.1 and other spending categories can be understood as a pragmatic choice consistent with the aim to arrive at as precise an indication of health spending as possible. Our analysis using the SOCX health category data inevitably leaves some health spending out (most notably individual out-of-pocket payments), but we opted for this approach to maintain consistency in the scope across all SOCX categories.
- 20 At the time of conducting our analyses, there were 34 OECD member countries. The discrepancy between our report and that of Bradley and Taylor stems from the fact that four countries (Chile, Estonia, Israel and Slovenia) joined the OECD after 2005, that is, at the end of Bradley and Taylor's reference period. Additional observations were gained by including data for all OECD countries until 2011.
- 21 For instance, a piece in *The Economist* (*Poverty rates* 2015) routinely refers to the OECD as 'a club of rich countries'.
- 22 The report by Woolf et al. (2013) excluded Belgium as a peer country because of missing data. We included Belgium, so we used  $n=17$  peers in our analyses.
- 23 We are also aware that the USA is a notable outlier in some aspects, for example, in terms of the ratio of health to social spending. To check whether this strong outlier was driving results, we re-ran the analysis without the USA. But even without the USA, the pattern persisted – lower levels of social expenditure still seemed to be significantly associated with poorer health outcomes.
- 24 This produced 40 models (four outcomes  $\times$  ten lags). Due to their volume, these results are not reported in the Appendix but are available from one of the authors (AS). The reason for this multitude of models was that, to our knowledge, there is not any authoritative consensus on whether and how big a time lag would be appropriate in this type of analysis. As such, our selection was arbitrary.
- 25 The nature of the relationship between social expenditure and health could run from health to expenditure. As a basic assessment of this 'reverse causation', we swapped dependent and independent variables around and looked at lags once again. The result was that the only health measure consistently related to social expenditure was low birth weight. In 9 out of 10 lag mod-

- els, low birth weight was *positively* and *significantly* related to SOCX expenditure. For lags of 1–5 years, some of the other measures were also associated, but not consistently and counter-intuitively, i.e. higher all-cause mortality is associated with lower SOCX expenditure a year or two later. That said, we believe it is likely that the relationship between measures is likely to be reciprocal over time.
- 26 We are grateful to Ellen Nolte for suggesting this approach.
- 27 This is a 'within' model that time de-means the data, with the additional benefit that unobserved factors that do not change over time are accounted for in the model (Tarlton 2009). See Appendix A.
- 28 One methodological limitation should be noted here before we proceed to the findings on this question. By using SOCX categories as the lowest level of analysis (as is discussed in Appendix B, SOCX's disaggregation is one of the generally agreed strong points of the database), we focused on areas of spending rather than on individual programmes. A limitation of this approach is that it would not capture the impact of individual programmes, which may differ substantially within their respective policy areas. For an example of literature on the role of individual programmes, see, for instance, Berkman and O'Donnell (2013).
- 29 As before, we included a logged measure of GDP to account for shifts in the size of country economies over time.
- 30 In 2011, US Old-age spending was 10.5% of GDP. The EU15 average was 10.8%.
- 31 We note, however, that grandparental non-monetary contributions to child care (e.g. donating time) may be primarily compensative for lack of money in poorer socioeconomic groups. We are grateful to Robert Putnam for this insight.
- 32 The advantageous tax treatment is one of the conditions of SOCX data to classify private spending as social. Of course, there are other financial mechanisms that may be used to finance one's retirement that fall outside of this scope – differential tax rates for income and capital gains do not count as a tax advantage in SOCX.
- 33 A 2013 FDIC survey found that 7.7% of US households (nearly 9.7 million households) were 'unbanked', i.e. did not have a bank account at an FDIC-insured institution. A further 20% (24.8 million households) were 'under-banked', i.e. did have an account but used alternative financial services outside of the banking system (Burhouse et al. 2014).
