BLOOD ON THE TRACKS
LIFE-COURSE PERSPECTIVES ON HEALTH INEQUALITIES IN LATER LIFE

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Men make their own history, but they do not make it as they please; they do not make it under self-selected circumstances, but under circumstances existing already, given and transmitted from the past.

(Karl Marx; The Eighteenth Brumaire of Louis Bonaparte, 1852)
Abstract

The overall aim of the thesis was to explore social inequalities in: a) mortality during mid-life, b) health in later life, and c) old-age mortality, from a life-course perspective. The studies are based on longitudinal Swedish survey and registry data.

The results from Study I showed substantial inequalities in health, based on social class and gender, among older adults (aged 55+). Moreover, the magnitude of these inequalities did not change during the period 1991-2002.

The results from Study II revealed social inequalities in cognitive functioning among the oldest old (aged 77+). Social turbulence and social class during childhood, education and social class in adulthood were all independently associated with level of cognitive functioning in later life.

In Study III, social inequalities in mortality during mid-life (i.e., between ages 25 and 69) were explored. The results showed that childhood living conditions were associated with marital status and social class in adulthood and that, in turn, these conditions were associated with mid-life mortality. Thus, the results suggested that childhood disadvantage may serve as a stepping stone to a hazardous life-course trajectory.

Study IV explored the association between income in mid-life, income during retirement and old-age mortality (i.e., mortality during retirement). The results showed that both income during mid-life and income during retirement were associated with old-age mortality. Mutually adjusted models showed that income in mid-life was more important for women’s mortality and that income during retirement was more important for men’s. Thus, the results of the present thesis suggest that there are substantial social inequalities in the likelihood of reaching old age, as well as in health and mortality among older adults. These inequalities are shaped by differential exposures throughout the life-course that affect health in later life both through direct effects and through processes of accumulation.
Sammanfattning

Det övergripande syftet med denna avhandling är att studera ojämlikhet i hälsa bland äldre i Sverige ur ett livsförloppsperspektiv. Mer specifikt sker detta genom analyser av hur olika erfarenheter under livsförloppet påverkar: a) sociala skillnader i sannolikheten att överleva till en hög ålder, b) sociala skillnader i hälsa bland äldre, samt c) sociala skillnader i dödsrisk bland äldre.


Resultaten från Studie II visar att det finns sociala skillnader i kognitiv förmåga bland de allra äldsta (77 år och äldre). Ogynnsamma sociala och socioekonomiska förhållanden under barndomen, låg utbildning och att ha haft ett manuellt arbete som huvudsaklig sysselsättning leder till en ökad risk för att ha en lägre kognitiv förmåga senare i livet.

I Studie III undersöks sociala skillnader i prematur dödlighet (definierat som risken att dö mellan 25 och 69 års ålder). Resultaten visar att levnadsförhållanden under barndomen har betydelse för civilstånd och social klass i vuxen ålder. Dessa faktorer påverkar i sin tur risken att dö innan 70 års ålder. Med andra ord visar dessa resultat att ogynnsamma förhållanden under barndomen kan komma att utgöra startpunkter för ohälsosamma levnadsbanor.

I Studie IV analyseras sambanden mellan inkomst under medelåldern, pensionsinkomst och dödsrisk bland äldre (65 år och äldre). Resultaten visar att både inkomst under medelåldern och pensionsinkomst har effekter på dödsrisken. Analyser där inkomst vid båda tillfällen tas i beaktande visar att inkomst under medelåldern har en större effekt på kvinnors dödsrisk, medan pensionsinkomst har en större effekt på mäns dödsrisk.

Sammanfattningsvis visar avhandlingens resultat att det finns sociala skillnader i sannolikheten att överleva till en hög ålder, samt i risken för hälsoproblem och dödsrisk bland äldre personer i Sverige. Dessa skillnader för-
mas av ojämlika levnadsförhållanden under livsförloppet som påverkar hälsan senare i livet.
List of original publications

The thesis is based on the following studies referred to in the text by their respective Roman numerals.


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1. Introduction

The population of Sweden is ageing – rapidly. In 1960, 12% of the population was aged 65 and above, in 2008 the corresponding proportion was 18%, in 2020 it is assumed that the proportion will have reached 21% and that in 2060 a quarter of the population will be 65 and above (Statistics Sweden, 2009). This development is mainly driven by two different processes, namely decreasing fertility and increasing longevity. Both processes are associated with exceptional increases in economic and social development.

The increase in longevity is certainly one of the most remarkable achievements in human history. But the ageing population presents an unprecedented challenge to the welfare state, testing the capacities of the welfare state fully. Perhaps the most obvious strain on the welfare state is the changes in the ratio between individuals active in the labour force and individuals dependent on economic transfers. From this perspective, older people have long been considered a vulnerable group. Rowntree identified three life stages during which individuals are most vulnerable to poverty, namely during childhood, family formation (especially for families with many children), and during old age (Rowntree, 1901). However, recent research shows that poverty is uncommon among older adults in Scandinavia, suggesting that redistributive welfare policies have been successful in protecting this potentially economically vulnerable group (Fritzell & Ritakallio, 2010; Kangas & Palme, 2000).

Older adults are also a medically vulnerable group. Ageing is associated with increasing health problems. Even in this domain, research suggests that there have been substantial improvements. Longevity and health have increased among the older population (Christensen et al., 2009). Whereas there is some evidence that this trend might have been less uniform during the most recent years (perhaps due to the greater likelihood of survival among unhealthy individuals (cf. Parker & Thorslund, 2007), overall it seems that even this potential vulnerability among older adults has been successfully handled by the welfare state.

Thus, it seems that the ageing population, on the whole, should be considered a tremendous success for the welfare state. People are living longer, healthier lives, and are protected from poverty and material deprivation dur-
ing old age. However, this may be truer for some than for others. The evidence shows that socially disadvantaged groups are more likely to have poor health and to die prematurely (Commission on Social Determinants on Health, 2008; Marmot, 2004).

Such inequalities stem from unequal distributions of advantages, disadvantages, and exposures to risk and opportunity experienced throughout the life course. Thus, a detailed study of inequalities in premature mortality and health during old age, caused by inequities experienced throughout the life course, could provide the basis for a forceful evaluation of the welfare state’s ability to protect its most vulnerable citizens.

The overarching objective of the present thesis is to explore some of the life-course mechanisms generating social inequalities in health and mortality later in life.
2. Aims

The overall aim of the thesis was to study health inequalities among older adults in Sweden from a life-course perspective. In order to do this, four empirical studies were conducted. Studies I and II explore the effect of social determinants on health and cognition in later life from a life-course perspective. Studies III and IV explore the effect of social determinants on premature mortality and old-age mortality from a life-course perspective.

