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REPORT

HOW DOES MONEY INFLUENCE HEALTH?

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This report explores the association between income and health throughout the life course and within families.

Improving the income of the poorest members of society is often proposed as a way of improving their health, and hence reducing health inequalities. However, for this policy to be effective, it is important to understand *how* money influences health. Effective policy responses must take all the factors that link income and health into account.

The report identifies key theories that explain how money influences health, including:

- materialist arguments: for example, money buys health-promoting goods and the ability to engage in a social life in ways that enable people to be healthy;
- psychosocial mechanisms: for example, the stress of not having enough money may affect health;
- behavioural factors: people living in disadvantaged circumstances may be more likely to have unhealthy behaviours;
- being in poor health may affect education and employment opportunities in ways that affect subsequent health.

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EXECUTIVE SUMMARY

This report explores the role of 'money' for people's health. Understanding the importance of money for health is crucial as reducing inequalities in health is a key government policy across the UK, and reducing poverty and improving family incomes are often seen as key components of such policies.

Introduction

Evidence about the association between income and health, both at one point in time and over time, can be found in a wide range of disciplines. However, there is much debate about the specific causal pathways that link people's income and health and the two key concepts – income and health – are both defined and measured in a wide range of ways. Given this complexity, a systematic theoretical review has been conducted to develop a better understanding of how income and health are related over the lifecourse.

Methods

This project was based on systematic searches of the literature. Using electronic bibliographic databases from a wide range of medical and social science disciplines, this review identified both highly cited influential papers and very recent literature that was developing new ideas. Terms to identify a wide range of ways that researchers might measure and describe 'money' and 'health' were employed to ensure that all relevant papers were identified. Terms to identify theories were also used, as it was not evidence of the association that was important for this study but discussion of the reasons why the association existed. In addition, the expertise and libraries of the research team were drawn on to identify more wide ranging relevant papers. For those papers identified as very useful for the study, the references were identified and followed to see where ideas had originated, as well as examining what papers referenced them to see how key ideas were subsequently developed. From all these sources 5,795 potentially

relevant papers were examined. With very structured processes, these papers were scanned to see if they would provide useful theories for the review. Information from 272 papers was extracted and summarised, and is employed in the main report.

Background

Evidence of the existence of social inequalities in health in England has been demonstrated for over 150 years. In the earliest of research it is easy to see the causal links from low income, through poor housing and sanitation, inadequate diets and hazardous jobs, to poor health such as infectious diseases, injuries and accidents. Today, however, the relationship between income and health is more complex. For every incremental increase in income, there is an associated higher level of good health. Moreover, it is clear that there are complex chains of exposures and pathways between income and health across the lifecourse. For example employment – as a major source of income in adulthood – will be influenced by education, which in turn is influenced by childhood health and circumstances that will have been influenced by the income and wealth of the parents. This means that the relationship between money and health is inter-generational and bi-directional. For example, parents' income influences children's health and children's health influences their later earning capacity and hence income. Moreover, these pathways are likely to operate differently in different macro social economic and policy contexts.

Drawing on the papers identified, and other reviews in this field, a framework for conceptualising the interrelated pathways between income and health over the lifecourse has been developed. This groups the mechanisms that are thought to causally link income and health into four main pathways.

Theories

Material mechanisms

Money buys people the key necessities they need for health such as shelter, warmth and food. It also allows them to avoid, or ameliorate, potentially harmful 'toxins' for example living in poor neighbourhoods that are noisy or polluted. This implies a basic level of financial resources is required for good health, but evidence suggests that there is a much more graded association: the more money people have the better their health.

The context in which people live will influence the extent to which money may influence health. For example, in well developed welfare systems, the health-damaging effects of sudden income losses resulting from unemployment or family breakdown may be reduced by the availability of welfare benefits. Societies provide many key services, such as education and healthcare, but may vary in the degree and quality of these, which may have implications for population health and health inequalities.

Psychosocial pathways

Psychosocial mechanisms are a result of the way in which people's social environment makes them feel. Two broad paths are believed to link people's financial situation to their health. The first is that living on low income is stressful. At the same time people in disadvantaged situations may have less support to draw on to help them cope with difficult circumstances. The

second path has a relative or comparative dimension; feelings of lower status than others in society, because of less money, make people feel distressed. Increasingly, biological research is providing evidence that shows how such 'feelings' can get 'under the skin' to cause biochemical changes in the body, which when experienced repeatedly, can cause damage to physiological systems and hence lead to poor health.

Behavioural pathways

Many negative health behaviours are more prevalent among socially disadvantaged groups. A number of specific mechanisms have been proposed to explain this. First, some healthy behaviours are expensive, for example a healthy diet has been shown to be more expensive than an unhealthy one, joining a gym or taking part in extra school sporting clubs can be costly. Second, people may use some unhealthy behaviours such as smoking or drinking alcohol as a way of coping with difficult situations. A linked argument is that the difficulties of coping with life on low incomes inclines people to discount the future more heavily, meaning people are less concerned with the long-term health-damaging effects of behaviours that bring them current pleasure or stress relief.

The cultural context of the lives of people with different income levels may differ, for example the degree to which unhealthy behaviours are socially acceptable or the extent to which health-promoting messages to change behaviours are adopted. Understanding this broader context, together with the different mechanisms that lead people on low incomes to engage in unhealthy behaviours, helps to explain why it is difficult to improve health behaviours without addressing these multiple reasons for the behaviour.

Poor health leads to low income

Health selection theory describes how people's health influences their income. The most direct route is that ill health prevents someone from undertaking paid employment, which reduces their income. More long term ill health in childhood may influence educational outcomes which in turn affects employment opportunities and earning potential later in life. There are also more subtle mechanisms. For example a significant literature exists that suggest that people's health, in particular obesity, height and physical appearance, can influence economic outcomes such as employment opportunities or wages. The hypothesised mechanism is that gatekeepers to such opportunities subconsciously associate being slim or tall or attractive with other positive attributes that they value.

Other pathways

Some researchers have argued that the association between income or money and health is actually caused by a third factor affecting both of them. Two key candidates put forward in the literature are intelligence and personality. For example, it has been argued that intelligence may lead to both educational advantage and socioeconomic success as well as more health-promoting behaviour and hence good health.

Drawing theories together

While some researchers promote the dominance of one theoretical approach over the others in terms of the causes of poor health, most commentators argue that health inequalities are the result of a combination of pathways. Some examples in this review illustrate how one mechanism

may directly affect health, for example, low income leads to poor diet that results in health consequences. However, other theories suggest more complex combinations; for example, low income leads to stress leads to depression leads to lack of engagement in exercise leads to poor health. As such the theories should not be seen as competing or mutually exclusive; there is a complex web of causal factors.

Conclusions

Many previous studies of income and health tested relationships associated with a particular theory or attempted to compare the relative merits of 'rival' theories. In contrast, this review emphasises the interdependence of mechanisms. There is no specific pathway or mechanism that dominates the explanation, the pathways link to each other and interact across people's lives in multiple ways that influence health.

This implies that broad-ranging policies are required to address health inequalities. There is, however, a particular emphasis on the importance of parental income for both their children's health during childhood and also the long-term consequences of their future social economic and health circumstances. Further, health improvement policies that rely only on initiatives that target specific risk factors or deliver single interventions are in danger of being insufficiently comprehensive to yield anything more than modest benefits.

1 INTRODUCTION

This report explores the role of 'money' for people's health. Understanding the importance of money for health is crucial, as reducing inequalities in health is a key government policy across the UK, and reducing poverty and improving family incomes are often seen as key components of such policies. However, whether changing people's income is an effective policy lever for improving health and reducing health inequalities depends on whether the association between income and health is causal and on what the causal mechanism(s) might be.

Unfortunately, our understanding of the specific role of financial resources for health within the causal pathways is limited. Money may be a key factor influencing and being influenced by people's circumstances across their lifecourse, from birth through childhood and education, into employment and retirement. For example, employment – as a major source of income in adulthood – will be influenced by education, which in turn is influenced by childhood health and circumstances that will have been influenced by the income and wealth of the parents (Benzeval *et al.*, 2000). This means that the relationship between money and health is intergenerational and bi-directional; for example, parents' income influences children's health and children's health influences their later earning capacity and hence income. Moreover, how these pathways or chains of risk (Kuh and Ben-Shlomo, 1997) differ in different macro social economic and policy contexts is unclear (Easterlin *et al.*, 2010).

Evidence about the association between money and health, both at one point in time and over time, can be found in a wide range of disciplines – epidemiology, public health, sociology, economics, psychology, geography, social policy, politics, history – and the two key concepts – income and health – can be understood, defined and measured in a wide range of ways. Given this complexity, as a first step to gaining a better understanding of the role of financial resources for health, this report presents a theoretical review that describes the pathways between individual and family income

and wealth, and health over the lifecourse. Reviews of theory can aid our attempts to navigate and synthesise such diverse literature by providing a means of summarising and modelling the hypothesised relationships between explanatory factors and health, which include societal and contextual factors that may affect them (Baxter *et al.*, 2010; Tugwell *et al.*, 2010; Anderson *et al.*, 2011; Lorenc *et al.*, 2012). However, in conducting such a review, a number of challenges need to be addressed.

First, we need to decide what counts as 'theory'. Scientific theory is a system of ideas or hypotheses put forward to explain a phenomenon. Theories are testable potential explanations and become substantiated or disproven by the weight of evidence that supports or does not support them (Popper, 2002). In the context of this review, we believe a theory should articulate a mechanism or pathway that explains how income might affect health causally (and vice versa). Given this, our report needs to encompass reviews, think pieces, theoretical contributions and policy documents as well as empirical papers.

The key challenge is identifying theories about the role of financial resources per se from general debates about socioeconomic position (SEP) and health. In the health literature, measures of SEP are often used interchangeably (Benzeval *et al.*, 2001), generally more dependent on the available data or disciplinary perspective than theoretical considerations about their causal mechanism. There is also an income-specific literature, some of which uses income as a marker of SEP and some that attempts to investigate the specific causal role of income for health. In economic and social research, the 'best' measure of the resources available to a family is captured by equivalised household income (Atkinson, 1992). This is also the predominant measure in the income and health literature (Benzeval *et al.*, 2001), although there is also a debate about how best 'money' should be measured in this research (Benzeval *et al.*, 2001; Geyer, 2011). However, in order to understand how money affects health, some parts of the literature examine more specific aspects of income. For example, economists in particular focus on wages (Smith, 1999) since they are often concerned with how health affects people's ability to work and earn income. In addition, there are smaller literatures on the specific role of debt for health (Sweet *et al.*, 2013) and the importance of wealth (Aittomaki *et al.*, 2010). In general in this review we use the term income, as this is the focus of much of the literature. However, we draw attention to specific debates in the literature that highlight the influence of specific sources of income or investigate the role of wealth and debt more directly, we draw attention to these.

In this review, we need to draw on all of these literatures to understand the role of money for health. To achieve this, we have conducted two separate but interlinked reviews. First, drawing on seminal contributions to debates about the socioeconomic determinants of health and health inequalities, we present a broad framework for the key theoretical pathways between SEP/income and health. Second, employing systematic review techniques, we investigate in more depth the specific mechanisms between income and wealth per se and health across a range of disciplines. Where possible we explore the ways in which key concepts and ideas from one field have been taken up and developed in another.

Formal theoretical reviews are relatively new activities without a standard methodological approach. This review builds on techniques developed for an earlier theoretical review, undertaken by two of the current authors, which focused on theories related to health, crime and perceptions of crime (Lorenc *et al.*, 2012). This review in turn drew on the approach of Baxter and colleagues based on the work of the National Institute for Health and

Clinical Excellence (Baxter *et al*., 2010) and three underlying methods: realist synthesis (Pawson, 2002), critical interpretive synthesis (Dixon-Woods *et al*., 2006) and causal mapping (Joffe and Mindell, 2006) literature. Our review methods draw to some extent on this previous work but also incorporate some methods associated with traditional systematic reviews, but all within the constraint of this being a rapid – nine-month – review.

Aims and objectives

Overall, therefore, the aim of this project is to synthesise the available theoretical arguments on the pathways between various measures of income and health. We begin by outlining our methodological approach. Next we describe the broad theoretical frameworks that explain how socioeconomic factors might influence health, and identify a number of key concepts and debates that provide important contexts for the association. Drawing on the more systematic part of our review, we then describe in more depth how these broad theories are put into practice in specific mechanisms and pathways, and illustrate them with evidence from different disciplines. The next section draws the different theories together, and illustrates their interconnectedness with a series of case studies, and finally, we outline how policy might most helpfully be employed to use income as an instrument to improve health.

2 METHODS

The literature review for this project was conducted in two distinct ways. For the broad framework and concept definition, we drew on our existing knowledge and literature libraries, identifying what we believed to be key texts about broad theories of how socioeconomic position may influence health. This approach is therefore embedded in social epidemiology, the field in which we work. However, we then used systematic and other searches of literature to identify how these broad theories are articulated, employed and developed in relation to income and health, and to investigate whether other theories are also employed. Our approach to the more systematic searches is outlined below.

Searching

The search strategy had a number of components, each designed to complement and compensate for limitations of the other components. Iterative searching of relevant literatures was conducted until theory saturation (that is, until no further substantial schools of thought were added by further searching) was achieved within the limited time frame.

The search strategies involved:

- systematic searches of electronic databases;
- searching of private collections within the project group;
- citation tracking of key papers;
- reviewing contents pages of new issues of key journals.

The following searches were conducted between August 2012 and January 2013:

- 'highly cited literature': this was an attempt to identify the most influential theoretical work.
- 'recent literature': this search was restricted to the past decade to find more recent relevant literature, possibly less cited than papers in the above search.
- systematic reviews identified by the Centre for Reviews and Dissemination.

The search terms employed across these different approaches are shown in Box 1.

With regard to the search for 'highly cited literature', we searched Web of Knowledge, comprising Web of Science and Web of Social Science from Thomson Reuters, and SciVerse Scopus from Elsevier. These electronic databases focus on high-impact journals and are designed for citation tracking. The top 2,000 papers, ordered by number of citations, were taken from each database, on the assumption that the most highly cited papers were most likely to have been particularly influential. This search was repeated twice as we refined our search terms. Given the focus on highly cited papers, these searches tended to identify older papers.

The 'recent literature' search was designed to be more specifically focused on identifying emerging theories from different disciplines. It focused on subject-specific databases from the fields of health sciences (such as epidemiology, medical sociology, health economics, health psychology, health geography, clinical sciences, public health and so on), economics, political sciences, geography and sociology: CINAHL, Econlit, Embase, IBSS, Pubmed, RePEc, Socindex and PsychInfo. We limited the search to articles published within the past ten years to identify more recent theories and those that have current application.