- 34 Examples of such programmes include mandatory sick leave policies or occupational pension schemes. With few exceptions, they do not represent a notable share of OECD countries' social spending.
- 35 It may be of note that Putnam is not the author of the term, but rather a researcher who is probably the most famously associated with the notion of social capital. It is possible to identify pre-Putnam discussions of social capital, perhaps most notably that by Bourdieu, which viewed social capital as individuals' networks and connections (Bourdieu and Wacquant 1992).
- 36 For studies working with the network component of social capital, see, for example, Cattell (2001), Caughy et al. (2003), Rose (2000) and Ziersch et al. (2005).
- 37 For studies working with the norms component of social capital, see, for example, Cattell (2001), Hyyppä and Mäki (2001) and Kawachi et al. (1999).
- 38 For studies working with the trust component of social capital, see, for example, Hendryx et al. (2002), Kennelly et al. (2003), Poortinga (2006) and Veenstra (2000).
- 39 These were: (1) Served on committee for local organisation last year; (2) 'Most people can be trusted'; (3) 'Most people are honest'; (4) voting turnout in presidential election; (5) served as officer of local organisation last year; (6) 510(c)(3) charitable organisations per 1,000 people; (7) attended club meetings: frequency last year; (8) civic and social organisations per 1,000 people; (9) attended public meeting on town or school affairs; (10) organisational membership per capita; (11) 'I spend a lot of time visiting friends'; (12) entertained at home: frequency last year; (13) did volunteer work: frequency last year; and (14) worked on community project: frequency last year.
- 40 According to Halpern (2005), when compared with Putnam's aforementioned composite index, social trust was able to explain 85% of its variance, i.e. was highly correlated ( $r=.92$ ).
- 41 For a comprehensive treatment of the history of the concept, see Halpern (2005).
- 42 Collective socialisation refers to adults in the community contributing to child development, behaviours and health outcomes.
- 43 Informal social control refers to a group's ability to regulate the members' behaviours to align with collectively desired goals.
- 44 Collective efficacy refers to 'willingness to intervene on behalf of the common good' (Sampson et al. 1997, 918); this concept is viewed as a mixture of informal social control and neighbourhood social cohesion.
- 45 An exception is Islam et al. (2006), who examined the relationship between social capital and health in the context of a country's level of egalitarianism.
- 46 Results from factor analyses of measures of social capital show that interpersonal trust loads most strongly and explains most of the variance in the latent concept of social capital (Halpern 2005, 5). We should not forget that statistical methods are poor approximations of reality. It might be, for example, that personal connectedness follows from interpersonal trust, so the overlap in these is captured by trust. Similarly, other research tells us that social ties need not be strong to facilitate advantages (Granovetter 1973). We are also reminded that 'trust is a process', meaning that single measures of trust may fail to capture this complexity (Khodyakov 2007).
- 47 We also considered trust in various public institutions as an indicator of social capital. However, we note that this effort was of an exploratory nature because the use of institutional trust as an indicator of social capital is less anchored in the available research literature on social capital and is further complicated by data availability issues. Pertinent details are reported in Appendix A.

- 48 What is interesting is that adding SOCX to a model with trust already included substantially shrinks the associations between trust and health measures.
- 49 A refinement of Bradford Hill's nine criteria (Schünemann et al. 2011).
- 50 Its value arithmetically expresses the average of all pairs of incomes in a population, divided by two and normalized by the mean income.