2.1 Specific objectives

- To explore health inequalities among older adults in Sweden (Study I).


- To explore the association between childhood living conditions and cognition in later life (Study II).

- To explore whether the association between childhood living conditions and cognition in later life is mediated or modified by socioeconomic position in adulthood (Study II).

- To study the associations between childhood living conditions, marital status, socioeconomic conditions in adulthood and mortality during mid-life (Study III).

- To explore the impact of mid-life income and old-age pensions on the risk of mortality during old age (Study IV).
To study whether income inequalities in old-age mortality can be explained by differences in early childhood development, social class at birth, education, or marital status (Study IV).
3. Social stratification

Most societies are stratified. That is, in most societies the resources available are unevenly distributed. Some individuals have better living conditions and more advantageous life chances than others do. These differences are associated with the social positions these individuals inhabit in the social structure of society. A social structure can be defined by four principles. A social structure is a system of social positions, defined by ‘objective’ criteria, stable over time, and independent of the individuals inhabiting it (Jonsson, 2007).

As a system of social positions, the social structure patterns the relation of different social positions to each other according to some underlying principle. Perhaps the most common principle is that of the economy. Thus, the socioeconomic structure patterns the relations between different socioeconomic positions according to their position in the economy.

The social structure is defined by ‘objective’ criteria. This means that the structure of social positions is not defined by subjective experiences, neither by the observer nor by the inhabitants of the structure. Rather, the structure is defined by objective, observable criteria.

The social structure is stable over time. This does not mean that the structure is static, but rather that the dynamics of the structure is characterized by inertia. Hence, the social structure changes, but slowly and gradually (with the exception of revolutions).

Finally, the social structure is independent of the individuals inhabiting it. This means that the properties associated with the different positions in the structure remain constant regardless of the flow of individuals into, out of, and between the different positions. This principle has been vividly illustrated by Schumpeter: *For the duration of its collective life, or the time during which its identity may be assumed, each class resembles a hotel or an omnibus, always full, but always of different people* (Schumpeter, 1955, p. 126).

As mentioned above, the social structure, in practice, generally refers to the socioeconomic structure, and the social positions to socioeconomic positions. Yet, there is no consensus as to the principles governing the socioeconomic-
omic structure. Several systems of analysis have been suggested. The most commonly studied measures of socioeconomic conditions are social class (as assessed by occupation), education, and income. While being associated, these different indicators of socioeconomic positions all have different implications and theoretical underpinnings (Geyer et al., 2006).

3.1 Social class

Whereas there is an abundance of theories on social class within the field of social stratification, the most influential and pervasive stem from the writings of Karl Marx and Max Weber.

According to Marxist theories of social stratification, the primary stratifying principle in society, under capitalism, is that of commercial ownership. Those who own the means of production (the bourgeoisie) have diametrically different interests than those who, due to lack of property, are forced to sell their labour to earn their living (the proletariat). Whereas Marx recognized social classes beyond the simple dichotomy based on ownership, his thesis was that these classes would, given time, vanish into the two main classes. These classes were, in turn, assumed to have conflicting interests. The bourgeoisie would maintain and expand their wealth by exploiting the proletariat. The concept of exploitation is essential to Marxist class theory. Exploitation, according to the Marxist notion, follows three principles:

1) The inverse interdependent welfare principle.

2) The exclusion principle.

3) The appropriation principle.

According to the inverse interdependent welfare principle, the welfare of the exploiters depends on the deprivation of the exploited. This principle, in turn, depends on the exclusion principle, which entails excluding access to certain productive resources for the exploited. Finally, according to the appropriation principle, this exclusion enables exploitation of the labour efforts of the exploited (Wright, 2005).

Neo-Marxist theories of social stratification have abandoned the class dichotomy of orthodox Marxism and include a richer spectrum of social classes. However, the principles of the neo-Marxist class schemas are still based on ownership and exploitation. Perhaps the most influential neo-Marxist class schema is that of Eric Olin Wright. Wright’s schema distinguishes classes on the basis of exploitation and domination. In this schema, he defines several ‘contradictory locations’. That is, social classes that share
interests both with the exploiters and the exploited (e.g., managers and supervisors) (Wright, 1997). Marxist class schemas are rarely used in contemporary research on health inequalities.

The fundamental tenet of Weberian class theory is that of life chances. A social class is a group of people who share common life chances. The life chances are, in turn, assumed to be unevenly distributed on the market depending on the resources held by the individuals (Weber, 1922 / 2000). The major distinction in Weberian (as in Marxist) theories of social class is that between employers, self-employed workers and employees. However, Weberian class theory also recognizes dividing lines between different categories of employees based on differences (implicit and explicit) in the terms of their employment contracts. Here, the dividing line separates wage workers, whose salaries are based on a relatively specific and short-term ‘money-for effort’ principle, from salaried employees, who enjoy rising salary increments and career opportunities based on a more non-specific and long-term ‘compensation-for-service’ principle (Goldthorpe, 2009). Class schemas based on Weberian class theory are commonly used in contemporary research on health inequalities and form the basis of the measures of social class used here.

3.2 Education

Level of education is another, commonly used, marker of socioeconomic position. Even though education is often used as an interchangeable indicator of socioeconomic position, it has theoretical implications and interpretations of its own. Education is a central institution in the social stratification of society. It mediates the transition between parents’ socioeconomic positions and the individual’s achieved socioeconomic position. Thus, as education is a powerful determinant of future employment and income, it can both facilitate and limit social mobility. Formal education also has stratifying properties in that it facilitates the ranking of individuals on the basis of level of education as well as on the basis of the prestige of the education (J. W. Lynch & Kaplan, 2000).

Furthermore, educational attainment serves as an indicator of immaterial resources that may increase the propensity for advantage throughout the life course. It has been suggested that education creates cumulative advantage through permeation.

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1 Recently, however, Wright has abandoned his staunch Marxist standpoint in favour of an integrated analytical approach, encompassing elements from Marxist theory, Weberian theory and an individual-attributes approach (Wright, 2009).
Permeation means that most aspects of life are affected by education, including economic success, habits, psychological resources, social relationships and cognitive abilities (Mirowsky & Ross, 2005).