The systematic review search focused on the Centre for Reviews and Dissemination's DARE (Database of Abstracts of Reviews of Effects) database (note that literature reviews, including systematic reviews, were also identified from other components of our literature search described above).

Box 1: Search terms

Terms to identify 'money'
Financial difficult*; income support; personal finance; public assistance; social security; disability benefit*; earning*; economic*; income; money; pension*; poverty; salaries; salary; wage*; wealth* expenditure*; spending*; living standards; standards of living.

Terms to identify health
Life expectancy; medical condition*; quality of life; well being; death; disease*; happiness; health*; hospitalisation; illness; lifespan; malaise; morbidity; mortality; QOL; wellbeing.

Terms to identify theory
Theory; pathway; model; mechanism; longitudinal; cohort; lifecourse; review.

Terms used to search DARE
Income; poverty; wealth.

Note: * = wildcard

Inclusion criteria

To identify potentially relevant papers, the following inclusion criteria were applied:

- **Money.** Publications were included if they provided a definition of financial resources. The terminology of significance for this review included income (individual, family or household), earnings, salary, wages, wealth, financial difficulties and poverty.

- **Health.** Literature covering all outcomes relating to health, including wellbeing, happiness and health behaviours, was included. Literature focusing on access to healthcare as a mechanism was included but access to healthcare as an outcome was excluded.

- **Theories.** As a minimum requirement, an included publication had to describe a theory that connected financial resources to health through a specific pathway/mechanism. More complex theories (such as those that involve multiple and multi-staged pathways and outcomes, feedback loops, contextual factors and so on) were included providing they involved the three core components: a measure of money; causal pathway/mechanism; and health outcome. Papers were excluded if they did not present theories containing all three of the core components. Papers were also excluded if the theoretical discussion was judged to be cursory, for example in cases where a hypothesis or existing theory was briefly referred to or implied as part of a general discussion. Excluding 'cursory' theoretical discussions depended on the reviewer's subjective judgements, but we found in practice that such cases were generally easy to identify. If in doubt, we erred on the side of inclusion.

- **Countries.** Theories had to relate to developed countries. Membership of the Organisation for Economic Co-operation and Development was used as a guide to determining a country's 'developed' status.

- **Publication date.** Any date of publication.

- **Publication type.** Any type of publication – the majority of included studies were from academic publications.

- **Language. English language.** This language criterion was essentially pragmatic in that the review search, selection and data extraction process was conducted by English speakers.

The above criteria were applied to the titles and abstracts of the articles identified by the literature searches. Full text was obtained of all articles that met the inclusion criteria. At this stage, the screening of abstracts was inclusive, particularly in relation to the money and the health criteria. In cases where inclusion or exclusion could not be determined from titles and abstracts, full papers were retrieved and checked.

Data management

A 'search diary' was kept, detailing the names of the databases searched, the search terms used and the search results. Similarly, records were kept

regarding the manual searches. The results of each search were exported to an Endnote database, along with details of which database and which search they were imported from. Titles and abstracts were screened and inclusion/exclusion decisions recorded on the Endnote database. To check for consistency in screening, a random sample of abstracts was screened by another reviewer and their decision to include or exclude checked against the main reviewer's decision. Retrieved studies were filed according to inclusion/exclusion decisions.

Theories and concepts were systematically extracted from relevant studies and coded thematically (in a similar way to qualitative analysis), by publication details, theory category and, if relevant, study details, to inform the data analysis. Data were extracted by one reviewer, and a second reviewer independently extracted a sample of studies; results were compared and differences discussed to develop a common consistent approach. The following data was extracted and entered into an Access database.

- Publication details: author; title; journal; date; primary focus; type of paper (for example, theory, review, primary quantitative research, primary qualitative research).
- Theory information: name of theory; financial resource measurement; health outcome(s); mechanism(s)/pathway(s); reference to previous theory; reference to lifecourse; other contextual factors referred to in the theory. Theories were coded according to the broad framework identified in the wider socioeconomic position literature.
- Study details: population; country; textual/diagrammatic summary of theory; theory supported by primary/secondary quantitative/qualitative data.

The extracted literature was first organised by the coding framework created to capture theories describing mechanisms linking financial resources and health. Guided by Baxter and colleagues' (2010) method of developing a conceptual framework, for each of the broad theory topics outlined in Chapter 4 (material, psychosocial, behavioural, influence of health on income, those coded as 'other', and lifecourse) texts were searched for descriptions of specific pathways between financial resources and health. The 'other' category subsequently developed into 'biological processes' and 'personal characteristics'. Lifecourse was a perspective potentially relevant to all theories.

The text was then organised by themes emerging from the data within each theory category, drawing together similar theoretical pathways from differing disciplines, influenced by critical interpretive synthesis methods (Dixon-Woods *et al.*, 2006) and aggregating and interpreting methods (Noblit and Hare, 1988).

Narrative synthesis techniques were used to scope, compare and contrast the key theories that were identified, and focused on:

- the definition of key concepts;
- hypothesised pathways;
- the range of contextual factors included in the model/theory;
- the time sequencing of hypothesised influences and outcomes within the lifecourse.

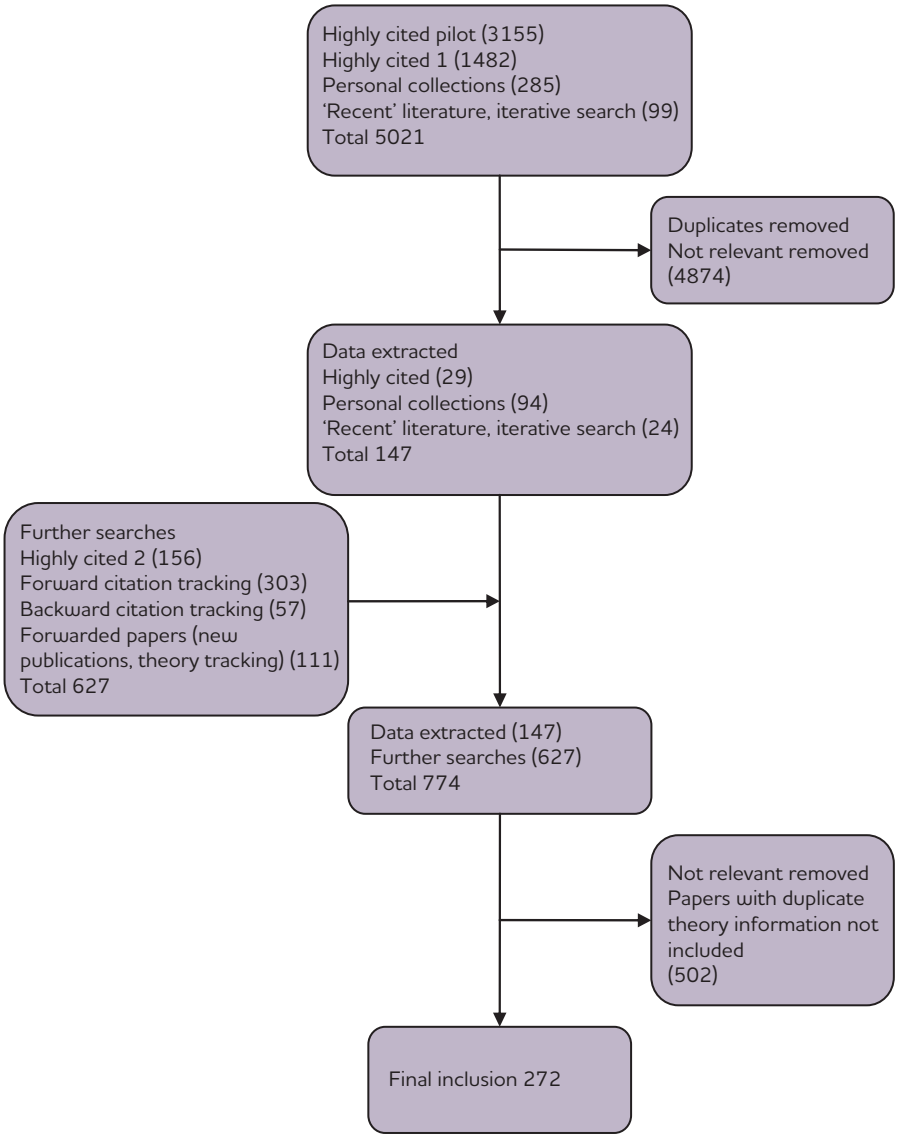
An interpretative (rather than aggregative) summary of findings was undertaken to create a causal map and review the key concepts and relations that were believed to be important.

Search results

Figure 1 shows the number of articles identified by the different methods, and how many of these were included in the study. The first set of searches resulted in 147 papers used for data extraction. Of these selected papers, 19 were theoretical reviews, 6 systematic reviews, 22 literature reviews, and 100 reports of empirical research.

The final stage of literature searching involved citation 'pearl growing', additional searching using key references (Dolan *et al*., 2005). Forward citation tracking was conducted on key papers identified through the systematic searches and the private collections. Additional papers identified from personal collections were collected throughout the review period and included in the review if they provided relevant supplementary information. These papers were the results of new journal articles, backwards citation searching, and following the development of theories emerging in the review.

Figure 1: Flow chart of literature review



3 OVERARCHING THEORETICAL FRAMEWORKS TO EXPLAIN THE SOCIOECONOMIC POSITION–HEALTH ASSOCIATION

To develop an overarching theoretical framework we reviewed key inquiries and think pieces that have shaped the debate about the causes of social inequalities in health. Below we outline the broad framework and some of the key debates that are relevant to theories about the income and health association.

The Black Report

Evidence of the existence of social inequalities in health in England has been demonstrated for over 150 years (Farr, 1860). In the 1840s, evidence showed that people born to gentry lived on average to the age of 35 years in Liverpool, while those born to labourers had an average life expectancy of only 15 years (The Lancet, 1843). These kinds of data gave rise to many of the public health campaigns to improve living standards in the 19th and early 20th centuries. However, social inequalities in health per se became a significant focus of attention with the publication of a government-commissioned inquiry in England, known as the Black Report, in 1980 (DHSS, 1980). The evidence available at the time showed that men in

unskilled occupations in England and Wales (see Figure 2) were 2.5 times more likely to die before reaching 65 years of age than their professional counterparts (OPCS, 1978). In the most recent national data for England and Wales for 2002-6, men in the highest occupation group can expect to live 5.8 years longer than those in the lowest, while the difference for women is 4.2 years (Johnson, 2011). Such inequalities exist across all developed countries (Mackenbach *et al*., 2008; Adler and Stewart, 2010; Brown and Nepal, 2010).

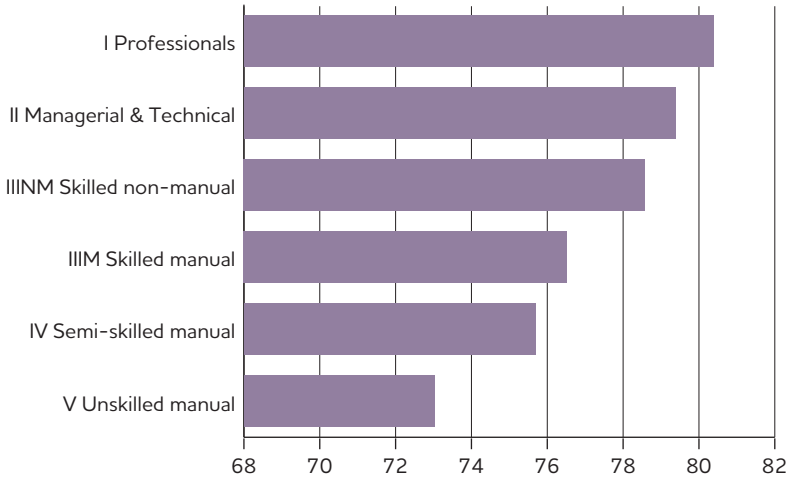
The Black Report provided the first clear theoretical framework for explaining social inequalities in health, and most arguments since then have developed these ideas. It sets out four broad explanations that social inequalities in health are:

- an artefact of measurement error;
- the result of social selection;
- caused by individuals' behaviours;
- the outcome of individuals' social and material circumstances.

Macintyre (1997), in a review of progress since the Black Report, suggests that the Black Report contains two versions of each theory: a hard version – often narrow and uncompromising – and a 'soft' version, which acknowledges the complexity of analysing and understanding social inequalities in health (Macintyre, 1997).

The first theory for health inequalities considered by the Black Report was that health inequalities were an artefact of the way variables were measured. The 'hard' version suggested that this was the entire reason for the observed inequalities, while the 'soft' version acknowledged that the extent of health inequalities was influenced by the way in which the variables were measured. The Black Report considered, and dismissed, the idea that social inequalities in health were the consequence of measurement problems. While there were clearly limitations with the data available to examine inequalities at the time – for example, different sources of data for health and population information – careful examination of evidence suggested that this was a very modest contribution to overall differences (Fox *et al*., 1985). As analyses of social inequalities in health become ever more sophisticated, there continue to be methodological challenges in how we measure variables and inequalities in them (for example, Orpana *et al*., 2007; Vagero; 1997;

Figure 2: Life expectancy for men (2002–6) in England and Wales



Source: Johnson 2011

Scanlon, 2006). Nevertheless, the notion that inequalities in health are a consequence of measurement problems is no longer considered realistic (Bambra, 2011).

The second theory that the Black Report considered and largely dismissed was that of natural/social selection, that is, that inequalities in health are the result of poor health leading to disadvantaged socioeconomic circumstances rather than the opposite way round (the hard version). The 'soft' version suggests that health may contribute to an individual's social position, both directly, for example, becoming ill and losing a job, and indirectly, for example, ill health in childhood leading to poor education and subsequent socioeconomic status. Again the Black Report itself dismissed social selection as the sole explanation for health inequalities. Subsequent research with longitudinal data suggested that although there was some evidence of such health-related social mobility, it was likely to account only for a small proportion of health inequalities (Whitehead, 1992). Part of the reason for the firm dismissal of social selection ideas, by the Black Report and researchers that followed, was the need to pre-empt and rebut attempts to 'explain away' social inequalities both in the immediate response to the report and subsequent political debate (Macintyre, 1997). However, in other research fields such as economics, there is an ongoing and strong research tradition of examining the two-way association between income and health (for example, Smith, 1999), while in social epidemiology the increasing adoption of a lifecourse perspective (Kuh and Ben-Shlomo, 1997) has meant that the notion of health/biological pathways through life affecting subsequent health and socioeconomic circumstances has become a more integral part of debates.