- 51 For instance, multiple sets of income distributions can have the same value of Gini, and the Gini index may be subject to measurement bias when not calculated using individual income data, e.g. on the basis of income quintiles (Charles-Coll 2011). The Palma ratio, coined by economists Cobham and Sumner (2013a), is calculated as the ratio of the cumulative income of the highest-earning decile to the cumulative income of the lowest-earning deciles. It is based on work by Cambridge economist Gabriel Palma, who observed that the share of gross national income earned by people in the fifth to ninth deciles (i.e. those in the 40th to 90th income percentiles) was remarkably similar in the vast majority of countries. By contrast, notable variation was observed at the two ends of the income distribution, among the 40% lowest-earning people in their country and the 10% highest-earning people (Palma 2011). The use of the Palma ratio is also in line with recommendations made by Pickett and Wilkinson (2015), who called for the use of measures that are more top- and bottom-sensitive. In addition, while Gini's relatively straightforward character has been lauded as one of the reasons for its popularity, the coefficient may still be less understandable for non-technical audiences than the Palma ratio (Cobham and Sumner 2013b). Despite differences in their definition, Gini and Palma measures are strongly associated with one another ( $r=.996$ ).
- 52 An association that remains at around  $r .57$  (or an  $r^2$  of .29) even if examined using cross-sectional data from a single year (see also Wilkinson and Pickett 2006).
- 53 This is itself surprising because the two inequality measures are correlated at  $r=.996$ .
- 54 The magnitude of difference between the strength of the two relationships is large – the coefficient for Palma is 13 times that for Gini. This could be due to how the measures are constructed. As we described above, the Palma ratio ranges from 0.65 to 3.56 but is quite skewed. Logging does have a strong effect on results – particularly on all-cause mortality, which changes from [b -210; se 118; p.075; to b -481; se 149; p.001].
- 55 The strength of association to life expectancy, low birth weight and all-cause mortality increased for both measures, by 84% in the case of the Palma ratio and life expectancy. For infant mortality, there was a 30% reduction in the strength of association for the Palma ratio, moving this result to non-significance.
- 56 We used the post-estimation margins command in Stata 13 for this.
- 57 While some of the direct effects for inequality measures were not statistically significant, many results for social expenditure were, meaning that interactions are a valid next step (Jaccard and Turrisi 2003). Where main effects were not significant, we present results for completeness (e.g. Gini and low birth weight).
- 58 Again, this proposition is not necessarily surprising given the fact that income inequality negatively affects people in the lowest income groups, who in turn stand to benefit most from improvements in health outcomes. In the US context, the Economic Policy Institute found income inequality to be the biggest contributor to poverty over the three decades preceding the Great Recession (Mishel et al. 2012).
- 59 This phenomenon has been observed, for instance, in southern European countries, leading the literature on the classification of welfare regime types to, at times, include a 'Mediterranean' regime. This type is characterized by the fact that support from family and friends may substitute or make up for a relatively weaker official social security system. See, for instance, Rostila (2007).
- 60 We exclude the District of Columbia and US overseas territories from this analysis.
- 61 Due to very small numbers recorded in smaller geographical units, data on infant mortality were averaged over multiple adjacent time points. This should be borne in mind when interpreting the results of our models, as ideally predictor and outcome years would be perfectly matched.
- 62 Here we discuss variation in health outcomes using life expectancy to illustrate. In addition to variation in health outcomes, variation in access to and utilisation of healthcare also has been well documented. Please see Appendix D for that discussion.
- 63 The Hispanic population is a growing segment of the US population, representing 17.1% in 2013. The estimates for whites remain about the same when the Hispanic population is taken into account, but the estimates for blacks decrease somewhat in all categories when Hispanic origin is taken into account, illustrating that the higher life expectancy of Hispanics inflates the life expectancies estimates for both black males and females. In general, Hispanics have a somewhat higher life expectancy than whites and blacks.
- 64 This is based on a first-differenced model, because there were only two time points of data available for infant death rate.
- 65 Results for infant death rate are not reported in the table because these are from a different model specification (first-difference). We used the FD approach to account for the fact that there were 44 states rather than 50, meaning that talking about 'national' results would be misleading.
- 66 We note that due to its size, which is manifested, among other features, by a dedicated cabinet-level department, the support system for veterans in the United States has few, if any, comparators in other OECD countries. We include the results of the analysis here because the BEA data reported this type of transfer as a separate item.