3.3 Income

It has been argued that income is the best single indicator of material living conditions (Galobardes et al., 2006). Besides being an indicator of material living conditions, income distribution is often used as an overall indicator of the level of inequality in a society. Furthermore, income can be used as an indicator of relative hierarchical socioeconomic position (cf. Elstad et al., 2006; Wilkinson, 2005). It has been suggested that one of the strengths of income as an indicator of socioeconomic position is that it does not assume discrete socioeconomic categories, but that it allows for continuous, gradual differences in socioeconomic rank (Wilkinson, 1999). On the other hand, the use of income as an indicator of socioeconomic position has been criticized, as it obscures the mechanisms generating income inequalities (Goldthorpe, 2009; Muntaner & Lynch, 1999).

3.4 The multiple facets of social stratification - measuring socioeconomic position in life-course studies

As shown in the previous sections, social class, education and income are all commonly used indicators of socioeconomic position, albeit each with their own characteristics. As different indicators have different meanings during different life stages, the choice of indicators is of great importance in life-course studies. One way of viewing these indicators from a life-course perspective is as a life-long sequence of socioeconomic positions. In this view, childhood socioeconomic position may be assessed using parents’ education, parents’ social class or household income during childhood. Socioeconomic position during young adulthood could be assessed by looking at education. Socioeconomic position during adulthood could be assessed by social class or income, and socioeconomic position in old age could be assessed in terms of income, wealth or poverty (Galobardes et al., 2006).

Such a perspective is somewhat confining, however, as it restricts the possible interpretations of these indicators. The impact of education, for example, is likely to reach far beyond adolescence and affect living conditions throughout the whole life course through a wide range of pathways (e.g., opportunities for socioeconomic success, cognitive abilities, behaviour, self-efficacy) (Grundy & Holt, 2001; Mirowsky & Ross, 2005). Similarly, social class is more than an indicator of occupational conditions. It is meant to
indicate a position in a social structure, a position that governs life chances, living conditions and access to resources. This position is not necessarily abandoned with retirement. On the contrary, the evidence rather suggests that the position, and its consequences, is carried over into retirement (Fors et al., 2008; Grundy & Holt, 2001; Lundberg & Kåreholt, 1996; Vogel, 2006).

Thus, it is important to consider what life stage is under study when choosing indicators of socioeconomic position. On the other hand, a strict life-course schema in which each life stage is associated with a certain set of indicators may prove too restrictive. Rather, each specific study should be preceded by thorough considerations of the specific implications of the different available indicators of socioeconomic positions, with regard to the study aims and population.
4. Health inequalities

4.1 Health

Health is a complex matter. Whereas a thorough analysis of the manifold nuances of health is beyond the scope of the present thesis, a couple of issues deserve mentioning. The main outcomes of the thesis are illness, physical and cognitive functioning, and mortality. Using a liberal definition, these can all be viewed as aspects of health.

Here, all health outcomes are defined as health problems (i.e., illness, impaired mobility, lower levels of cognitive functioning, and risk of mortality). Hence these are indicators of the absence of health rather than of health itself. Such a focus on negative health conditions is the most common approach within health research. Yet there have been attempts at defining health as a positive feature. Perhaps the most influential of these definitions is the one found in the constitution of the World Health Organisation from 1946, where it is stated that: “Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (WHO, 1946). Such an exceptionally broad and positive definition of health is, while sympathetic, scientifically problematic. The challenges of explicitly defining and measuring such a state of multifaceted well-being are virtually insurmountable. In contrast, health problems are generally less complicated to define and measure empirically.

Moreover, the distinction between positive and negative health has potential implications for social policy. In his seminal work *The open society and its enemies*, Popper (1945) suggested that social policies can be understood in terms of two different approaches: utopian and piecemeal social engineering. The utopian approach starts with the end point, the ideal, and engineers social policies to progress society towards that end. Whereas this approach may seem rational, historically the results of such projects have been disastrous, partly because the definition of utopia is rarely consensual.

The piecemeal approach, on the other hand, does not design social policies as stepping stones toward an already defined utopia. In contrast, the goal of
piecemeal social engineering is “searching for, and fighting against, the greatest and most urgent evils of society, rather than searching for, and fighting for, its greatest ultimate good” (Popper, 1945, p. 139). Thus, from this perspective, a focus on negative, rather than positive, health is both scientifically viable and provides an, arguably, more reasonable basis for social policy.

The other issue that demands attention is the choice of health indicators. The health indicators used here encompass a wide range of different health problems, and are assessed using different methods. One distinction can be made between ‘objective’ indicators and subjective health problems. Using this distinction, mortality (information gathered from mortality registries) and cognitive function (as measured by a test of cognitive performance) can be seen as objective measures. Self-assessed measures of health problems, on the other hand, fall into the category of subjective health problems.

Another distinction can be made between general and specific health problems. According to this distinction, global self-rated health may be seen as the most general health measure, whereas ischemic heart disease mortality may be seen as the most specific health measure.

4.2 What are health inequalities?

‘Health inequalities’ is, in itself, merely a descriptive term referring to the unequal distribution of health within a population. However, when used within the fields of research and social policy, the meaning is generally more confined. In practice, for example, the term ‘health inequalities’ rarely, if ever, refers to individual health variations, but rather to systematic differences in health between social groups (such as socioeconomic groups). In such cases, the terms ‘health inequalities’ and ‘health inequities’ are often used interchangeably. Health inequities, in turn, is a normative concept implying unfairness. Dahlgren and Whitehead suggested that health inequities occur when health variations are systematic, socially produced and unfair (Whitehead & Dahlgren, 2006). That is, when the distribution of health is systematically patterned throughout the population, not biologically determined, and generated by social arrangements that “offend common notions of fairness”. The third notion, that of ‘fairness’, is clearly the most controversial. There is no consensus as to when health differences are to be considered unfair. The normative arguments regarding the supposed unfairness of health inequalities will be discussed in a later chapter. At this point, a definition of health inequalities based on the first two notions will suffice. Thus, health inequalities are health variations that are systematic and (at least partly) socially produced.
4.3 Absolute and relative health inequalities

Health inequalities can be assessed both in absolute and in relative terms. The choice of perspective makes a difference when it comes to interpreting the results.

Absolute inequalities refer to the differences in health between different socioeconomic groups. Relative inequalities, on the other hand, refer to the health in one group in relation to the health of another group.

For example, imagine a hypothetical society consisting of 1,000 manual workers and 1,000 non-manuals. In this society, 50 manual workers, but only 10 non-manuals caught a specific disease during a year. This means that, during this year, the absolute inequality in disease prevalence was 40 (that is, 40 more manual workers than non-manuals caught the disease) whereas the relative inequality was five (that is, the risk of getting the disease was five-fold among the manual workers, as compared to the non-manuals).