The third theoretical explanation put forward by the Black Report is that social inequalities in health can be explained by people in disadvantaged circumstances being more likely to participate in health-damaging behaviours. The hard version suggested that individual behaviours could explain away health inequalities (Macintyre, 1997), while the softer version acknowledged the role of behaviours embedded in social structures. Much political and policy debate since the Black Report has debated notions of individual responsibility and socially determined behaviours.

Finally, the key explanation for health inequalities supported by the Black Report was that social inequalities in health were the result of the poor material circumstances experienced by those from disadvantaged social classes, for example, poor housing, living in harmful environments and not having the resources to pay for a healthy diet. Income is clearly at the core of this explanation. The softer version of this argument contained in the report was that health inequalities were a consequence of both the material and psychosocial processes consequent on the social and economic status accorded to different social classes (Macintyre, 1997).

Beyond the Black Report

Adler and Stewart (2010) suggest that the Black Report was published in an era, starting in the 19th century, that focused on a poverty threshold – that is, a binary distinction between 'rich' and 'poor' – and not surprisingly the core explanation of the difference in people's health was the material resources they had available to them. But in the decades that followed the publication of the Black Report, attention switched to the continuous gradient in health across the social spectrum. This phenomenon was highlighted most noticeably by analyses of the Whitehall Study – a cohort

of mainly white-collar employees in London – which showed a stepwise gradient in mortality across all employment grades (Marmot *et al.*, 1984). This led to a rejection of the material explanations for health inequalities in favour of psychosocial ones. Within the Whitehall Study these looked as psychosocial aspects of work such as job demand and control, and social support (Marmot, *et al.*, 1997; Stansfeld *et al.*, 1998; Chandola *et al.*, 2006). More broadly, Wilkinson in his seminal work examining national differences in life expectancy (1992) argued that inequalities in health in developed countries were not the result of poor material circumstances – because in the main people had adequate living standards for health – but a consequence of income inequality. His hypothesis suggested that psychosocial stress caused by people's relative position in society was the main driver of health inequalities. Others, however, argued that the association between income inequality and health was the result of neo-materialist factors – in other words, that more unequal societies had poorer and more unequal social and economic structures for promoting health across society (Lynch *et al.*, 2000).

While biological pathways between poverty, material or physical environments and health had been relatively obvious in earlier literature – for example, toxins from exposures to pollution, occupational hazards, damp housing and so on – the mechanisms for psychosocial pathways required investigation. This led to a significant focus in the literature on the potential underlying biological processes that might link social stress with biochemical changes in the body to health and disease (Evans *et al.*, 1994; Brunner, 1997).

At the same time as these arguments between material and psychosocial explanations for health inequalities were playing out, two other theories entered the debate: the importance of area context and the role of lifecourse (Graham, 2000).

Initially, area-level factors were employed in health inequalities research as proxies for individual-level data. Increasingly, however, researchers began to investigate the role that different environmental neighbourhoods might have in creating health inequalities. Factors of potential importance included the physical environment, availability of goods and facilities (Macintyre *et al.*, 2002) and, more recently, linked to debates about mechanisms by which income inequality might affect health, social capital (Kaplan *et al.*, 1996). At the same time as this focus on neighbourhood influences on health was emerging, others were arguing for a multi-level approach to health inequalities, but taking into account much more macro influences at societal and even international level. Dahlgren and Whitehead's (1991) layers of influence 'rainbow' model of the determinants of health captured this notion of multiple levels of influence layered on top of each other starting at the centre with individuals' actions themselves, which are influenced by their family and friends, community and neighbourhoods which in turn are influenced by social and economic structures such as employment and housing and finally national policies on welfare and cultural influences such as the role of women, and international trade agreements (Whitehead, 1995).

The other growing theoretical driver in health inequalities research concerned the role of factors across the lifecourse. Lifecourse influences have long been debated in sociology (for example, Elder, 1974, 1975, 1985) and within health research in very specific debates around the association between in utero development, childhood illness and heart disease in adulthood (Forsdahl, 1977; Barker *et al.*, 1993). However, these ideas – focusing on the role of factors at early stages of life for later – became central to debates about the determinants of health with the publication of 'A

lifecourse approach to chronic disease epidemiology' (Kuh and Ben-Shlomo, 1997). This argued that there were biological and social pathways between childhood and adulthood that accumulated risks for health, behaviours and socioeconomic circumstances, and that these chains of risk developed within layers of contexts and were transmitted between generations (Ben-Shlomo and Kuh, 2002). The lifecourse perspective now underpins virtually all research on the social determinants of health, although it still makes a relatively modest contribution to specific debates about income and health (Benzeval *et al*., 2000). Moreover, while it provides a general framework and lens with which to investigate inequalities in health, it does not illuminate which mechanisms are important.

Given the enduring persistence of health inequalities (Mackenbach, 2012), a number of theories have been put forward to explain this. The earliest of these was the notion that socioeconomic position might be a 'fundamental cause' of poor health (Link and Phelan, 1995). This theory suggests that SEP provides flexible resources – money, power, prestige, knowledge, social connections – that regardless of the context enable those with these resources better access to health than others. It is argued that this helps explain how socioeconomic position is associated with multiple outcomes via multiple mechanisms; and while the specific mechanisms and outcomes vary over time and between places, the association with socioeconomic position remains constant. However, what this theory does not do is shed light on what the specific mechanisms might be (Mackenbach, 2012).

One specific candidate proposed as the 'fundamental cause' of social inequalities in health is IQ (Gottfredson, 2004), while others have broadened this idea to be personal characteristics more generally (Mackenbach, 2010). The theory suggests that people with higher IQ and more favourable personality traits move up the social strata and those with lower IQ or less positive personality traits move down, and that higher IQ and/or other personal characteristics may, among other things, create better socioeconomic opportunities and affect health behaviours in ways that create inequalities in health. However, it is important to note that such arguments are often put in a lifecourse perspective as well, suggesting that IQ and personality are developed during childhood and therefore affected by the social and economic environments in which children grow up (Mackenbach, 2010).

While the basic framework set out by the Black Report remained salient throughout the subsequent 30 years, methods and data to investigate the resulting research questions and the consequent development of our understanding of these ideas has led to the wider theories described above, and a much bigger and more vibrant research community engaged in addressing these issues. Across disciplines, and these broad theoretical ideas of the causes of health inequalities, are a number of cross-cutting themes, which we briefly outline in the remainder of this chapter.

A gradient in health?

A key finding in health inequalities research is that there is a gradient in health across the social spectrum rather than simply a health divide between those poor and not. While those in the best socioeconomic position tend to have the best health and those in the worst circumstances the poorest health, those in between tend to have slightly better health as we progress

up the socioeconomic hierarchy. For example, life expectancy increases as we move each step up a social class scale, as illustrated in Figure 2.

Researchers have even found that small changes in socioeconomic position show differences in health risk. For example, studies have suggested a lower mortality risk for those with higher degrees compared with ordinary degrees (Marmot, 2004). This suggests an underlying continuous gradient in health rather than just a stepwise one between broad groups. Income often displays a continuous gradient with health, although the relationship between income and health at higher incomes may weaken and at some point there may no longer be any health gains from more income. This curvilinear relationship is illustrated in Figure 3. Whether income has a curvilinear or linear (no drop-off in gains at higher incomes – see Figure 3) impact may be important for policy, as, if curvilinear, the health gains of redistributing income could be high without damaging the health of the best off because income matters more for health for those with lower rather than the higher incomes. Evidence is mixed on the shape of the relationship, and, as the UK censuses lack a measure of income, such large-scale evidence in this country is lacking.

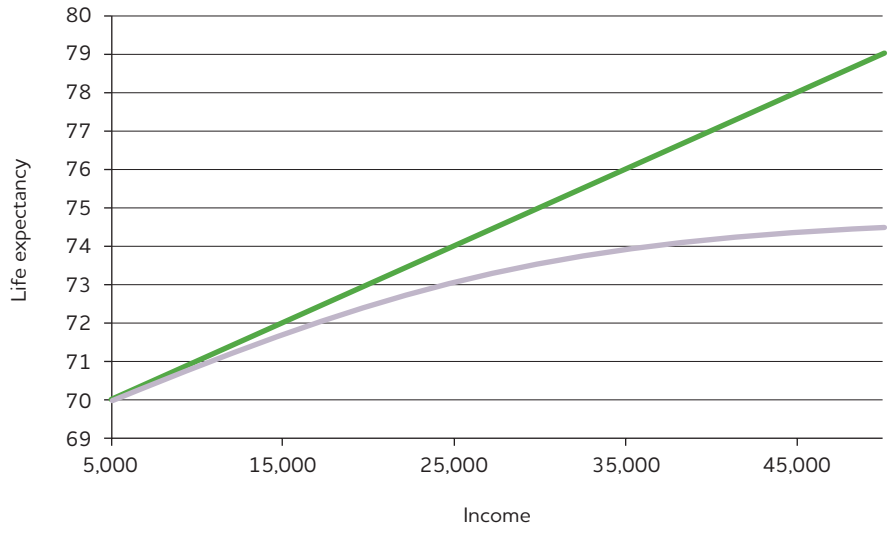
A review of policy documents on health inequalities highlighted that they do not always reflect this health gradient, rather emphasising the health disadvantage of people who are poor or the health gap between the best and worst off. This is argued to be problematic, as ignoring the health gradient tends to focus attention only on the health of people who are poor rather than seeing health inequalities as a population-wide problem that may have its roots in uneven life chances across the social spectrum (Graham, 2004).

Causality

Increasingly, researchers are seeking to establish whether the observed association between income and health is causal. Below we outline some of the general issues raised. It is not meant as a comprehensive discussion, but an overview of the concept of causality in the medical and social sciences.

While income is usually found to be associated with health, whether a higher income causes a decrease in the risk of poor health is a more open

Figure 3: Hypothetical data to illustrate two possible relationships between income and health



question in rich countries where extreme poverty is rare (Kawachi *et al.*, 2010). As income may not be better randomly assigned, any association between income and health may be due to other confounding factors that are related to both income and health. For example, income is associated with education, which itself may be an important correlate of health. Failure to account for differences in education across the income scale may then overstate the income–health relationship. In studies of income and mortality among those of working age, it is notable that accounting for differences in employment (those with low income are less likely to be employed and non-employment is associated with a heightened risk of mortality) weakens considerably the association between income and mortality (Tarkiainen *et al.*, 2013). This is often interpreted as (although it may not in fact be) evidence of health selection, which is discussed below.

As prior health (because, for example, poor health may restrict earning capacity) may also be related to income and present health, it could also be a confounder. This is often described as (direct) health selection in the literature. Strongly related is the concept of reverse causality, which suggests that the direction of causality may be the reverse (health causes income) (Gunasekara *et al.*, 2008). It is possible that causality runs in both directions, so there may be a reciprocal relationship between health and income over the lifecourse (Kawachi *et al.*, 2010). Longitudinal data collected over the lifecourse can be helpful in unpacking the timing of events and the direction of relationship(s), and for understanding the possible interrelationship between income and health across lives (Benzeval and Judge, 2001). As noted earlier, that prior health leads to differences in income receives greater emphasis in economics than in epidemiology, where the income to health relationship is identified as most important.

Can we establish whether having more income would, on average, allow people to improve their health? First, the relevant question may not be whether more income would improve health or not but what is the size (and direction) of any effect of more income on health at a particular time and place. In other words, it is a context- and time-dependent question, as income is not a fixed exposure with one universal effect. Understanding income's effect over the lifecourse may be more complex than changing income levels at one point in time. Additionally, increasing income alone but not improving other aspects of people's lives may not be enough to improve health (Ludbrook and Porter, 2004).

Second, for establishing causality we would ideally want to observe people at the same time with and without the extra income we are hypothesising that will improve their future health. This is the counterfactual at the heart of much causal thinking. Of course this is not possible – a person cannot be in both situations at the same time. Randomised controlled trials (RCTs) through randomisation to the intervention (in this case income) are equivalent as the process of being allocated the intervention is known (the randomisation) and the groups receiving the extra income or not will have similar average characteristics apart from the extra income to a control group, given a sufficiently large sample size (Oakes and Johnson, 2006). However, RCTs are rare and underutilised in broad public health fields such as these for various reasons (Macintyre, 2011; Roberts *et al.*, 2012) but they are possible and could perhaps be used more in policy contexts (see Kawachi *et al.*, 2010 for a couple of income examples). Given this, we are often reliant on observational data (surveys, routine statistics, censuses, and so on) of income and health where people have not been randomised to more income and so the associations are more prone to confounding. There are a number of design and statistical techniques that attempt to overcome confounding,

including using 'naturally' occurring interventions that approximate randomisation of income (an example is lottery wins) or controlling for confounding using various methods (for example, fixed-effect methods on repeated measures of income and health to control for fixed characteristics such as personality that are hard to measure – see Gunasekara, 2012 for an overview). None of these strategies is perfect and concerns may remain that confounding is still possible. As a result, commonly in epidemiology other evidence is employed to give some confidence in the causality of observed relationships. This includes the strength of the association, whether it is consistently observed, whether it is a specific rather than general association, whether the temporal order is clear, whether there is a dose response, whether it is biologically plausible, whether it is coherent with existing evidence and whether it is analogous with existing causal relationships (Hill, 1965).

Absolute or relative?

It is often argued that there is a threshold for material (physical) living conditions (adequate nutrition, warmth and shelter, clean water and sanitation) beyond which such prerequisites are no longer important for health or have diminishing returns. Given that such absolute material deprivation is not experienced by the majority of people in rich developed countries, if follows that material living conditions are unlikely to be a key driver of the health gradient that extends across the whole social spectrum. This suggests a further route through which income could affect health across the gradient. More income allows access to better social living conditions (social participation) that may be good for health and not subject to a threshold (Marmot, 2002). So income could affect health through access to both material and social conditions that are good for health.