- 67 Programmes in this category include assistance that is supposed to be drawn in very adverse social situations, such as disaster relief benefits, compensation of victims of crime or compensation of survivors of public safety officers, which would suggest that recipients may represent a disadvantaged group with respect to health outcomes. However, other programmes included in this category may be harder to link through any mechanisms to adverse health outcomes (e.g. federal educational exchange benefits or Bureau of Indian Affairs benefits).



- 68 We are indebted to Robert Putnam for this insight.
- 69 Other research has commented on time lags (see, e.g. Zheng 2012). The issue of time lags in a broader policy context is also discussed in Putnam (2015).
- 70 For instance, in his recent book *Our Kids: The American Dream in Crisis*, Robert Putnam (2015) argues that education alone is unlikely to explain the differences in outcomes across various social groups in the United States. This further supports the focus on the role of wider social policies that has guided this research. Recent research on social mobility from the UK also highlights the possibility of 'opportunity hoarding'. This manifests as a 'glass floor' for more affluent families, providing a cushion from downward social mobility and making it much more likely that low-attaining children from affluent families end up in high-earning jobs (McKnight 2015).
- 71 We are grateful to Richard Neu and Robert Putnam for this research hypothesis.
- 72 In this context, we recall a study by Kumlin and Rothstein (2005), who found that social welfare programmes organized on a universal basis tended to *increase* societal trust, while means-tested programmes tended to *decrease* it. Another example is the work of Karlsson et al. (2013), which examines the effect on mortality rates of maternal vs infant care in Sweden.
- 73 For an example of a cross-national analysis of the operationalisation of individual social protection programmes, see Burkhauser et al. (2014).
- 74 There is extensive evidence on one corollary of decision-making, namely, self-control, highlighting the short- and long-term consequences of low self-control for a range of life outcomes, such as health, education, crime and employment (e.g. Moffitt et al. 2010), but also that self-control is amendable to intervention (see Piquero et al. 2010).
- 75 OECD (n.d.) Social Expenditure Database (SOCX)
- 76 Note that the determining factor here is the entity where the spending originates. Thus, for instance, pensions paid out to former civil servants through autonomous funds are classified as private (Adema et al. 2011).
- 77 The limited scope of SOCX can be seen, for instance, in the difference between the size of US health spending as reported in the SOCX database and in the OECD health database, the latter of which is more comprehensive and records higher values.
- 78 To illustrate, preferential tax treatment of families with children is considered as part of social spending, while preferential tax treatment of married couples is not. Similarly, in the domain of housing, rent subsidies for low-income households are within the scope of SOCX, whereas residential support in the form of mortgage relief is not (Adema et al. 2011). The reason for the exclusion of mortgage relief is lack of clarity and consensus across countries regarding up to what level of income or property value such support should be seen as a social programme.
- 79 According to the SOCX manual, available US data enables clear identification of 'pensions and individual retirement disbursements, which are part of the social domain as defined above, and are therefore included in the private pension expenditure data in SOCX' (Adema et al. 2011, 95).
- 80 In this context we note that the decreased reliability of private social spending data may pose a methodological challenge because of the frequently acknowledged greater importance of philanthropic spending in the United States compared with other OECD countries. However, based on an examination of available cross-national data, we are confident that this does not represent a substantial distortion of our analyses. According to data collected by the Johns Hopkins Center for Civil Society Studies covering 1995–2002, the USA indeed ranks at the top of international tables in terms of charitable giving, with donations amounting to nearly 2% of GDP, followed by Israel (1.34%) and Canada (1.17%). No other OECD country exceeded 1%. For comparison, the total voluntary private social spending in the three countries in 2002 totalled 9.06%, 1.80% and 5.27%, respectively. We acknowledge that these data are proxy measures at best. They capture data on the income of charitable organisations rather than their spending, and it is unclear how much of this falls under the scope of SOCX and how much is captured by SOCX. But these nevertheless demonstrate that the extent of any data error even in the event of near-complete omission by SOCX is unlikely to exceed approximately 1% of GDP (Salamon et al. 2004).