Then, imagine the same society a year later. This year the disease spreads more aggressively, infecting 500 manual workers but only 100 non-manuals. This year, the absolute inequality amounts to 400 (i.e., 400 more manual workers than non-manuals caught the disease). However, the relative inequality remains five.

In other words, the relative inequalities may remain stable even when the absolute inequalities changes in magnitude. The relative health inequalities estimate the magnitude of the inequalities regardless of the actual rates of health problems. This is useful when analysing mechanisms and processes that generate health differences. However, it may be less useful when it comes to assessing and comparing different societies and public health interventions, where the actual rates are crucial. In such cases, absolute measures of health inequalities may be preferable (Lundberg, 2003). See Chapter 4.5 for an empirical example.

4.4 What causes health inequalities?

4.4.1 Material factors

Whereas it is intuitively easy to understand how material conditions cause health inequalities in the developing world (e.g., through unequal access to food, clean water, heating), it is perhaps less clear how material conditions cause health inequalities in a developed welfare state such as contemporary Sweden. The proponents of a material perspective on health inequalities in
the developed world often use the term ‘neo-material’ factors, so as to distinguish these from the basic, material factors mentioned earlier. According to the neo-materialists, societies characterized by higher levels of income inequality are also societies characterized by economically liberal policies and underinvestment in public resources. Egalitarian societies, on the other hand, are societies characterized by generous public investments and extensive welfare systems offering a rich array of resources to the population. According to the proponents of the neo-material perspective, it is this difference in available public resources (e.g., health care, education) that causes poorer health and shorter life spans in unequal societies (J. W. Lynch et al., 2000). Such public resources could, in turn, affect health through different pathways. Exposures to hazardous environments (e.g., lead paint, mould, unsafe infrastructure) could affect health directly. Moreover, material living conditions could affect lifestyle and behaviours in ways that, in turn, affect health. For example, high crime rates and poor access to recreational outdoor areas could increase the propensity for a sedentary lifestyle.

4.4.2 Lifestyle

An abundance of research has shown that hazardous lifestyles and health behaviours are socially patterned. A wide range of unhealthy behaviours are more prevalent in the lower socioeconomic strata. Figure 4.1 and 4.2 show results on the association between smoking, sedentary lifestyle, and social class from a Swedish public health survey comprising individuals aged 18-84 (Swedish National Institute of Public Health, 2008).

![Figure 4.1. The association between social class and the likelihood of being a daily smoker among Swedish men and women aged 16-84, during 2004-2007 (Swedish National Institute of Public Health, 2008).](image)
The results uniformly show that these indicators of an unhealthy lifestyle are markedly more common among individuals from the lower social classes. Some studies have shown that such social patterning of behavioural factors tends to explain a substantial part, albeit not all, of the socioeconomic inequalities in health (Laaksonen et al., 2005; J. W. Lynch et al., 2006; van Rossum et al., 2000).

4.4.3 Psychosocial factors

According to the psychosocial perspective, part of the detrimental effects of social inequality is caused by the psychological effects of inequality. Richard Wilkinson, who is one of the most prominent proponents of this perspective, suggests that man is, through evolution, hardwired to live in both egalitarian and highly hierarchical societies. However, our strategies for coping vary depending on the type of society. In egalitarian societies, cooperation, social relations and social cohesion are rewarded and, hence, abundant. In hierarchical societies, on the other hand, individual struggle for status and resources is rewarded and, thus, the predominant strategies for success. This means, according to Wilkinson, that in a society characterized by a high level of inequality, people tend to be more individualistic, competitive and antisocial. These behaviours corrode the social relations of the society, causing status anxiety and psychosocial stress. These psychosocial processes are then, in turn, assumed to cause morbidity and death (Wilkinson, 2005). Thus, according to the proponents of the psychosocial perspective, it is the relative social differences between individuals in the socioeconomic structure that, through neuroendocrine processes, cause health inequalities in the developed world, rather than differences in material living conditions.
4.4.4 Selection

The material, psychosocial and behavioural perspectives on health inequalities all assume that health inequalities arise because socioeconomic conditions affect health. One could, however, assume other causal directions in the associations between socioeconomic conditions and health. One alternative hypothesis is that of reverse causality. That is, health affects socioeconomic conditions. Another potential mechanism is that of a third, confounding, factor that is associated with both health and socioeconomic conditions.

4.4.4.1 Health selection

The health selection hypothesis states that it is health that affects socioeconomic conditions, rather than the other way around. In other words, poor health limits the likelihood of socioeconomic success and, thus, causes a social gradient in health. There is certainly an inherent logic to this argument, and some empirical studies have found that health selection may contribute to health inequalities (Dahl, 1993; Manor et al., 2003). However, most empirical evidence speaks against it. Figure 4.4 shows a rudimentary analysis of the associations between social mobility (as assessed by a combination of father’s social class during childhood and the individual’s social class in adulthood) and global self-rated health in Sweden. The analysis is based on the Swedish level of living survey from 2000, comprises a nationally representative sample of the Swedish population aged 18-75, and is adjusted for sex and age.

![Figure 4.3. The association between social class stability, mobility, and the likelihood of reporting poor health.](image)

As seen in the figure, the class-stable non-manuals had the lowest odds of poor health, and the class-stable manual workers the highest. Those who experienced upward class mobility had, on average, better health than their class of origin, but worse health than their destination class. Similarly, those who experienced downward class mobility had, on average, worse health than their class of origin, but better health than their destination class. These
findings are in line with previous studies and have given rise to the ‘gradient constraint hypothesis’, which suggests that social mobility moderates rather than amplifies health inequalities (Bartley & Plewis, 1997, 2007; Blane et al., 1999; Claussen et al., 2005; Power et al., 1996).

4.4.4.2 Intelligence

Another hypothesis concerning the causes of health inequalities states that the association between socioeconomic position and health could be attributed to differences in intelligence. This is a controversial theory that has gained ground rapidly during recent years (Batty, Shipley et al., 2009; Gottfredson, 2004). Three different mechanisms through which intelligence could cause health inequalities have been suggested (Marmot & Kivimaki, 2009):

- Intelligence could be associated with a greater capacity to lead a healthy lifestyle.
- Intelligence could affect the likelihood of socioeconomic success that, in turn, could affect health.
- (Low) Intelligence could be a marker of something else (e.g., early exposures to injuries, infections, illnesses) that, in turn, affect health.

The empirical evidence for these hypotheses is scattered. If the first hypothesis is correct, one would expect traditional risk factors to explain the association between intelligence and health (Marmot & Kivimaki, 2009). However, this does not seem to be the case. A study of cardiovascular disease mortality showed that “IQ appeared to offer greater explanatory power than apparent for traditional CVD risk factors” (Batty, Shipley et al., 2009, p. 1903). Similarly, another study showed that the association between intelligence and mortality vanished when education and income were taken into consideration (Jokela et al., 2009).