Alternatively, income and its consumption may act as markers of status and through comparison with others in society we can feel inferior to those we regard as having higher status. This theory is called relative deprivation – following Runciman (1966) – as people feel deprived because of their relative position compared with that of others. It is argued that such feelings of inferiority due to status may lead to stress and hence poor health (Wilkinson and Pickett, 2007). Thus there are two major theoretical positions about how income affects health: one – relative deprivation – emphasises social comparison and the other – sometimes described as the absolute income theory –says that more income is good for health because it allows access to health-giving material and social living conditions. However, this theory may be incorrectly labelled 'absolute'. The Black Report's favoured explanation for social class differences in health was that the uneven distribution of income between social classes meant that those in lower-class groups were most likely to be deprived of contemporary material (physical) and social living standards. In essence, this is 'absolute income' theory, although the poor material and social circumstances related to low income are also described as 'relative deprivation' in the Black Report (DHSS, 1980). This is unsurprising, as Peter Townsend was a member of the report's committee and was a proponent of the argument that poverty and deprivation were always relative to the societal norms, rejecting the notion of absolute poverty or deprivation (Townsend, 1979, 1987). So although often portrayed as absolute versus relative theories, both may be relative to the context in which people live, the difference between them being that relative deprivation was used by '... Runciman to denote feelings of deprivation

relative to others and not conditions of deprivation relative to others' (Townsend, 1979), pp. 47-48, emphasis in original). The idea that income's influence (whether through status or relative living conditions) is relative to the situation of others is well recognised in the income–health literature, with different formulations of income comparison used to attempt to tease out the specific pathways to health (Kawachi *et al.*, 2010). The theory of absolute income is still postulated but to represent the impact of an income increase on an individual's health regardless of the situation of others in their society (Kawachi *et al.*, 2010). Finally, a very similar debate around the relative impact of 'absolute' and relative (comparative) income on happiness (utility) occurs in economics (see Clark *et al.*, 2008 for a review).

Context

As discussed in the previous section, relative deprivation/income theories incorporate the idea that the effect of income should be understood relative to the context in which the person resides – what level of income is needed for societal participation. In health inequalities there is a related literature on context, described briefly below.

Whether the temporal and spatial context (international, national or local) people live in shapes average health and the degree of health inequality has been a growing area of study in the health inequality literature (Macintyre *et al.*, 1993, 2002). For example, the influence of local neighbourhoods on health has received particular attention in recent decades (Riva *et al.*, 2007). Often the concern has been to separate the impact of context from that of composition (arising from the characteristics of individuals) but their interconnectedness is increasingly studied in that context shapes people's situation and (groups of) people to varying degrees may be able to shape their context (Oakes, 2009). This is mirrored by concerns with structure, agency and their interplay (Frohlich and Potvin, 2010). Clearly we cannot do justice to this area of research in the limited space available, but we do reflect briefly on work relating to two major theoretical strands in population/health inequalities literature.

There has long been an interest in the type of national economic, social and health policies that maximise population health – how the context we live in influences incomes, living conditions and their distribution and thus potentially population health and health inequalities. For example, there has been a long-running debate about the relative roles of economic growth, public health and medicine in the rise of life expectancy since the industrial revolution (Grundy, 2005). The debate about the relationship between economic growth and life expectancy has continued to be contentious in more modern times (Mackenbach, 2007). Perhaps most famously, the 'Preston curve' shows that the association between the gross domestic product (GDP) of countries and their life expectancy is curvilinear so that more GDP is more strongly associated with greater life expectancy in poorer compared with rich countries where gains in GDP are more weakly – if at all in the very richest – associated with greater life expectancy (Cutler *et al.*, 2007; Preston, 2007).

Tangentially, research suggests that economic recession may have mixed impacts on health in the short term by reducing deaths (in road traffic accidents, for example) associated with more intense economic activity but leading to increased mortality in other areas (for example, suicides associated with unemployment). Furthermore, there may be an inequalities impact

because recessions may impact lower socioeconomic groups most (Suhrcke and Stuckler, 2012).

Given the findings that economic growth alone may not be sufficient for the highest levels of national health, researchers have also become interested in how the national distribution of income (income inequality) within these rich societies is associated with population health – more income inequality being associated with poorer population health (Wilkinson and Pickett, 2006), as outlined in the previous section. Again, this is a contentious area, both in terms of the strength of the association and its meaning. Focusing on the latter debate, for some the inverse association of income inequality with health and the lack of association of GDP with health implies that the level of inequality itself (reflecting the extent of status hierarchies within societies) is what is most damaging to health (Wilkinson and Pickett, 2006). It is argued that more equality may have benefits for the health of all socioeconomic groups in society and thus reduce absolute health inequalities by reducing social comparisons of status and status competition, and increasing overall social cohesion (Wilkinson and Pickett, 2010).

For others, the income inequality–health association reflects the degree of variation across socioeconomic groups in healthy living conditions within societies resulting from the level of government investment in health influencing public services and infrastructure (Lynch *et al.*, 2000). These debates about the reasons for the association between national income inequality and health have contributed to theorising and research about the relative importance of 'absolute' and 'relative' living conditions for overall health and health inequalities outlined in the previous section.

Further, such concern with why the distribution of healthy infrastructure, living conditions and life chances varies across socioeconomic groups in rich countries has led to a growing interest in whether and how variations in political and policy contexts are important for differences in health and health inequalities in these countries (Beckfield and Krieger, 2009). It is theorised that policy – and thus the political process involved – will shape a country's institutions, infrastructure and its distribution of resources across the socioeconomic spectrum and so policy and political variation could be potentially important for differences in population health and health inequalities. Perhaps the most prominent statement reflecting this position in recent times was made by the World Health Organization's Commission on the Social Determinants of Health, which argued:

> The poor health of poor people, the social gradient in health within countries, and the substantial health inequities between countries are caused by the unequal distribution of power, income, goods, and services, globally and nationally, the consequent unfairness in the immediate, visible circumstances of people's lives – their access to health care and education, their conditions of work and leisure, their homes, communities, towns, or cities –and their chances of leading a flourishing life. The unequal distribution of health-damaging experiences is not in any sense a natural phenomenon but is the result of a combination of poor social policies and programmes, unfair economic arrangements, and bad politics.
> – Marmot *et al.*, 2008, p. 1661

Specific examples of this policy focus from recent research include investigating whether population health is better in rich countries governed by more equity-focused political parties that may deliver a more equal

distribution of resources and life chances (Navarro *et al*., 2006), whether countries with welfare states that (over time or between countries) do more to 'dampen' the importance of the market for welfare deliver smaller health inequalities (Beckfield and Krieger, 2009) and whether countries that have undertaken the most market-orientated economic and social policy reforms in recent decades ('neoliberalism') have seen the magnitude of health inequalities increase compared with those that have undertaken less reform (Beckfield and Krieger, 2009). This is a relative young and complex field because, for example, there may be a significant lag in health outcomes (such as mortality) occurring in relation to the relevant policy exposure. Also, policies will operate across the lifecourse to influence later life social conditions and health, emphasising the potential importance of a lifecourse approach (Beckfield and Krieger, 2009). Finally, some argue that rather than studying the overall welfare or political context and history of groups of similar countries and their different impacts on health and health inequalities, it may be more fruitful to study specific social policies and their impact on health and health inequalities as the theoretical causal pathway may be more obvious. For example, Lundberg and colleagues explored the impact of between-country differences in the generosity of the basic pension and the effect on old age mortality differences (Lundberg *et al*., 2008).

Lifecourse

Often studies exploring the impact of income on health do so using a single measure of income taken in adulthood following people to disease incidence or not. Such a snapshot approach is problematic if it is then taken to represent the income and health relationship because it ignores income and health acting across a person's life (their lifecourse). For example, parental income may be important for both socioeconomic and health development from utero through childhood into adulthood with knock-on effects for later-life income and health. Increasingly, researchers are adopting lifecourse approaches to study the (inter)relationship between socioeconomic position (including income) and health across people's lives.

Within the health literature there are a number of lifecourse models. The critical period model suggests that risk-factor exposure at a critical development point in the lifecourse may have impacts for future health. For example, under-nutrition in later pregnancy may increase heart disease mortality risk in later life (Barker *et al*., 2002). The pathway lifecourse model argues that adverse circumstances in an individual's early life influence social and biological trajectories throughout life. For example, childhood disadvantage may lead to ill health and poor development, all of which may restrict educational opportunities in particular, which influences earning potential and social and health behaviours in adult life (Graham, 2002), which in turn will increase the risk of chronic disease in adulthood (Kuh *et al*., 2004). A third lifecourse theory – the accumulation model – suggests that continued exposure to a risk factor across life (low income or socioeconomic position) may have accumulative effect on poor health risk (Davey Smith *et al*., 1997). A variation of the accumulation model is one 'with correlated insults'. These correlated traumas can either be 'risk clustering' (where a group of adverse circumstances that are linked occur at same time, for example low birth weight, poor diet, passive smoking, worse education), or 'chain of risks' with additive or trigger effects (where one exposure leads to another, for example, unemployment, financial insecurity, marital conflict, separation, divorce) (Ben-Shlomo and Kuh, 2002).

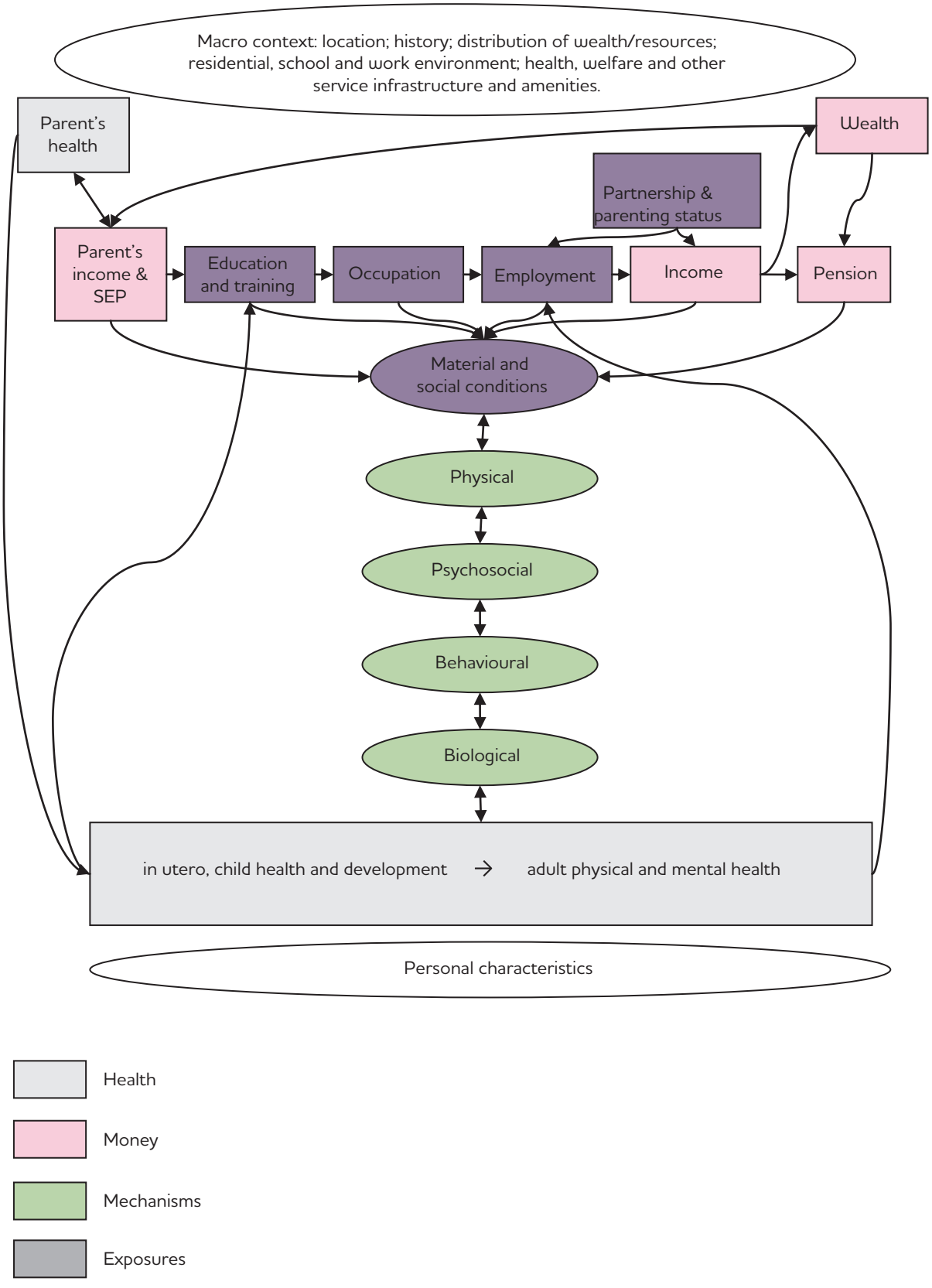
Of course, similar lifecourse ideas and models are common in other disciplines. For example, intergenerational social reproduction and mobility are much studied in economics (for example, income mobility – see Blanden *et al*., 2007). Linking such social science research to the lifecourse of health has much potential to enhance understanding, for example the degree to which social mobility may reduce or increase inequalities in health (Boyle *et al*., 2009). Finally, social mobility highlights the intergenerational nature of the lifecourse. For example, a recent study has explored the role of parental transfer of income to adult children for health (Scodellaro *et al*., 2012).

4 SPECIFIC THEORIES FROM INCOME AND HEALTH LITERATURE

To guide our review of specific theories we undertook a review of all conceptual frameworks included in selected papers, and combined these with the core theories from broader literatures on social inequalities in health described in Chapter 3. We have summarised these key ideas into an overarching framework, shown in Figure 4. This framework is used to guide our discussion below, and is a high-level summary of the broad theoretical mechanisms identified in the literature.

The first point to note is that income is only one of a number of socioeconomic characteristics in the model; these are important determinants of income, but they also have direct health effects themselves. Moreover, they will have been shaped by parental income in the previous generation. People's incomes will also have been influenced by intergenerational inheritance of wealth, and wealth is likely to become more pertinent as people move into retirement. These socioeconomic factors create the material and social conditions of people's lives, which through physical, psychosocial and behavioural pathways can affect people's health. To do this they need to create biological changes in the body that cause ill health. The model shows not only the pathways from income to health but also those from health to income. It is important to note that the mechanisms are likely to interact. For example, what might seem a material factor – damp housing – may have a physical impact on health (for example mould spores leading to asthma in children) and at the same time lead to depression among parents (Platt *et al.*, 1989). People suffering from depression may self-medicate with alcohol (Laitinen *et al.*, 2002) or restrict their children's activities (McLoyd, 1990).

Figure 4: Pathways between income and health



We start below by describing theories from the income and health literature as they relate to each of the main pathways in turn. Within each of these broad theories we identify the core sub-pathways, which are highlighted in the text by a causal pathway from income → mechanism → health. We then consider the role of health for income, and finally, examine the significance given to personal characteristics. In each of these sections we illustrate the core pathway with a case study, but use it to illustrate how a number of different pathways may result from a particular mediator between income and health.

It is beyond the scope of this review to look at the paths that do not directly involve health, for example from education to employment to income or between income and pensions and wealth.