- 81 Tax exclusion of employer contributions for health care, health insurance premiums and long-term care insurance premiums is currently by far the largest tax expenditure in the United States, estimated to total 785 billion USD between 2014 and 2018 (Joint Committee on Taxation 2014). The next three largest US tax expenditures are not included in the SOCX data (reason for exclusion given in brackets): exclusion of pension contributions and earnings (due to lack of comparable cross-national data); reduced rates of tax on dividends and long-term capital gains (not considered social); and mortgage interest deduction on owner-occupied residences (lack of consensus on what level constitutes 'social'). Please note that the actual amount of government revenue foregone as a result of these tax expenditures may differ from the estimations above because individuals may modify their behaviour as a result of changed incentives in the event of the tax expenditures' abolition.
- 82 Of course, the extent of local government's role varies across policy areas. The OECD manual highlights the provision of childhood services where this challenge may be of particular concern (Adema et al. 2011).
- 83 The U.S. Department of Health and Human Services (HHS) manages Healthy People 2020, which provides science-based, 10-year national objectives for improving the health of all Americans. It establishes benchmarks and measures progress over time in achieving those objectives. See <http://www.healthypeople.gov/2020/top-ics-objectives/topic/social-determinants-health> and <http://www.nap.edu/catalog/13088.html>
- 84 The life course perspective is a holistic approach to examining the lives of people over time. Five key concepts that have been frequently applied in life course research on health are trajectories, transitions/events, cultural and contextual influences, timing in lives, and adaptive strategies. A critical component of the life course perspective has been an emphasis on the relationship between individual development and ecological factors, such as social locations, social institutions, social and peer networks, and families (Wethington and Johnson-Askew 2009).
- 85 Social determinants of health refer to those factors apart from medical care that can be influenced by social

- policies and shape health. The term is often used to refer broadly to any nonmedical factors influencing health. The World Health Organization's Commission on the Social Determinants of Health has defined social determinants of health as 'the conditions in which people are born, grow, live, work and age' and 'the fundamental drivers of these conditions' (Braveman and Gottlieb 2014).
- 86 Healthy People 2020 (n.d.b)
- 87 Woolf and Laudan (2013)
- 88 Healthy People 2020 (n.d.c)
- 89 NCHS (2014)
- 90 Centers for Disease Control and Prevention (2013)
- 91 Jaffe and Frieden (2014)
- 92 OECD data. Available from <http://www.oecd.org/statistics> [last accessed 1 December 2015]
- 93 WHO (2012)
- 94 Statistics Canada (2013)
- 95 Karanikolos et al. (2013)
- 96 Based on the social determinants of health literature, we know that such factors as poverty, educational attainment, housing quality, exposure to violence, and a host of other socio-economic factors affect individual health. See, for example, Gehlert et al. (2008).
- 97 OECD (2014)
- 98 OECD Road Transport Research Programme (n.d.)
- 99 OECD data. Available from <http://www.oecd-ilibrary.org/statistics> [last accessed 1 December 2015]
- 100 Operationalising institutional trust via questions about confidence has drawbacks – namely, that we assume that these concepts are either exchangeable or overlap enough to warrant the inclusion of this measure in analyses.
- 101 Note that for all analyses of survey data, we use robust standard errors to account for the additional uncertainty from having a smaller dataset (see Allison 1999).
- 102 We are conscious that the measure of social capital used here is quite different to that used in the international analysis – although we note again research highlighting associations between different measures of social capital (Halpern 2005).
- 103 This operationalisation is similar to that in the paper by Kim et al. (2006), in which bridging and bonding social capital are distinct from trust as an indicator of social capital.
- 104 See, for instance, Kennedy et al. (1998).