This leads us to the second hypothesis. Is the association between intelligence and health mediated through socioeconomic position? Intelligence has been shown to be associated with the heritability of socioeconomic inequality (Bowles & Gintis, 2002). Thus, it seems as though intelligence is one of the determinants of socioeconomic success. However, it may not be directly associated with health and, thus, not ‘explain’ health inequalities (Marmot & Kivimaki, 2009).

Finally, the third hypothesis assumes that both intelligence and health are moulded by additional conditions, such as early childhood experiences that may, in turn, be socially patterned. Like the previous hypothesis, this hypothesis is plausible, but it does not ‘explain’ health inequalities.
4.5 Health inequalities and ageing

Recently it has been suggested that there is an association between socioeconomic position and the ageing process. That is, individuals holding lower socioeconomic positions, on average, tend to age faster than individuals holding more privileged positions. This is a complex hypothesis to test empirically, as it requires a definition and a measure of ageing. Despite these difficulties, several attempts to test this hypothesis have been undertaken. Empirically they can be sorted into two different categories.

First, there are the studies that have tried to assess the association between socioeconomic position and ageing using biomarkers. Perhaps, the most common way of assessing biological age using biomarkers is by measuring telomeres. Telomeres consist of repeat sequences of DNA that protect chromosome ends (Wong & Collins, 2003). The length of telomeres is shortened by cell replication, a process that eventually leads to reduced capacity for cell replication (i.e., replicative senescence). As a consequence, telomere length is inversely associated with age, and could provide a measure of biological ageing (Aviv, 2004). One study from 2006 showed that socioeconomic position was associated with telomere length independent of a range of risk factors known to affect the ageing process (Cherkas et al., 2006). These findings support the hypothesis that socioeconomic conditions affect the biological ageing process. However, a more recent study found little evidence for an association between socioeconomic position and telomere length (Batty, Wang et al., 2009).

Second, there are the studies that assess ageing by different measures of health and physical function. By studying the rate of physical decline in different socioeconomic groups, these studies have tried to explore socioeconomic differentials in the ageing process. Typically, these studies show a more rapid process of age-bound health decline among those holding lower socioeconomic positions (as compared to those holding higher socioeconomic positions), supporting the hypothesis of socioeconomic inequalities in the ageing process (Chandola et al., 2007; Mirowsky & Ross, 2005; Tell & Nilsson, 2006).

4.6 Health inequalities in Sweden

In 1997, a comparative study of inequalities in mortality risk in 11 European countries was published (Mackenbach et al., 1997). The results showed that “Sweden and Norway have larger relative inequalities than most other countries”. Thus, they concluded that “our data do not support the hypothesis that inequalities in health are smaller in countries whose social, economic, and
health-care policies are more influenced by egalitarian principles, such as Sweden and Norway”.

This conclusion was soon challenged by two Swedish researchers. Vågerö and Erikson (1997) showed that these findings were virtually reversed when absolute, rather than relative health inequalities were analysed. Figure 4.5 shows the absolute differences calculated on the same material as the original article.

![Mortality Rates for Non-manual and Manual Workers](image)

Table 4.4. Mortality for non-manual and manual workers, aged 45-59, in nine European countries, ranked by absolute level of mortality of manual workers (Vågerö & Erikson, 1997).

The figure clearly shows that the mortality rates for both manual workers and non-manuals in Sweden are at the bottom end in the international comparison. This means that, in actual numbers, fewer excess deaths occur among manual workers (as compared to among non-manuals) in Sweden than in the other countries. However, as relative inequalities do not account for the actual numbers affected, this is not found when only relative measures are used. This phenomenon has also been effectively illustrated, using empirical evidence, by Fritzell and Lundberg (2005).

Whereas the health inequalities in Sweden, at least in the absolute sense, are modest in an international comparison, research shows that they are stable over time and, according to some studies, even increasing (Fors et al., 2008; Fritzell et al., 2007).
4.7 A family affair? Gender, marriage, socioeconomic conditions and health.

The gender paradox is a well-known phenomenon within health research. Women, on average, have poorer health than men do, but live longer. The causes of this paradox are obscure, but it is likely to encompass a combination of social and biological mechanisms (Rieker & Bird, 2005). Women are biologically different from men (Oksuzyan et al., 2008). As a consequence, some differences in health and longevity may be inevitable. On the other hand, the gender differences vary widely between different societies and different eras, suggesting that a substantial part of the gender differences in health is caused by social conditions.

One of the social conditions that could contribute to the gender differences in health is marital status. Epidemiological research has consistently shown that marriage is associated with health benefits. Married individuals have better health and lower mortality risk than unmarried individuals (Hu & Goldman, 1990; Lennartsson & Lundberg, 2007). Several mechanisms have been suggested for this association. They can be sorted roughly into two categories, mechanisms based on the assumption that marriage is beneficial to health and those based on the assumption that the association is an artefact of selection, i.e., those assuming that individuals who are married are healthier, or at least have healthier dispositions (e.g., lifestyle, genetics) than individuals who are unmarried. The empirical evidence suggests that both of these types of mechanisms play a role (Goldman, 1993).

This association is found among both men and women, but is typically stronger among men (Hu & Goldman, 1990). That is, marital status is associated with a greater health advantage among men than among women. However, there is evidence suggesting that these differences can largely be explained by differences in socioeconomic position and labour force participation. That is, unmarried women are more likely to participate in the labour force than married women are and, conversely, unmarried men are less likely to participate in the labour force than married men are (Johnson et al., 2000). Thus, when labour force participation (which, in itself, is positively associated with health) is taken into account, it seems marriage is associated with an equal health advantage for both men and women.
5. Life-Course perspectives on health inequalities in later life

5.1 Life-course perspectives on health

By using a life-course perspective, it is possible to understand how experiences accumulated throughout life can affect health in later life. From a life-course perspective, we can study how exposure to different conditions during childhood and adulthood affects socioeconomic position and the risk of ill health later in life, which in turn can explain the social gradient in health (Ben-Shlomo & Kuh, 2002; Blane, 1999; Dahl & Birkelund, 1997; Kuh et al., 2003). Within the life-course perspective there are at least two pathways through which earlier exposures can affect health later in life.