Material

The Black Report's favoured explanation – what it called materialist or structural – for inequalities in health across social class groups was the uneven distribution of economic and other resources resulting from the economic structure (DHSS, 1980). This materialist theory is often associated solely in the literature with the health impacts of material (tangible) living conditions deriving from differences in monetary resources across socioeconomic groups (Macintyre, 1997). However, this is a conflation of terms (materialist versus material) (Macintyre, 1997; Kroenke, 2008) as the Black Report emphasises that social class may affect health in multifaceted ways that may include other mechanisms beyond differences in material living conditions (DHSS, 1980; Macintyre, 1997). So in this section we focus on theories relating to material living conditions (related to differences in income) and health rather than political economy theories of why the economic structure may cause an uneven patterning of income and living conditions (recognising the possible importance of material conditions) by social class and thus cause health inequalities.

Income → living conditions → health

That income allows people to buy the basic material necessities for health (these are often stated to include shelter, adequate nutrition and sanitation) is one perspective in the literature (Marmot, 2002) and this is sometimes taken to imply that there is a threshold (for example when there is clean water for all) beyond which more income does not improve material conditions for health. The critique of this position is that the impact of material conditions should always be understood in terms relative to prevailing needs rather than to some absolute need (DHSS, 1980).

Although not implying a threshold for health, researchers have attempted to calculate a minimum income needed for healthy living covering both material and social conditions of living and found it to be above benefit/minimum wage levels in place at the time (Morris *et al.*, 2000, 2007). The minimum income was based on requirements for good nutrition, meeting exercise and recreation recommendations, healthy housing (see Box 2), other living costs (clothing, for example, to meet physical and psychosocial needs) and social integration and support.

A minimum income for healthy living was recommended in the Marmot review – a recent overview of health inequalities in the UK – and followed previous reports arguing for rises in benefit levels to meet minimum health needs (Black *et al.*, 1999). However, it is argued that this may not tackle

Box 2: Case study: income → housing → health

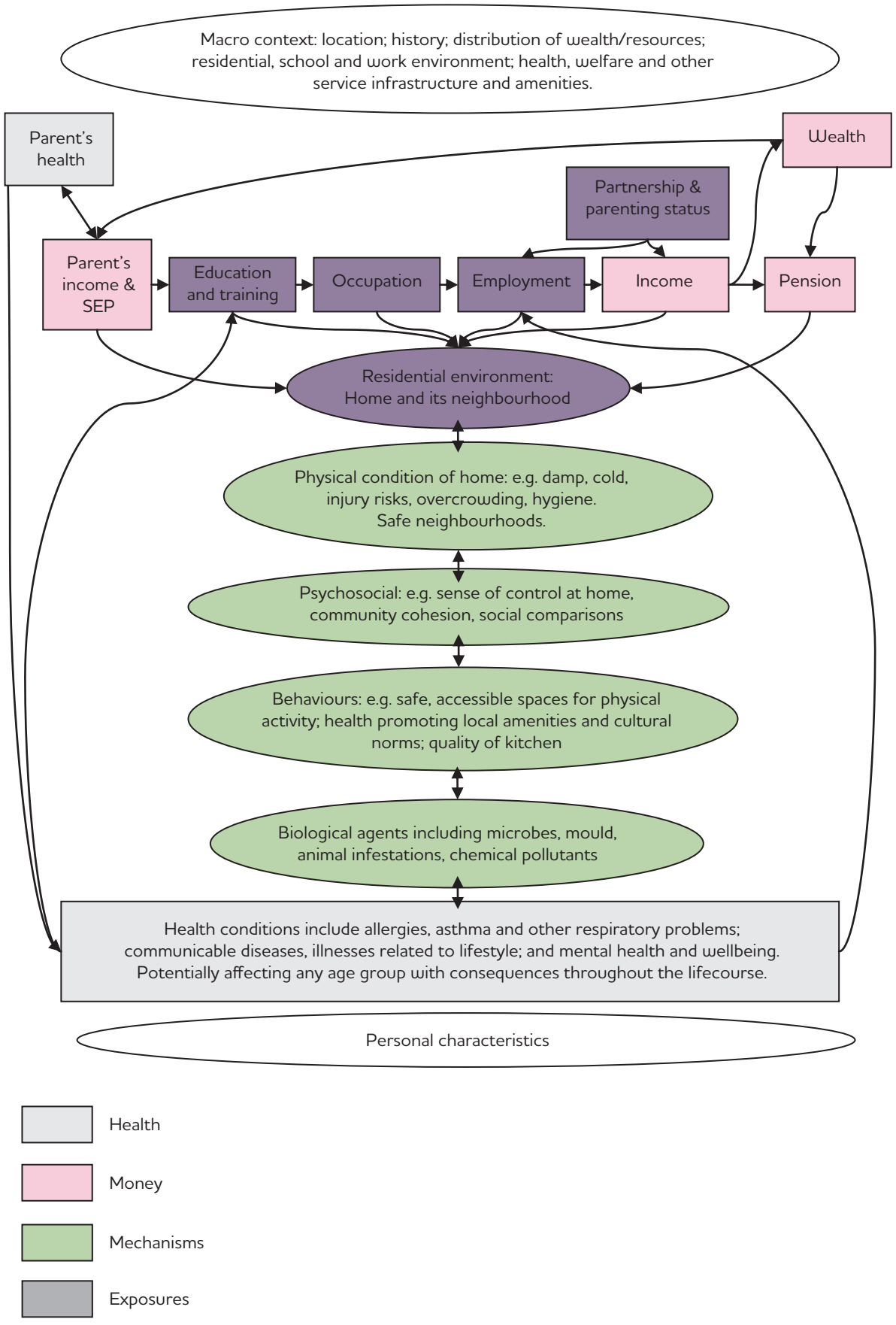
Housing conditions can affect health (Marsh *et al.*, 1999; Thomson *et al.*, 2013). There is longitudinal evidence to support the hypotheses that growing up in poor-quality housing increases the risk of disability or severe ill health, and that a history of poor housing during childhood continues to be a risk factor among adults who have subsequently moved to better-quality housing (Marsh *et al.*, 2000). Housing may be considered to be 'material' in the sense that homes are physical environments and financial assets (or burdens), but theories that might explain associations between housing characteristics, income and health can extend beyond purely material pathways (Marsh *et al.*, 1999; Fullilove and Fullilove, 2000; Clark *et al.*, 2007; Gregg *et al.*, 2007; WHO Commission on Social Determinants of Health, 2008; Quinn *et al.*, 2010). Figure 5 outlines the potential causal pathways between income, housing and health.

Theories about the social patterning of housing conditions tend to assume a positive association between the price and quality of dwellings; that is, people with higher incomes are more likely to afford better-quality homes, while people on lower incomes are more likely to reside in poorer- quality homes (Anderson *et al.*, 2003; Braubach and Fairburn, 2010; Quinn *et al.*, 2010). This apparently simple relationship is likely to be complicated by house prices being subject to a range of market influences rather than simply tied to 'quality' (however defined) (Sheppard, 1999; Gibbons and Machin, 2008). Welfare measures may also provide some low-income households with access to better housing, while house-buying potential is likely to be influenced by savings/wealth, as well as income (Aittomaki *et al.*, 2010).

Characteristics of 'poor-quality' homes can include poor structural integrity, ventilation and temperature regulation, and the presence of condensation or damp, which in turn may lead to health risks from biological agents, including microbes, mould and animal infestations, and from chemical pollutants (McNicholas *et al.*, 2000; Jacobs *et al.*, 2010; Thomson *et al.*, 2013). Health conditions such as allergies, asthma and other respiratory problems, and communicable diseases have been linked with such problems (Thomson *et al.*, 2013). Poorly constructed, equipped and/or furnished homes may also be associated with greater rates of injury, including fire-related injuries (Marsh *et al.*, 1999; Raw *et al.*, 2001). Such pathways from income through housing to health are materialistic, in that income is assumed to be a determinant of people's exposure to environments that are capable of directly affecting their health for better or for worse. Higher incomes also provide a resource for coping with ill health by enabling people to adapt their home environments in ways that may slow or even reverse the progression of health problems (Herd *et al.*, 2007).

Income may also influence the degree to which a household's subjective housing needs can be met. For instance, large households are likely to need a bigger, and potentially more expensive, house than smaller households to avoid overcrowding, which may affect health, stress and behavioural pathways. A lack of space may reduce feelings of privacy and control, placing a strain on household relationships and increasing the risk of health problems related to stress, including mental health and wellbeing (Marsh *et al.*, 1999; Gibson *et al.*, 2011). Adverse outcomes from a deficient home psychosocial environment may also be linked to

Figure 5: Pathways between income and health via housing



stress during pregnancy (Kramer *et al.*, 2000) and to children's socio-emotional development, which may continue to have an impact at subsequent points of the lifecourse (National Health Strategy, 1992; Evans and English, 2002). Residents' behaviours may also be negatively influenced by a lack of useable outdoor space (for example, a garden) as a barrier to physical exercise, or a lack of internal space making it more difficult to work (including homework for school children), cook (in the case of small kitchens) or socialise at home (Marsh *et al.*, 1999; Thomson *et al.*, 2013).

Income can also widen residents' housing choices in terms of location, which in turn can affect exposure to a range of health determinants relevant to neo-materialist theories (Lynch and Kaplan, 1997; Lynch, 2000; Lynch *et al.*, 2000a; Dunn *et al.*, 2006), including access to amenities, health services, employment and school catchment area (Gibbons and Machin, 2008). Location also influences exposure to psychosocial environments related to community cohesion, social capital and networks (Berkman and Glass, 2000). The relative positioning hypothesis suggests that further psychosocial benefits or disbenefits accrue when residents compare their own residential environment (home and neighbourhood) with that of others to gain a sense of their relative social status (Kearns *et al.*, 2013).

An alternative set of pathways emphasises the potential for homes to affect people's financial situation. For example, home-owners may invest in their property as a means of generating additional wealth, but also risk financial loss depending on how the housing market performs (Searle *et al.*, 2009). People who rent social housing and residents who rely on welfare benefits to meet housing costs may experience income shocks due to changes in eligibility caused either by changing welfare policies or a change in personal circumstances. This in turn may lead to housing affordability stress or even, at its most extreme, loss of home (Taylor *et al.*, 2007; Bentley *et al.*, 2012).

Health selection is also a plausible hypothesis in that poor health can have a negative impact on people's ability to meet housing costs, and in some cases can directly influence housing choices. Presumed associations between housing quality and health may also be confounded by alternative pathways that link residents' low income to poor health (Dalstra *et al.*, 2006; Rehkopf *et al.*, 2010).

While all these theories have face-validity, the extent to which they have been tested varies. This makes it difficult to assess their relative merits as starting points for intervention planning. However, the best available evidence to date suggests that targeted housing improvement, particularly the provision of more affordable heating, and financial assistance to help people relocate to improved residential settings, can benefit health (Jacobs *et al.*, 2010; Ludwig *et al.*, 2012; Thomson *et al.*, 2013).

health differences across the entire social gradient, as many groups already have higher income levels (Marmot, 2010).

Broadly, a non-exhaustive summary of potentially health-damaging material living conditions mentioned in the literature could be split into neighbourhood, employment and household conditions. For example, people

living in the most income-deprived neighbourhoods may be most exposed to air pollution (Evans and Kantrowitz, 2002; Finkelstein *et al.*, 2003). Low-income neighbourhoods may have poorer access to recreation venues or parks, and greater numbers of fast-food outlets (Adler and Stewart, 2010), (Harper *et al.*, 2011). The risk of being injured or killed in road traffic accidents may be much larger in low-income neighbourhoods (Steinbach *et al.*, 2011).

Low-paying work often is found to be associated with reduced working conditions, including greater chance of injury related to manual labour or repetitive strain, and increased contact with toxins and fumes (Lundberg, 1991). There is a tendency for low-paid employment to involve higher risk of physical injury and low levels of job control (including influence over planning work, when to take breaks, learning new things and varied work) (Hemstrom, 2005). There is evidence of a graded relationship so that exposure to poorer work environments decreases higher up the socioeconomic scale (Clougherty *et al.*, 2010). Additionally, the risk of unemployment and repeat unemployment are higher for lower social class groups and these events may accumulate to increase the risk of poor health (Bartley and Plewis, 2002). Further, lifetime earnings may be poorer in lower social class groups (Goldthorpe, 2004), so that people arrive at retirement age with very different levels of wealth, labour market histories and health, with possible consequences for later life health (Banks, 2006).

Low income affects household conditions include housing (see Box 2), and the quantity and quality of diet affordable. The concept of food insecurity covers both inadequacy in terms of quantity of food and inadequacy of quality. So, for example, food-insecure households could see adult sometimes go without while children may have sufficient quantity but poor-quality diets (Pilgrim *et al.*, 2012). Diet quality shows a graded socioeconomic relationship that may be due, in part, to affordability (Darmon and Drewnowski, 2008). For example, energy-rich but nutritionally deficient foods tend to be more affordable, hence increasing the risk of high-energy but poor-quality diets with lower income (Darmon and Drewnowski, 2008). So it is possible that both under-nutrition and obesity may be associated with low income in rich countries (Armstrong *et al.*, 2003). Low income may also have a negative impact on diet in pregnancy, increasing the risk of low birth weight, for example (Haggarty *et al.*, 2009).

The literature does go beyond the idea of a threshold, and suggests the possibility that there is a graded impact of income on living conditions so that those with progressively more income or wealth are able to access (intentionally or not for health reasons) living conditions that are less detrimental or more protective for health (Aittomaki *et al.*, 2010).

Income → resources for coping with ill health

Literature from the United States more often mentions healthcare as a key mediator between income and health. This highlights that it may be problematic to consider living conditions independent of the societal context in which people live and the resources the state may provide, in the US's case the lack of universal healthcare. For example, an early US paper exploring the reasons for inequalities in preventative healthcare by income put forward three explanations: that it was because those on low income could not afford it; that they value their health less as a result of their poverty and so are less inclined to make use of preventive services; or because of 'system barriers' that mean that accessible and quality healthcare is less available than for the rich (Rundall and Wheeler, 1979).

There is also a continuing concern within universal healthcare systems of the possibility of an inverse care law (Hart, 1971), that there is still inequality of access, provision and outcomes by socioeconomic group for those with the same level of need – the best off possibly benefiting more (Dixon *et al.*, 2007; Hanratty *et al.*, 2007). Research suggests that the most consistent evidence of inequity is found for referral to, and treatment by, specialist healthcare, which people access via their GP (Dixon *et al.*, 2007).

Further, it has been proposed that access to healthcare can be reduced for some people with lower socioeconomic position due to factors such as 'travel time, transportation availability and cost, scheduling flexibility, and sense of self-efficacy and control' (Adler and Stewart 2010 , p. 12). Greater access to money can enable individuals to purchase expensive medications to manage chronic illness or prevent the onset of additional chronic conditions, and give more opportunity to modify or adapt residential and work environments (for example, retiring from unhealthy work, moving to a more healthful or supportive residential environment) (Herd *et al.*, 2007).