- 105 The strongest association was for 'civic', which is  $r = .10$  (the same as the overall scale).
- 106 U.S. Census QuickFacts. <http://quickfacts.census.gov/qfd/states/00000.html> [last accessed 18 Aug 2015].
- 107 Hispanic origin was added to the U.S. standard death certificate in 1989 and was adopted by every state in 1997.
- 108 This measure represents the average number of years that a baby born in a particular year is expected to live if current age-specific mortality trends continue to apply. Calculations for the 5-year life expectancies (1997–2001) were made by Chris Murray and colleagues at the Harvard School of Public Health. Methodology and data source information is described in Murray et al. (2006).
- 109 To do so, they used data on all-cause mortality to analyse trends in mortality and mortality disparities in U.S. counties and grouped counties on the basis of whether their mortality changed favourably or unfavourably relative to the national average. This allowed them to identify those counties with mortality stagnation and increase. Finally, they also examined trends in disease-specific mortality and selected socioeconomic characteristics of counties with below- or above-average mortality performance (Ezzati et al. 2008).
- 110 Of the major categories of disease, cardiovascular disease contributed most to the disparity in mortality from any cause (34.0%), followed by infection (21.1%) and trauma (10.7%). Cancer contributed only 3.4% to the racial disparity in potential life-years lost, even though cancer was the predominant cause of death among white persons (33% of the total life-years lost) and the second most common cause among black persons (25%). Deaths from cardiovascular disease ranked first among black persons (31%) and second among white persons (30%).
- 111 Many of these studies also controlled for other potential confounding factors, such as racial differences in the severity or stage of disease progression; the presence of co-morbid illnesses; where care is received (e.g., public or private hospitals and health systems); and other patient demographic variables, such as age and gender. Some studies that employed more rigorous research designs that followed patients prospectively, using clinical data abstracted from patients' charts, rather than administrative data used for insurance claims.
- 112 These included, for example, preventive care measures for cancer, children's dental care, and flu vaccinations for adults over age 65; hospital admissions for diabetes complications; hospital admissions for asthma; hospital care for pneumonia; hospital care for heart attack; HIV infection deaths; infant mortality; patient safety events; patient-centred care; and access to care.
- 113 Collective socialisation refers to adults in the community contributing to child development, behaviours and health outcomes.
- 114 Informal social control refers to a group's ability to regulate the members' behaviours to align with collectively desired goals.
- 115 Collective efficacy refers to 'the global willingness of residents to intervene on behalf of the common good' (Sampson et al. 1997); this concept is viewed as a mixture of informal social control and neighbourhood social cohesion.

The United States fares poorly on a range of population health outcomes in comparison with other OECD countries, despite spending by far the most per capita on healthcare. This finding has fed an already growing interest in the relationship between health outcomes and wider societal factors. Notably, previous studies observed that social spending and the ratio of social to health spending are associated with better health outcomes in OECD countries. This exploratory study builds on this finding by widening the scope of the analysis, by incorporating other societal factors – namely, social capital and income inequality – and by assessing these relationships not only cross-nationally but also at the state level within the United States.

We found that higher levels of social spending relative to health spending are strongly associated with better health outcomes. We also found that this positive relationship between social spending and health outcomes holds both across countries and within the United States. Further, this positive relationship persisted when the United States (as a potential outlier) was taken out of the analyses. This relationship appears to strengthen with the introduction of time lags that attempt to capture the potential delayed relationship between increased expenditure today and future health outcomes.

We also expanded the analysis to incorporate two wider contextual factors, namely, social capital and income inequality. We found that adding social capital, as measured by trust in others, produces notable, albeit relatively minor, shifts in strength to the relationship between social spending and health outcomes. Our analysis also showed that the association between social spending and health outcomes may differ depending on the level of income inequality in a given country. The association of health outcomes with social spending is stronger in contexts where there is less equality, meaning that social protection may be more important for health outcomes in more unequal societies.