It is possible that exposures during critical periods affect health later in life. A critical period should be understood as a limited period in life when exposures can have negative or positive effects for the development of ill health later in life. According to this hypothesis, it is primarily problematic prenatal and childhood conditions that lead to socioeconomic health inequalities later in life (Barker, 2006; Hallqvist et al., 2004; Kuh et al., 2003; Wadsworth, 1999). Childhood conditions have been linked to a wide spectrum of health problems later in life, for example psychological distress, vascular problems, pain (Lundberg, 1997; Modin, 2003) and mortality (Kåreholt, 2001).

<table>
<thead>
<tr>
<th>Childhood living conditions</th>
<th>Health in later life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth rate in utero</td>
<td>Global self-rated health</td>
</tr>
<tr>
<td>Father’s social class</td>
<td>Impaired mobility</td>
</tr>
<tr>
<td>Economic hardship</td>
<td>Pain</td>
</tr>
<tr>
<td>Large family</td>
<td>Psychological distress</td>
</tr>
<tr>
<td>Conflicts in the family</td>
<td>Cognition</td>
</tr>
<tr>
<td>Broken home</td>
<td>Mortality</td>
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Figure 5.1. Critical period. The association between childhood living conditions and health in later life
Figure 5.1 illustrates how such associations might connect the indicators of childhood conditions and health in later life used in this thesis. Another hypothesis suggests that it is primarily the accumulated exposures throughout life that affect health later on. Exposures may accumulate in different ways. One pattern of accumulation that has been suggested is the ‘unhealthy life career’. That is, a pattern of accumulation where exposures to early disadvantage serve as starting points for subsequent chains of risk factors stretching throughout the life course that, in turn, affect the risk of poor health in later life (Lundberg, 1993; J. W. Lynch et al., 1997). This pattern of accumulation is illustrated in Figure 5.2.

**Figure 5.2. Unhealthy life career. The association between childhood living conditions, living conditions in adulthood, and health in later life.**

Another, perhaps more intuitive, pattern of accumulation is the direct accumulation of exposures. That is, the frequency, duration and severity of exposures experienced throughout the life course correspond to a gradual increase in risk of poor health and mortality (Ben-Shlomo & Kuh, 2002; Ferraro & Shippee, 2009). Such a pattern of accumulation is illustrated in Figure 5.3.

In practice, however, these different patterns of exposures and outcomes throughout the life course are not mutually exclusive. It is certainly possible for all these patterns to be valid (as illustrated in Figure 5.4).
Figure 5.3. Direct accumulation of exposures. The association between childhood living conditions, living conditions in adulthood, and health in later life.

Childhood living conditions
- Growth rate in utero
- Father’s social class
- Economic hardship
- Large family
- Conflicts in the family
- Broken home

Living conditions in adulthood
- Education
- Employment status
- Social class
- Income
- Marital status

Health in later life
- Global self-rated health
- Impaired mobility
- Pain
- Psychological distress
- Cognition
- Mortality

Figure 5.4. Critical period and accumulation of exposures. The association between childhood living conditions, living conditions in adulthood, and health in later life.

Childhood living conditions
- Growth rate in utero
- Father’s social class
- Economic hardship
- Large family
- Conflicts in the family
- Broken home

Living conditions in adulthood
- Education
- Employment status
- Social class
- Income
- Marital status

Health in later life
- Global self-rated health
- Impaired mobility
- Pain
- Psychological distress
- Cognition
- Mortality
5.2 Intergenerational inequality

Individual socioeconomic achievements are determined by a complex amalgamation of factors, including the structure of the economy and production within society, individual traits (e.g., intelligence, personality), and agency. However, one of the most influential determinants of socioeconomic success is the socioeconomic position of the family during childhood. Socioeconomic positions tend to transfer from parents to children, generating intergenerational inequality (Bowles & Gintis, 2002; OECD, 2009). The degree of intergenerational inequality in a given society is often measured by intergenerational income elasticity. According to a recent comparative study, Sweden has an income elasticity of 0.27, suggesting that about 27% of the differences in parental earnings are inherited by the children (Corak, 2006).

Intergenerational inequality is caused by a mosaic of mechanisms, encompassing shared genes (affecting intelligence, personality, and appearance, etc.), cultural capital, parent’s education, residential segregation, discrimination, and self-fulfilling beliefs (Bowles & Gintis, 2002; Esping-Andersen, 2005; OECD, 2009). Thus, socioeconomic conditions experienced in early life tend to work as unequal starting points for subsequent socioeconomic trajectories. Early disadvantage limits the opportunities for socioeconomic success, whereas early advantage facilitates socioeconomic progress.

5.3 Cumulative inequality

Thus, small initial inequalities may, through accumulation of advantage and disadvantage, magnify over the life course and generate increasing heterogeneity (House et al., 2005; Mirowsky & Ross, 2005). Theoretically, the processes generating cumulative inequality have been framed in different ways (Dannefer, 2003; Ferraro et al., 2009). One of the most recent theoretical developments of the field is the formulation of the Cumulative inequality (CI) theory. The CI theory is formulated in the form of five axioms (Ferraro & Shippee, 2009; Ferraro et al., 2009):

1. Social systems generate inequality, which is manifested over the life course through demographic and developmental processes.

2. Disadvantage increases exposure to risk, but advantage increases the exposure to opportunity.

3. Life-Course trajectories are shaped by the accumulation of risk, available resources, and human agency.

4. The perception of life trajectories influences subsequent trajectories.
5. Cumulative inequality may lead to premature mortality; therefore, non-random selection may give the appearance of decreasing inequality in later life.

In short, the theory states that social differentiation starts early in life, when childhood conditions and family lineage play a crucial role. The stratification process is then driven by differential exposures to risks and opportunities. Inequalities may also diffuse across life domains (e.g., education, income and health). The extent to which the inequalities do accumulate depends on exposures to risk, available resources and agency. However, perceived success can amplify inequalities over time, as it may affect agency and self-efficacy (Ferraro & Shippee, 2009).

The fifth axiom of CI theory is developed in the next chapter.

5.4 Cohort inversion

It has been suggested that the impact of health inequalities in later life could be obscured by cohort inversion. Cohort inversion is, assumedly, caused by individual variations in mortality risk. That is, frail individuals susceptible to poor health are likely to die before more robust individuals with more advantageous health prospects. Thus, when premature mortality removes the frailest persons from a population, it is likely to appear as healthier than before. As premature mortality is more common in disadvantaged socioeconomic groups, it is also likely that these groups will experience a higher rate of cohort inversion. This phenomenon may eventually lead to apparently decreasing health inequalities (Ferraro & Shippee, 2009; Hobcraft et al., 1982; Noymer, 2001). This phenomenon is illustrated in Figure 5.4, where the life-course health trajectories of three hypothetical individuals (one with high socioeconomic position and two with low socioeconomic positions) are shown. All three individuals experience health decreases with age, but those with a lower socioeconomic position experience a more rapid decline. This leads to increasing health inequalities. However, when the individual with the steepest health trajectory dies, the health inequalities appear to decline (S. M. Lynch, 2003).
Figure 5.4. A hypothetical illustration of cohort inversion as caused by selective mortality (adapted from S. M. Lynch, 2003).
6. Are health inequalities unfair?