A further example from the child development literature suggests that higher income may provide a buffer against the negative effects of maternal depression on child outcomes (for example, ability to pay for childcare), although this was not supported in the study (Petterson and Albers, 2001).

Neo-material theory – arising out of the debate about the reasons for the connection between national-level income inequality and health – highlights that historical and contemporary government policies and cultural practices may affect the material and social living conditions of people across the lifecourse and thus their health (Lynch *et al.*, 2000b). It should be recognised that neo-materialist and neo-material are used interchangeably in the literature, but, as argued elsewhere, this may be a similar conflation (Kroenke, 2008) as with materialist and material, and here we focus on the neo-material aspects rather than political economy explanations inherent in neo-materialist theory.

Neo-material theory emphasises that policy may influence not only the level of individual personal resources – in part by redistribution through the tax and benefit system as already discussed – but also living conditions through funding of services (including healthcare and education) and through regulation (e.g. limiting risky occupational exposures) (Lynch *et al.*, 2000b). Related concepts used in the health literature include the social wage – the improvement of living conditions through central rather than individual funding of services and infrastructure (Popay *et al.*, 2008) and decommodification – the degree to which the (welfare) state through, for example, benefits and services, makes living conditions less reliant on labour market performance (Eikemo and Bambra, 2008).

For example, welfare systems to varying degrees aim to smooth the living-standard impact of income shocks like job loss, for example through contributory and non-contributory benefits (Bambra and Eikemo, 2009). Benefits for people who are unemployed tend to vary by welfare state type in terms of the level of benefit, conditions attached and duration of payments, with Nordic welfare states (Sweden, for example) tending to be more generous than other European countries (Bambra and Eikemo, 2009).

There was a particular focus in the literature reviewed on parental material living conditions for children's development (including physical, psychological, cognitive, health and socioeconomic development). Heckman provides an economic overview and argues that parental investments are vital but that parents are often financially constrained because they are unable to borrow to specifically invest in their children (Heckman, 2007, 2008). He argues that sustained investment, particularly early in childhood,

is a key factor in human capital development. Of course, much of the literature is not solely about income but also about parenting, but there is a clear argument in the literature that more income helps parents invest in their children. For example, Evans and English (2002) argue that the physical environment (noise, overcrowding and housing quality) is often overlooked in the literature linking poverty and socio-emotional development. Further, the financial capital model states that lack of material resources in impoverished families leads to poor child outcomes. This is criticised for being too vague, as the model fails to define the material resources involved (Guo and Harris, 2000). However, methods to improve cognitive stimulation, and therefore child wellbeing, include material resources such as educational toys and books (Guo and Harris, 2000). Similarly, the financial capability model (similar to human capital accumulation theory (Gregg *et al.*, 2007)) proposes that parental level of material resources will affect children's educational achievement through the ability to purchase materials, experiences and services that benefit child development (Gregg *et al.*, 2007). It could also include the ability of parents to afford to live in catchment areas of higher-rated schools, given the house price rise associated with the latter (Machin, 2011). Such theory emphasises that material resources may be important for maximising returns even when services (such as education or health care) are universal.

An important critique identified in the literature is the tendency to underplay possible psychosocial or behavioural responses to adverse material conditions in the '(neo)-material literature', perhaps because this would imply interventions aimed at changing behaviours or stress responses rather than the material conditions hypothesised to be the root cause (Kroenke, 2008). Further, the perhaps artificial separation of material and social conditions may affect our theorising and understanding. For example, it may be important to consider that people face important competing demands on their income, including meeting their social needs (whether this to maintain status or to socially participate) possibly ahead of their material needs (Wilkinson and Pickett, 2010).

Psychosocial

The term 'psychosocial' describes an intermediary level that bridges individual psychology and social structures (Martikainen *et al.*, 2002). This 'meso-level' helps us conceptualise how social environments influence the way we feel (Egan, 2013). However, there is a lack of clarity in the literature with respect to what is a psychosocial risk factor (Egan *et al.*, 2008), often with confusion between psychosocial factors and psychological problems, and sometimes psychosocial factors and risk behaviours. To some extent, different conceptualisations of 'psychosocial' may also reflect the variety of research traditions and subject areas from which researchers have come to take an interest in this field.

Psychosocial theories often assume stress to be a central feature of how income affects health outcomes. The theory proposes that low income leads to the experience of severe stressors, which further leads to psychological stressors and then to poor health (Klabbers *et al.*, 2009). There are two general psychosocial theories of how low income leads to stress, which leads to poor health.

Income → social support/control at work/work–life balance → stress → health

The first theory proposes that low income exposes people to stressful circumstances such as limited control and autonomy at work, and poor balance between home and work (Adler and Stewart, 2010; Ploubidis *et al.*, 2011). Thus 'lack of material opportunity might lead to a lack of hope and consequently depression or hostility, jobs that lead to feeling a lack of control over tasks at work, or adverse psychological conditions at work or at home, which jeopardize health, directly or through health compromising behaviors' (Kroenke, 2008, p. 32). At the same time, those with low financial resources are less likely to have social support (Blaxter, 1990) and living in poor environments may lead to different kinds of social relations in ways that affect health (see Box 3).

Severe or chronic stress has been found to have negative effects on health when the individual does not have sufficient social and psychological resources to deal with its emotional impact (Adler and Stewart, 2010). Stress can have a direct negative effect on biology and physiology, with psychosocial factors ameliorating these effects (for example, good social support, high status, autonomy and so on) or exacerbating them (for example, low status, job demands and so on). Acute and chronic stressors have been related to changes in physiological regulation and emotional responses leading to poor health (Friedman *et al.*, 2007; Theodossiou and Zangelidis, 2009). For example, Klabbers and colleagues (2009) describe how low income can expose people to jobs with low autonomy and control (stressful circumstance), which can lead to negative emotions (either depression or hostility), which in turn creates sustained physiological reactivity affecting the immune and cardiovascular systems. Further, individuals with the least income are likely to suffer most from stressors, with economic deprivation being a likely cause (Pearlin *et al.*, 2005). These arguments have also been linked to child health and behaviour outcomes, whereby it is argued that poverty leads to families experiencing stress, with fewer resources to help cope with these stressors (less social support and so on). The impact of such stressors may lead directly to poorer physical health outcomes (for example, low birth weight) and/or emotional, behavioural and educational outcomes, through lower levels of emotional attachment, or adopting an authoritarian parental style (McLoyd, 1990; Huston *et al.*, 1994). These arguments do not preclude consideration of material pathways as well as the psychosocial ones.

Box 3: Case study: income → social relationships → health

Social relationships are important for health, while isolation and loneliness are risk factors for a range of psychological (Almedom, 2005; De Silva *et al.*, 2005) and physical health problems (Berkman and Glass, 2000; Kim *et al.*, 2008). The literature on relationships and health considers numerous dimensions. At a household level, family composition and relationships may have important health consequences, for example through marital or parent–child relationships (Lundberg, 1993; Evans and English, 2002). Social networks describe the number of contacts people have and can also differentiate between the types of bond that people share across networks (Berkman and Glass, 2000; Stansfeld and Fuhrer, 2002). Social support refers to the help people receive from others and can include practical assistance (such as giving

friends or neighbours 'a hand' with certain tasks), advice, financial support and emotional support. Concepts such as social cohesion and social capital consider levels of trust, belonging and reciprocity – often at a neighbourhood level (Putnam, 2001). Theory of practice suggests that social inequalities may be created and reproduced through relationships that determine people's access to economic, social and cultural capital (Kim *et al.*, 2008). These various theories and concepts have emerged from a range of different research areas but are likely to be related and to describe mechanisms that interact (Egan *et al.*, 2008).

Social networks in relatively low-income communities have been characterised as socially homogenous and dominated by strong rather than weak bonds (Granovetter, 1973; Poortinga, 2006a, 2006b). It has been posited that more affluent members of the population tend to have wider, more heterogeneous networks through a mixture of both strong and weak bonds (Granovetter, 1973). Extensive and heterogeneous social networks may in turn confer advantages in terms of diffusion of influence and information, as well as opportunities for social mobility. Some low-income communities experience relatively low levels of social cohesion that have been linked to potential determinants of ill health such as isolation, low levels of community empowerment, poor neighbourhood safety and neighbourhood decline (Baum *et al.*, 2007; Egan *et al.*, 2008; Diez Roux and Mair, 2010).

The description above suggests a combination of materialist and psychosocial pathways from income, through social relationships, to health. Material factors (such as income) may contribute to people's exposure to social environments. Positive social environments may encourage further material benefits in terms of financial support, opportunities for social advancement (Sen, 1992, 1999) and, from a neo-materialist perspective, community empowerment encouraging improvements to local services and amenities (Lynch and Kaplan, 1997; Dunn *et al.*, 2006).

Social environments may also influence the social patterning of health through psychosocial pathways (Ahnquist *et al.*, 2012), for example through links from low income to isolation, stressful or exploitative relationships and poor emotional support to health (Portes and Landolt, 1996). Psychosocial stress responses have been theorised to have direct impacts on mental and physical health (Wilkinson, 1999a; Stafford *et al.*, 2004; Marmot, 2005). They may also affect behaviour, as in the case of losing motivation for activity (Wen *et al.*, 2003), or 'self-medicating' with alcohol or tobacco, and substance abuse (Macinko *et al.*, 2003; Subramanyam *et al.*, 2009). However, there is also the possibility of reverse causality: for example, illness may put a strain on relationships while physical mobility problems may be a barrier to social engagement (Sabin, 1993; Ren *et al.*, 1999).

In terms of lifecourse, familial socialisation problems that develop in the early years may persist later in life (Lundberg, 1993). Social relationships also exhibit different characteristics affecting pathways to health across life stages (Browne-Yung *et al.*, 2013). For example, social support during working life has been considered to be protective against job strain (Johnson and Hall, 1988). Causes of isolation such as mobility problems, fear of crime (Lorenc *et al.*, 2012) and the death of loved ones may affect elderly people disproportionately (Sabin, 1993; Prus, 2007).

Income → social status → stress → health

The second theory proposes that stress arises due to psychosocial risk factors from having less income and hence having a lower status (Marmot, 2004), or occupying a lower social position to others (Wilkinson, 1992; Kawachi *et al.*, 2002; Pham-Kanter, 2009). A focus on status and/or relative social position draws on the theory of relative deprivation whereby '... the inability to acquire what is considered to belong to the good life and thus the inability to lead a good life relative to social norms, and the lack of social status attached to such acquisitions, cause chronic mental distress' (Aittomaki *et al.*, 2010 p. 1018). The theorised mechanism for low income to poor health is that low social status leads to (dis)stress or perceived disadvantage, eventually leading to poor health/disease/death (Stouffer, 1949; Runciman, 1966; Marmot, 2004). This distress may be 'caused' by individuals comparing themselves with others, or due to other people's behaviour towards someone whose lack of commodities indicates lower status, as described by Aittomaki and colleagues (2010).

Psychosocial exposures do not necessarily affect health purely through psychosocial processes. For example, social support is often assumed to be a 'psychosocial factor' but it can lead to instrumental and material benefits as well as emotional support from friends and family (Martikainen *et al.*, 2002; Egan *et al.*, 2008). Thus a psychosocial exposure may result in a material pathway to health. Similarly, stress may lead to behavioural pathways through people self-medicating (smoking, drinking alcohol or taking other drugs) (Subramanyam *et al.*, 2009). Finding associations between relative income and health does not necessarily mean that the mechanism is through social comparison. It may well be that relative income is an additional indicator of the kind of living conditions that are available to people with a certain absolute level of income (Lynch *et al.*, 2000b; Aittomaki *et al.*, 2010). For this reason, and because evidence for some types of psychosocial association has been found to be inconsistent or weak, the evidence base supporting psychosocial pathways to health has at times been questioned (Macleod and Davey Smith, 2003; Egan *et al.*, 2008; Harper *et al.*, 2011).

Behaviour

Unhealthy behaviours are related to income level (Raphael *et al.*, 2005) and are significant mechanisms linking income and risk of death (Jarvandi *et al.*, 2012). Individuals with low incomes may be more likely to adopt behaviours with a negative impact on health, such as smoking (Adler and Stewart, 2010), high alcohol consumption (Cerdá *et al.*, 2011) and a high calorie diet and inactivity resulting in obesity (Jeffery and French, 1996). Direct behavioural explanation pathway mechanisms also include use of preventative healthcare services (Galama and van Kippersluis, 2010), health education information (Prus, 2007) and immunisation, contraception and antenatal care services (Scambler, 2012).

In the following paragraphs, possible explanations of why individuals with differing levels of income tend to have differing behaviours are illustrated. First, as outlined above, the stress associated with economic deprivation or social comparisons may lead people to self-medicate through unhealthy behaviours. Second, it has been argued that low incomes may influence behaviours through future expectations. The third broad theory relates to 'cultural capital', that is, that people use behaviours to signpost social status.

Low income → multiple daily stressors → influence on lifestyle, unhealthy behaviours → ill health

The stress vulnerability model suggests that stressors such as low income can result in stress, which may lead to psychological distress and/or coping behaviours such as smoking, alcohol consumption and unhealthy eating (Pearlin, 1989; Turner and Lloyd, 1995; Turner *et al.*, 1995; Raphael *et al.*, 2005). Such self-medication may be articulated either as a way of managing the stress or providing simple pleasures in difficult situations. In pregnant women, this may not only affect their own health but that of the child (Dowd, 2007).

Income → future expectations of health → health behaviour → heath outcome

One theory, proposed by Lawlor and colleagues (2003) in relation to smoking, is that the dangers of health behaviours, which can take years to develop, are perceived as less of a risk than more immediate material hazards (risk of injury, environmental exposures, non-smoking-related ill health) by individuals with low income who have a greater chance of encountering these material hazards than people in higher income groups. So resistance to giving smoking up is a rational response to reduced life chances.

Similar ideas are also found in economics. Galama and colleagues (Galama and van Kippersluis, 2010) argue that the income–health gradient is the outcome of 'rational constrained individual behavior' and propose a model of lifecycle utility maximisation, based on the Grossman model of the demand for health (Grossman, 1972, 2000). Higher income and wealth throughout an individual's life and a higher level of education encourage that person to invest in their future health by adopting healthy behaviours and using preventative health services (Galama and van Kippersluis, 2010). In economic terms, someone with a 'high discount rate' focuses on the present, not thinking, planning, saving or behaving for their future. In relation to income and health behaviours, this suggests that focusing only on the present may result in unhealthy behaviours and subsequent ill health and low income (Fuchs, 1982). It may be that individuals with long-term low income feel they have less reason to invest in future longevity (Cutler *et al.*, 2007). Meanwhile, individuals with a low discount rate take action to have good health in the future and future earning potential (Jones and Wildman, 2005).