The concept of health inequalities is, in itself, descriptive. It describes patterns of health distribution. There is no normative judgment inherent in the concept. However, the phenomenon of health inequalities is often described as unfair. Sometimes the term health inequities is used to emphasize the unfairness of the health inequalities in question. This raises the inevitable question: When, if ever, are health inequalities unfair?

In the developing world, the poor often lack access to basic provisions essential to the maintenance of good health, such as clean water, nutrition, sanitation, and adequate housing. As a result, public health and longevity in these countries are far worse than in the developed world. Most people would agree that these conditions are unfair, because they believe that policies that create and sustain poverty are unfair, and because they believe that a situation in which economic poverty entails lack of access to fundamental provisions is unfair (Daniels et al., 1999). However, such poverty has practically been eradicated in the developed world, yet health inequalities remain, thus revitalizing the original question.

This question can be viewed and answered (or left unanswered) from several different perspectives. As mentioned in a previous chapter, Whitehead and Dahlgren suggest that health inequities occur when health variations are systematic, socially produced and unfair (Whitehead & Dahlgren, 2006). However, they make no trouble defining which health inequalities are unfair and which are not:

*In today’s Europe, working out what social differences in health are fair and unfair is unnecessary. Essentially, all systematic differences in health between different socioeconomic groups within a country can be considered unfair and, therefore, classed as health inequities. There is no biological reason for their existence, and it is clear that even systematic differences in lifestyles between socioeconomic groups are to a large extent shaped by structural factors (Whitehead & Dahlgren, 2006, p. 4).*

Similarly, Braveman and Gruskin (2003) argued that health equity is the absence of systematic health differences. Thus, all social groups should have
the right to the highest attainable standard of health (as indicated by the health status of the most privileged group).

Yet these arguments have been challenged by other researchers. Vallgårda argued that the extent to which health inequalities are considered unfair depends on normative and ideological standpoints and, thus, no indisputable definition is possible (Vallgarda, 2006).

Other researchers have based their arguments on more thorough definitions of equality, justice and fairness drawn from the field of moral philosophy. Daniels et al. (1999) draw on Rawls’s theory of justice (Rawls, 1999) in order to distinguish to what extent health inequalities should be deemed unfair. Rawls’s theory does not explicitly mention health, but Daniels et al. argue that the fundamental principles of the theory can be extended to encompass health.

In its simplest form, Rawls’s theory of justice can be divided into two principles. The first principle calls for equal basic liberties, encompassing the right to participate in politics, freedom of speech and assembly, freedom of personal property and freedom from arbitrary arrest. These basic rights are considered fundamental and should be guaranteed for all.

The second principle of justice states that social and economic inequalities are fair when:

a) They are to the advantage of those least privileged, and

b) When the social positions are open to everyone under conditions of equal opportunity.

It is first and foremost the second principle that has bearing on health inequalities. The second principle argues that inequalities are fair when they are to the advantage of those least privileged. This means that, for example, economic inequalities are fair when they foster productivity and economic growth that benefit those least well off, as long as the different positions in society are open to all under conditions of equal opportunity. According to Daniels et al., a proper understanding of the principle of equal opportunity extends beyond formal, legal, equality and entails social policy that compensates for early life inequalities, disability and health problems.

Such a reading of Rawls’s theory of justice puts it in close proximity to Sen’s theory of equality. Sen’s theory of equality emphasizes equality of capabilities (rather than equality of wealth or income). Capabilities refer to the individual functions necessary to do basic things (A. Sen, 1992). In order to achieve equality of capabilities, social policies should compensate for
inequalities in basic capabilities (such as disability or poverty). Thus, the Rawlsian principle of equal opportunity and Sen’s emphasis on equality of capabilities call for the same type of social policies to target inequalities.

Daniels et al. suggest that any residual inequality remaining after implementing a Rawlsian system of distributive justice is not necessarily unfair and that pursuing any policies aimed at eliminating them is a question for democratic political decision-making rather than for moral philosophy (Daniels et al., 1999).
7. Health inequalities and the welfare state

7.1 The welfare state
The welfare state can be understood as the public institutions, of a given society, that govern the redistribution of welfare resources in that society. Such redistribution can be governed by different principles and encompass different sets of welfare resources. Esping-Andersen (1990) has developed a typology of different kinds of welfare states found among developed market democracies. The typology consists of three different groups of welfare states with different characteristics:

- The ‘liberal’ welfare states, where the redistribution of welfare resources is limited, and primarily aimed toward targeted, disadvantaged groups.

- The ‘corporatist’ welfare states, where the patterns of redistribution of welfare resources are mapped according to stratifying principles and, thus, serve to preserve social differences in society. Individuals of the corporatist welfare states are supposed to primarily draw on the family for support, and the state intervenes primarily when familial support is exhausted or unavailable.

- The ‘social democratic’ welfare states, where welfare resources are redistributed in order to promote equality of the highest standards. Thus, rather than focusing on providing a bare minimum for the disadvantaged, the social democratic welfare states attempts to provide resources and services to all strata of society.

7.1.1 The Swedish welfare state
Sweden is generally considered as one of the social democratic welfare states (Esping-Andersen, 1990). Others have referred to a ‘Nordic’ welfare model (Kauto et al., 2001). Such a welfare system is characterized by universalism, commitment to full employment, active labour market policies, relatively generous benefit levels, high quality public care services for chil-
dren and old people, relatively high taxes, low rates of poverty, and relatively small inequalities between genders as well as between different socio-economic groups (Fritzell & Lundberg, 2007).

7.2 Health inequalities in the welfare state

The welfare state can impact on health inequalities through a range of mechanisms working at several levels (Eikemo et al., 2008; Lundberg et al., 2008). First, the welfare state has substantial effects on the level and structure of the social stratification of society. These effects stem from a range of social policies redistributing resources throughout society. Such redistributive policies affect social stratification both quantitatively and qualitatively. Most obviously, perhaps, taxes and transfers relieve poverty and decrease income inequality. But public spending on good, pedagogic child care systems and educational systems accessible for all also affect social stratification by affecting the opportunities for social mobility (Esping-Andersen, 2005). Similarly, social policies aimed at eliminating systematic discrimination in the labour market, school system, residential areas and so forth facilitate social mobility.