Income → social/cultural influences → health behaviour → heath outcome

While behaviour is often presented as being about individual responsibility and choice, it is widely accepted that choice of behaviour is influenced by social and cultural conditions (Bartley, 2004). Health behaviours are often part of routine daily life, incorporating the circumstances in which people find themselves (Williams, 1995). It has been suggested that in recent times there has been an increase in behaviours being employed as ways of indicating 'social distinction' (Mackenbach, 2012). Individuals indicate their social position through how they behave, and in particular, how they invest in their health and future health by adopting behaviours that aim to increase health and wellbeing (Mackenbach, 2012). 'Social distinction' acts require 'cultural capital'. Cultural capital is a combination of an individual's attitude, knowledge and competency, gained from the surrounding environment and often passed from parents to children (Bourdieu, 1984, cited by Mackenbach, 2012).

One specific example of this idea is the diffusion of innovations theory (Rogers, 1962), which argues that people in higher income groups are quicker to engage in behaviours found to improve health such as stopping

smoking or eating a healthy diet. People with lower income tend to take up the healthy behaviours later, causing a greater gap in health outcomes between high and low-income groups. This is also known as the 'inverse equity hypothesis' (Victora *et al.*, 2000). The role of education in behavioural pathways between income and health may be important. Education might provide individuals with the cultural and psychosocial resources required to pursue healthy behaviours, fostering a greater sense of being in control of their own life, and a greater understanding of how some behaviours can harm health and how changing some behaviours can improve health in the future (Stronks *et al.*, 1997a; Lantz *et al.*, 2001; Pampel *et al.*, 2010).

Taken from a different viewpoint, the cultural-behavioural explanation suggests that particular health behaviours are more culturally acceptable in differing socioeconomic position groups (Skalicka *et al.*, 2009). Social norms of behaviours among peers and family will influence the adoption of health behaviours, including smoking, diet and physical activity (Lindström, 2008), through adolescence and into adulthood, and may perpetuate unhealthy behaviours among those living on low incomes and/or in disadvantaged communities. In such ways, cultural attitudes mix with social and economic circumstances. This emphasises the importance of including social structures and conditions within accounts of behavioural mechanisms explaining health inequalities (House *et al.*, 1994).

The pathways described above, from income through behaviours to health outcomes, suggest that the reasons for unhealthy behaviours are complex, and that to improve health the focus of interventions must address these complexities. The behavioural theories show that that only focusing on messages to improve health behaviours is unlikely to work. There needs to be improvement in an individual's prospects for them to have the idea that investing in their health is worthwhile (Deaton, 2002). It has been found that income shocks – one-off increase in income, such as a lottery win – do not improve health behaviours (Gunasekara *et al.*, 2011). A permanent increase in income, however, may improve an individual's prospects and encourage them to invest in their longevity by engaging in healthy behaviours (Kawachi *et al.*, 2010). While increasing income is important for improving health, it may not be sufficient to produce the motivation for necessary changes in behaviour (Ludbrook and Porter, 2004). The case study in Box 4 uses smoking to illustrate the mechanisms linking income and health with this health behaviour.

Biological processes

With the exception of accidents etc., all physical, social, economic and psychosocial environments that might affect health have ultimately to result in a biological change in the body that leads to ill health. Early debates about health inequalities that focused on material and behavioural causes did not dwell particularly on the biological pathways that led to ill health (DHSS, 1980). Perhaps because the 'hazards' were more obvious (for example, damp and mould spores, pollution, nicotine or alcohol, fat and sugar in diet and so on), it was felt less necessary to articulate the biological chains of changes to the body. Nevertheless, there is clearly evidence about how 'chemicals' lead to biological changes, which in turn affect different health conditions (Blane *et al.*, 2013).

Box 4: Case study: income → smoking → health

Smoking is a health behaviour linking income and health. Theoretical pathways from income to smoking include behavioural, psychosocial and material theory.

The most obvious theory describing this pathway is behavioural, incorporating an individual's cultural environment. Individuals with low income are more likely to start smoking (Hiscock *et al*., 2012). This may be partly because as children they are more likely to be exposed to family and other social contacts who smoke, and as there are higher smoking rates among adults with low income, it can be more acceptable to smoke (Jarvis and Wardle, 2006). Within higher-income groups, higher status is often signposted by adults in efforts to improve health, which include not smoking, and therefore it is often less socially acceptable to smoke in higher-incomes groups.

For some people with low income, smoking is an indulgence (Graham, 1987). Smoking creates feelings of wellbeing while risking physical health, it gives a reason to take a break and the ritual of smoking may be soothing (Graham, 1987). Psychosocial theory outlines how an individual's emotional state in relation to other people affects this health behaviour. Material deprivation is closely linked with smoking rates, which may be due to stress induced by deprived circumstances (Stronks *et al*., 1997b), as relief from stress is a key reason given for smoking. Even if stress is being caused due to nicotine cravings, smoking results in relief from this (Parrott, 2006, cited by Jarvis and Wardle, 2006).

Smoking cessation is important, as it may be that persistent smoking results in smoking-related health inequalities. People with lower incomes are more likely to begin smoking and less likely to give up smoking (Jarvis and Wardle, 2006, citing the General Household Survey 2000-3). Combinations of behavioural, psychosocial and material theories occur when considering smoking cessation interventions (Laaksonen *et al*., 2005). For instance, it may be the combination of experiencing less pressure to stop smoking and having greater material deprivation causing stress that prevents an individual from giving up smoking. While people with low incomes who smoke know that smoking harms health (Blaxter, 1990), the logic of addiction suggests that to give up smoking requires enduring withdrawal and craving, which may be far harder to resist when experiencing the stresses associated with low income (Jarvis and Wardle, 2006).

Increasing the price of cigarettes is a method used by many countries to reduce smoking rates (Gallus and La Vecchia, 2012). Tobacco price control reduces starting rates in young people and lowers use among those continuing to smoke (Chaloupka *et al*., 2011). If the price increase involves higher taxation, the revenue can be used to fund smoking cessation interventions (Gallus and La Vecchia, 2012). However, many of those who stop smoking are from higher-income groups (Hiscock *et al*., 2012). There is a need for smoking cessation interventions that are designed for people with low income, interventions that address the pathways that exist between low income and smoking and subsequent ill health. The success of interventions such as the Earned Income Tax Credit benefit in the US in reducing smoking may be due to an increase in income in combination with improved life and employment circumstances (Averett and Wang, 2012), thereby improving material and psychosocial conditions.

Low income → stressful circumstances → prolonged physiological reaction → impact on immune and cardiovascular systems → health outcomes

The more focused interest in biological pathways within debates about social inequalities in health mainly stems from an aspiration to demonstrate plausible biological pathways that link psychosocial circumstances to health in order to increase confidence in the causal nature of the association (Hill, 1965; Brunner, 1997; Adler and Stewart, 2010). The key proposed biological pathway is via stress (Blane *et al.*, 2013). Living in disadvantaged circumstances might increase the probability of difficult events (for example, unemployment or low income) and people in these circumstances may have fewer resources – financial, emotional and social – to cope with such stressors. Physiologically we respond to stress with a 'fight or flight' reaction, with our brains sending signals to our bodies via the sympathetic-adrenomedullary and hypothalamicpituitaryadrenocortical systems (Brunner, 1997). The former increases adrenaline in the body and the latter cortisol, both of which lead to a range of changes in different bodily systems. These stress responses can be protective in the short run, allowing the body to respond to the immediate threat, but experienced repeatedly over long periods of time, they can cause dysregulation of different systems, such as blood pressure, fat in blood vessels, increased susceptibility to infections and changes to the structure of the brain (Adler and Stewart, 2010). These harmful changes to body systems can lead, in time, to conditions such as heart disease (Brunner, 1997; Adler and Stewart, 2010). Of particular concern in some of these literatures is the effect of 'stress' in childhood, which might be a critical period for the development of processes by which the body responds to stress. Stress during this period may not only have long-term consequences for disease in later life but also for how the body manages stress further (Bartley, 2012). Combining insights from lifecourse studies with genetic and biological research, new ideas of biological embedding (Hertzman, 2013) are also becoming more prominent. These suggest that early childhood environments of stimulation, support and nurturing 'speak to our genes' through identifiable biological and physiological mechanisms to influence health across the lifecourse (Hertzman, 2013).

The influence of health on income

There is a strong tradition in the economics literature for investigating whether health, or particular dimensions of it (such as obesity or height), might influence income. While in social epidemiology it is presumed that the direction of association runs in the opposite direction, research efforts in general have aimed to explain away such effects rather than investigate them. Nevertheless, to a certain extent, these influences are acknowledged.

Ill health → reduced employment/job loss/early retirement → drop in income

The main hypothesis across both economic and social epidemiology literatures is that poor health limits a person's ability to access employment. This is known as direct selection (Stronks *et al.*, 1997a). This may mean that people are not able to apply for paid employment, or lose their job once they become ill or retire early (Martikainen *et al.*, 2003, 2009), with a consequent reduction in their income. It may also mean that they need to take less strenuous or stressful roles or only work part time, which again will result in

a reduction in income. In general, evidence suggests that health is more likely to affect whether people can take paid employment than to influence the sorts of occupations they may be able to take (Stronks *et al.*, 1997a).

A second, more subtle, theory about how health may affect income through employment opportunities is via biases in the labour market. The role of obesity, height and attractiveness on wages is a significant feature of both economics and psychology literatures (Udry and Eckland, 1984; Hamermesh and Biddle, 1993; Hosoda *et al.*, 2003; Han *et al.*, 2009; Judge *et al.*, 2009). A number of lifecourse studies have also demonstrated that these associations exist over time. For example, in the 1958 birth cohort, people who were obese, short or unattractive were less likely to gain employment and within posts more likely to earn less, than their slimmer, taller, more attractive counterparts (Harper, 2000). In a Scottish study, adolescents considered more attractive by up to three independent interviewers at age 15 were more likely to have a higher income 20 years later than those rated less attractive, taking account of a wide range of possible confounders (Benzeval *et al.*, 2013).The key theory behind this association from the psychology and labour economics literatures suggests that gatekeepers (that is, recruiting staff, personnel or managers making decisions about wages) may implicitly assume that slim, tall, attractive people are also likely to possess other positive characteristics, such as intelligence and positive personality traits, and hence unconsciously favour them (Langlois *et al.*, 2000).

Within lifecourse literature, another theoretical consideration is the role of health in childhood for adult health and income, known in social epidemiology as inter-generational direct and indirect selection (Davey Smith *et al.*, 1994). Heckman (2007) hypothesises that poor health in childhood will affect future adult health and, through this, opportunity for labour market participation. One specific pathway commonly suggested in the literature is via education (Hurd and Kapteyn, 2003; Lê *et al.*, 2013). In a wide range of ways, poor health in childhood may prevent children from attending school or may make their learning experience less positive, which may in turn affect subsequent socioeconomic opportunities (Case *et al.*, 2009).

Linked to the debates about the effect of child health on later employment and income, it is important to consider the role of parents' health. Drawing on psychology, education and neuroscience literature, Heckman (2008) suggests that parental wellbeing may affect both the child's health and development, which in turn affects their adult opportunities. He argues that early childhood is a particularly sensitive period for this. Poor parental wellbeing may be a result of parents' own income situation or health and may affect the child biologically when in the womb. It may also have a negative impact on children in early childhood through an inability to afford good nutrition or a safe home environment, through parental practices affecting a child's social and emotional environment or through an inability to provide a supportive learning environment during education etc. (Duncan and Brooks-Gunn, 2000; Adler and Stewart, 2010).

Personal characteristics

As noted above, some commentators have proposed that personal characteristics such as IQ or personality may be the 'fundamental' cause of health inequalities. Economists often refer to these ideas as unobserved factors (confounders), which may influence both health and income, but

because they are often missing from econometric models they may bias findings (Hurd and Kapteyn, 2003).

Income → IQ or personality traits → health

In the income and health literature, IQ in particular has been a focus of attention. Cognitive ability strongly influences schooling and education outcomes (although it is important to acknowledge that IQ measurement is not socially neutral). Educational outcomes will influence employment and occupation and hence income as an adult (Deary *et al.*, 2010). There is a debate in the literature about the extent to which IQ itself is the results of genetics or family and social environment in childhood (Hackman and Farah, 2009).

The ways in which IQ might affect health are fourfold (Batty *et al.*, 2007):

- higher socioeconomic position;
- enhanced ability to process health information and hence more likelihood of adopting health-promoting behaviours;
- increased health literacy and ability to communicate with health professionals in accessing health care;
- less risk of psychiatric disease, which is associated with other health outcomes.

IQ has been shown to account for a wide-ranging but significant proportion of the association between socioeconomic position (including income) and health (Batty and Deary, 2004; Singh-Manoux *et al.*, 2005a, 2005b; Batty *et al.*, 2010).

Personality has also been proposed as a possible fundamental cause/confounder in the income–health association (Mackenbach, 2010). Psychologists suggest that there are five principle personality traits: neuroticism (degree of emotional stability, sensitivity to unpleasant emotions), extraversion (outgoing or reserved), conscientiousness (level of self-discipline, planned or spontaneous actions), agreeableness (compassion and cooperativeness) and openness to experience (degree of curiosity) (Matthews *et al.*, 2009). These have been shown to be associated with both health (Deary *et al.*, 2010) and socioeconomic status (Jonassaint *et al.*, 2007), and to some extent these so attenuate the association between the two (Nabi *et al.*, 2008; Chapman *et al.*, 2010). Conscientiousness, agreeableness and low neuroticism in adolescence can help build resilience to economic hardship but do not negate the effects of low income (Donnellan *et al.*, 2009). Pathways between personality traits and health are similar to those for intelligence; that is, it is hypothesised that positive personality traits may lead to health-promoting behaviours, better engagement with health professional and access to health care, and higher socioeconomic circumstances (Deary *et al.*, 2010).

Drawing theories together

While there are some researchers who promote the dominance of one theoretical approach over others in terms of causes of poor health, in the main most commentators in the field argue that health inequalities are caused by a combination of pathways. Many of the specific examples in the preceding chapters illustrate how one mechanism may directly affect health, for example, low income leads to poor diet resulting in health consequences, while others suggest more complex combinations, for example, low income

leads to stress leads to depression leads to lack of engagement in exercise leads to poor health. As such, the theories should not be seen as competing or mutually exclusive. There is a complex web of causal factors. We have illustrated this in the different chapters with focused boxes on key aspects of each theory, showing how they interact with other mechanisms. One final illustration, in Box 5, demonstrates the interaction of different pathways to health at a key lifestage: childhood.

Box 5: Case study: childhood

Circumstances in childhood are an important part of several pathways between income and health. Children experience the impact of income through the circumstances of their parent or guardian. In families with low income, deprivation can directly affect a child's material circumstances and, as a consequence, their health. For example, poverty leading to a lack of nutritious food has a direct bearing on child health (Lundberg, 1993) and while parents can make choices, these are constrained by their life circumstances (Attree, 2005). Low income can determine many features of the home environment, where young children spend much of their time. Inadequate physical and social conditions in the home, including safety hazards, poor air quality, overcrowding and noise, can lead to poor child physical and mental health (Evans and English, 2002).

Parental material deprivation may also have a negative impact on childhood development. For example, poor nutrition during pregnancy, as well as smoking and exposure to stress, all of which are linked with low income, can contribute to low birth weight (Ermisch, 2008). Low birth weight in turn has been linked to adult coronary heart disease, blood pressure and diabetes (Galobardes *et al.*, 2004). This exemplifies the critical period lifecourse model, in particular the foetal origins hypothesis, which states that material circumstances or behaviour while pregnant can cause negative outcomes for the infant (Barker *et al.*, 1993). After birth, income may influence childhood environments and parenting practices through a number of pathways (Conger *et al.*, 1992). From a material perspective, income can allow for the purchase of goods and services that may potentially make the job of parenting easier, therefore reducing stress, or may increase opportunities for child development (Brooks Gunn and Duncan, 1997).

Social problems exacerbated by low income, for example negative relationships with neighbours or landlords, are psychosocial mechanisms that can cause stress to parents and affect their children via the home environment (Quinn *et al.*, 2010).

People with low incomes are more likely to have physical and mental health problems (Adler *et al.*, 1993). These may increase the risk of depressive symptoms, demoralisation and irritability, which can affect a parent's ability to maintain positive parent–child interactions and avoid conflict with their adolescent child (Brooks Gunn and Duncan, 1997). Parental depression is a psychological mechanism but the literature is often inconsistent in how, or whether, psychological and psychosocial (how an environment makes an individual feel) mechanisms are differentiated (Martikainen *et al.*, 2002). A poor psychosocial

environment is just one of a number of potential reasons why a parent may experience psychological problems. However, parenting methods linked to psychological problems may adversely affect the child through psychosocial pathways by reducing the child's social support or sense of control within the home environment (Bradley *et al*., 1994; Huston *et al*., 1994).

5 POLICY IMPLICATIONS

Developing a better understanding of the hypothesised causal pathways between income and health enables policy-makers to identify potential ways in which income can be used as a possible instrument to improve health and reduce health inequalities. In a very broad way therefore, this report contributes to the 'evidence-informed decision-making' agenda that has gained increasing prominence within the social and public health sciences over the past decade and more.

Reviews of theory are still relatively rare and some consideration needs to be given to how findings from this report may be interpreted or applied (Lorenc *et al.*, 2012). A crucial point to make is that phrases such as 'evidence-informed decision-making' or 'evidence-based policy and practice' are often used to describe a (sometimes idealised) process whereby decisions made by policy-makers and practitioners are in some way guided by findings from empirical research (Davies *et al.*, 2000). In contrast, this report does not provide decision-makers with empirical evidence on, for example, whether specific risk factors are associated with health, or whether a specific intervention delivers its intended outcomes effectively. We argue that one of the key strengths of a theory review is that it encourages us to focus more broadly on a range of interlinked processes through which health-related advantages and disadvantages are produced and unevenly distributed across society. The effect, we hope, is to illustrate why a more radical and cross-cutting approach to public health policy is necessary, and why health improvement initiatives that limit themselves to targeting specific risk factors or delivering single interventions may often be insufficiently comprehensive to yield anything more than modest benefits (when they yield any benefits at all).

Having scoped out some of the relevant literature, it appears to us that studies of income and health often test relationships associated with a

particular theory and/or attempt to compare the relative merits of 'rival' theories (Macintyre, 1997). In contrast, our synthesis plays down the view that the various theories described are rivals, and instead emphasises their interdependence. So, for example, Figure 4 identifies income (or parental income in the case of children) as an important determinant of people's educational and employment opportunities, their material and social conditions, health behaviours and psychosocial environment exposure – all of which are considered pathways to health and wellbeing. The case studies we have described illustrate how these pathways co-occur and interconnect. They also show how access to money enables people to situate themselves and their dependents in a range of health-facilitating environments, such as homes that are relatively free from pathogens and that meet subjective household needs; neighbourhoods characterised by high-quality amenities, services and aesthetics; and communities and social networks characterised by high levels of cohesion, efficacy and relatively healthy behaviours. A higher income provides people with a greater level of choice and control through purchasing power, and can help cushion the blow of negative life events such as illness, employment disruption and relationship breakdown.

Materialist, neo-materialist, behavioural, cultural and psychosocial theories can all take income as a starting point, particularly when it comes to explaining the social patterning of factors that either promote health or cause harm (House *et al.*, 1994). The inclusion of income and/or other material resources as part of their theorised pathways to health means that, in fact, all these theories have a materialist dimension. This leads us to argue that policy-makers are not in a position to choose between materialist and non-materialist theories when developing public health strategies. They cannot, for example, assume that behavioural or psychosocial theories provide 'non-materialist' solutions to the major problems affecting public health (Macintyre, 1997; Macleod and Davey Smith, 2003). The pathways to health summarised in Figure 4 suggest that income (and parental income) are an integral part of both the behavioural and psychosocial pathways to health. This in turn suggests a continuing need for public health strategies to consider the importance of income inequalities as a determinant of social inequalities in health.

The literature we have reviewed also includes a number of recommendations for how policy-makers might protect disadvantaged members of the community against the harmful effects of low income. Some of the recommendations can be described as welfarist, particularly recommendations to ensure that welfare benefits and taxation policies provide sufficient income to enable a healthy standard of living (however defined) (Der *et al.*, 1999; Benzeval *et al.*, 2000; Benzeval and Judge, 2001). It is recommended that such benefits should be responsive enough to protect people from sudden negative income shocks, such as those associated with job loss, relationship breakdown and other adverse life events (Taylor *et al.*, 2011). As financial hardship is not restricted to those who are unemployed, recommendations also include an adequate minimum wage for those in employment and other measures to counteract 'poverty traps' affecting low-income employees (for example, child care expenses and loss of benefits) (Subramanian and Kawachi, 2006). Financial measures could be aided by consensus building on what constitutes an acceptable income for healthy living (Morris *et al.*, 2000, 2007).

Population-level health inequalities are frequently assumed to take the pattern of a fine social gradient where health is positively related to socioeconomic position. An independent review group chaired by Michael Marmot has argued that income is a particularly important determinant

of this social gradient. The Marmot review also argues that focusing solely on the most disadvantaged population subgroup will not reduce health inequalities sufficiently; rather, to reduce the steepness of the social gradient in health, actions must be universal, but with a scale and intensity that is proportionate to the level of disadvantage (this principal is referred to as proportional universalism) (Marmot, 2010). To help achieve this goal, the review argues that more can be done to redistribute income and recommends action to develop and implement a minimum income for health living; to improve healthy living standards through reform of the taxation, benefits, pensions and tax credit systems; and to ease the transition in and out of employment and improve pathways for 'moving upwards' (in other words, social mobility) in terms of socioeconomic position.

Policy recommendations often identify employment as a potential pathway for upward social mobility and its associated health benefits. Employment among disadvantaged populations may be encouraged by accessible and tailored employment services providing career advice, training and practical assistance with job searching (for example, access to stationery, internet and transport). Alternatively, policies that attempt to promote economic growth may, if successful, increase the economy's demand for employees. However, job-creation strategies may only serve public health goals if they lead to jobs that promote health. The existence of jobs that are low paid and/or have poor working conditions can make such strategies appear problematic, as can barriers related to welfare entitlement and competing family demands (Bambra *et al.*, 2011).

Theories relating to behavioural economics argue that changing the environment in which people make financial decisions may be effective – by, for example, raising the price and reducing accessibility of unhealthy commodities and reducing the price and improving the accessibility of health-promoting commodities (Aittomaki *et al.*, 2010; Galama and van Kippersluis, 2010; Taylor *et al.*, 2011).

Finally, our synthesis of theories suggests that health selection is a potential cause of low income, which in turn may lead to further health problems (Stronks, 1997a). In our model (see Figure 4), the assumed pathway is a circular one from poor health to loss of income (loss of function and employment discrimination may be mechanisms for this), and then from low income to more health problems through the various theoretical pathways considered in this report (e.g. materialist, neo-materialist, behavioural, psychosocial, etc.). This circular pathway may affect individuals and/or their dependants over the lifecourse. From this perspective, interventions intended to prevent or cure health problems have a role to play in public health strategies that focus on income. This includes the activities of public and clinical health services as well as other activities that promote healthy lifestyles and environments (Prus, 2007). It also includes efforts to reform structures, practices and attitudes that discriminate against people with impairments and lead to their increased risk of experiencing poverty (Oliver, 1995).

Familiar themes

In their comparison of the three main English-government-commissioned reports on health inequalities – the Black Report (DHSS, 1980), the Acheson Inquiry (Acheson, 1998) and the Marmot Review (Marmot, 2010) – Bambra and colleagues (2011, p. 399) conclude that 'there were great similarities and very few differences in terms of both the theoretical

principles guiding the recommendations of these reports and the focus of the recommendations themselves'. In contrast to the broader remit of those three inquiries, our report has aimed to focus on theories that have been advanced to explain causal associations between income and health. Despite this narrower focus, it must be said that the theories we have identified tend to cover similar themes to those found in Bambra and colleagues' analysis of the government inquiries. These themes include early years and young people; education, training and employment opportunities; working conditions/environment; poverty and the distribution of wealth/resources; housing; services infrastructure and amenities (from both public and private sectors) affecting wider determinants of health; and lifestyle behaviours and their social determinants. These themes can all be identified or inferred from Figure 4, which highlights their importance as macro-level contextual factors, as well as individual-level exposures and mechanisms that determine SEP and health outcomes throughout the lifecourse. As a result, many of the policy recommendations we might put forward on the basis of this report are similar to those suggested in the three inquiries. This suggests a continuing agreement within the public health research community that modifications and/or improvements within each of the themes described above are required. Furthermore, those improvements should disproportionately benefit the most deprived groups in our society if the overall aim is reduced social inequalities in health rather than population health improvement.

After three decades of researchers supplying similar advice to policy-makers, it seems apparent that governments have been more successful at securing health improvement and less successful at reducing health inequalities. Researchers are continuing to explore possible reasons for this failure to tackle health inequalities (Mackenbach, 2012). Such explanations might focus on whether or not the advice itself was at fault – either as a result of faulty logic or because the recommendations that might have reduced inequalities in theory were not deliverable in practice. Alternatively, explanations might focus on the policy-makers and ask whether they lacked the political will to fully implement the more radical recommendations (Bambra *et al*., 2011; Mackenbach, 2012).

There is an as yet unresolved tension: on the one hand, there appears to be a need for radical solutions to tackle deeply embedded problems, but on the other hand such radicalism is an unknown quantity and hence may potentially lead to unpredictable and adverse consequences. In this report we have focused on an area of politics that, at certain points in history, has been the subject of radical political experiments – namely the distribution of income and other material resources (McKee and Nolte, 2004; Mackenbach and McKee, 2013). Redistributing income more equitably has been advanced as a means of tackling social inequalities in health. However, one unanswered question regarding this recommended approach is what the end point of such a policy might be. A key challenge for researchers is to find empirical methods for answering fundamental questions about the minimal and optimal levels of redistribution required to achieve public health goals regarding health inequalities, and whether redistribution interventions have unintended consequences.

6 LIMITATIONS AND NEXT STEPS

Our aspiration with this report was to identify the specific theories, within debates on social determinants of health across a range of disciplines, on the role of monetary income for health. This has proved complex for four broad reasons.

First, the literature on the determinants of health and health inequalities conflates income with other socioeconomic characteristics, and while some aspects of the literature identify distinct theoretical roles for the different characteristics, much treats them as interchangeable markers of socioeconomic position. Second, theoretical contributions to the literature are difficult to identify. Within empirical papers, theories are often implicit rather than explicitly stated and difficult to identify with traditional systematic review techniques since they are rarely mentioned in abstracts and titles. Moreover, there are few specific theoretical review papers published in relation to income and health per se. Third, literatures on health inequalities are predominantly based within social epidemiology. While we have endeavoured to overcome this by searching a wide range of multidisciplinary and specific disciplinary bibliographic databases, it is likely to still be biased to this perspective. Fourth, systematic review techniques are effective at identifying key literatures when a topic can be well defined in both searches and extraction criteria. Unfortunately that was not the case here. Given this, much effort was spent on only modestly productive searches and screening of the identified papers.

Given these factors, while this report captures the theoretical debates about socioeconomic position and health in general, the specific role of income per se often needs to be surmised rather than being part of the extracted data. Of course, it is both theoretically and empirically difficult to unravel the role of monetary resources per se from other socioeconomic factors. However, we believe that more could have been done in both of these respects than has to date. Further research is required to develop a more specific focus on money in theories of the social determinants of health and to test them in appropriate longitudinal data and lifecourse models.

7 CONCLUSION

Public health theories that receive the most support within the research community tend to assume that reductions in social inequalities will lead to reductions in health inequalities, but there is often disagreement or simply a lack of clarity about what the most effective levers of change for reducing social inequalities are.

There is considerable debates as to whether we should focus on material redistribution, educational reform, improvements to physical environments or psychosocial environments, targeted cultural and behavioural change, or some other alternative? In the absence of a clear rational for prioritising a specific type of intervention, and under the assumption that the causes of social inequalities are likely to involve multiple interconnected pathways, recommendations for public health strategies tend to take a holistic approach that recommends the levering of change through a wide range of intervention points and pathways (Bambra *et al*., 2010).

Given the complexity of population health, this holistic approach is necessary, but there remains the question of whether any specific levers of change are more important than others in terms of their potential contribution to public health goals. In terms of the specific question posed by our review, 'How much does money matter for health?', our understanding of the specific contribution of income, compared with other characteristics of socioeconomic position, remains underdeveloped. In short, our review has found a strong theoretical consensus that money does matter for health and the relationship is a positive one. However, we found less clarity regarding the particular role of income as a health determinant or the mechanisms by which income modification interventions might affect health.

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