Health inequalities are, in part, caused by differences in exposure to risk factors. Such risk factors encompass environmental, psychosocial and behavioural conditions. The welfare state levels out health inequalities by levelling out such conditions. For example, by banning or restricting the use of toxic materials (e.g., asbestos and solvents) in construction and industrial work, the working environment of large groups of manual workers has been substantially improved.

Another cause of health inequalities is differential susceptibility. That is, some social groups may, for some reason, be more susceptible to health problems than others. The welfare state levels such differences out by levelling out the differences in susceptibility. For example, a growing body of evidence has shown that disadvantageous conditions experienced in infancy and during childhood are associated with a higher risk of ill health throughout the life course (Barker, 1994; Fors et al., 2009; Lundberg, 1993). It is also known that such experiences are socially patterned. Lower socioeconomic groups are more likely to have been exposed to such conditions (Fors et al., 2009, Manuscript; Gisselman, 2007). Thus, through public support and interventions
during such critical periods, the welfare state can level out differential susceptibility and, in turn, health inequalities.

The welfare state can also affect health inequalities through social policies aimed at levelling out the differential consequences of health problems. For example, research has shown that, among men, mortality after heart problems is more common among manual workers than among non-manuals (Kareholt, 2001). By offering equal access to health care and equal medical treatment to all, the welfare state can help to level out the inequalities in terms of the consequences of poor health (consequences that may, eventually, cause further health problems).
8. Materials and methods

8.1 The Level of Living Survey, and the Swedish Panel Study of Living Conditions of the Oldest Old

The Swedish level of living surveys (LNU) was founded in 1968 as a mean to assess the welfare of the Swedish population extending beyond the scant information given by the gross domestic product. LNU consist of a nationally representative sample of the Swedish population, originally encompassing about 6,000 individuals in the age range 15-75 (however, later on the lower age limit was raised to 18). Since the first, baseline survey in 1968, follow-ups were carried out in 1974, 1981, 1991 and 2000 with additions of younger people and immigrants in order to maintain a representative sample. The response rates of the LNU studies have varied between 91% (in 1968) and 77% (in 2000).

The Swedish Panel Study of Living Conditions of the Oldest Old (SWEOLD) was founded in order to follow those participants of the LNU study who had out-lived the age span encompassed by the LNU study. In other words, SWEOLD consists of respondents who had previously been part of the LNU study, but were aged 75 or older at the time of the last LNU survey. The first SWEOLD study was conducted in 1992, and subsequent studies have been carried out in 2002 and 2004 (in 2004, the lower age limit was lowered to 69). The sample sizes of SWEOLD have varied between 537 and 1180. The response rates of the SWEOLD studies have ranged between 96% (in 1992) and 87% (it should be noted, however, that the 2004 SWEOLD study deviated from the other SWEOLD studies on two accounts: the interviews were conducted over the telephone, and the age range was wider).

Together, the LNU and SWEOLD studies make up a longitudinal database spanning a period of 36 years (see Figure 8.1 for a schematic representation). The interviews were conducted face-to-face in the respondent’s home (and, in a few cases by telephone). In cases where the respondents could not be
interviewed (e.g., due to cognitive impairment or illness), proxy interviews were conducted with relatives or care personnel.

8.2 The Uppsala Birth Cohort Study

The Uppsala Birth Cohort Study (UBCoS) is a registry study consisting of all men and women born at Academic Hospital in Uppsala between 1915 and 1929, yielding a sample of 14,609 individuals (of whom 14,192 were born alive). Information on health and social circumstances at different stages of the life cycle has been gathered from registries and archives, providing a unique data set following a cohort from birth to old age (Koupil, 2007).
8.3 Measurements

8.3.1 Socioeconomic position
The three most common indicators of socioeconomic position are social class (based on occupation), income, and education. In the present thesis, all three indicators are used. The social class measure used is the SEI schema, which classifies occupations based on ownership (self-employed or employee) and typical skills required for the occupation. This class schema is closely related to the Erikson, Goldthorpe and Portocarero (EGP) class schema, well established theoretically and empirically, and readily available in Swedish statistics. As both the respondents’ own occupation and their spouses’ occupation are known, it is possible to ascribe social class on both an individual and a household level. In the first study of the thesis, household class is used. This means that a single social class is assigned to the whole household. This is done according to an order of dominance, where both spouses’ occupations are compared and the ‘dominant’ occupation forms the basis of the household class. The rationale is that the dominant social class of a household is supposed to have a greater impact of the living conditions, values, and behaviours of that household than individual social class. The order of dominance reads as follows; farmers and self-employed dominate the employed (with the exception of employed professionals), the employed dominate the unemployed; among the employed higher positions with higher qualifications dominate positions with lower qualifications, and where qualifications are equal, non-manual positions dominate manual positions. In Study II and III individual social class is used.

Study II and IV include education (partly) as a measure of socioeconomic position. In Study II a dichotomous indicator of education is used, separating those with only a grade school education (i.e., 6-8 years of schooling) from those with a more extensive education. In Study IV years of education is used as a trichotomous variable, separating those with a grade school education, those with a high school education and those with an university education.

Study IV includes income as an indicator of socioeconomic position. The income measure used is equivalent to disposable household income. That is, the income of the whole household after taxes and transfers is divided according to the equivalence scale developed by Statistics Sweden in order to assess the individuals’ share of the household income. The equivalence scale adjusts for the number of persons in the household, and for their relative costs. For example, if the household consists of two adults and a child, the disposable household income is divided by 1 (for the first adult in the household), 0.55 (for the second adult of the household), and 0.47 (for the child).
8.3.2 Childhood living conditions

Several indicators of childhood living conditions are included in the studies. *Economic hardship, large family, broken home, conflicts in the family, and father’s social class* are all indicators used in Study II and III; these indicators are based on retrospective self-reports made in 1968, when the respondents were asked to answer questions regarding their living conditions during childhood (i.e., before the age of 16).

In Study IV, *growth rate in utero* and *social class at birth* were used as indicators of early life conditions. Growth rate in utero was assessed by birth weight, and social class at birth was assessed by father’s class at birth. Information on both these conditions was gathered from registries.

8.3.3 Health, cognition and mortality

8.3.3.1 Health

In Study I, four different measures of health problems are included; *global self-rated health, impaired mobility, musculoskeletal pain, and psychological distress*.

Global self-rated health was assessed using a single question: *How do you view your general state of health? Is it good, poor or in-between?* In the analyses, those reporting poor health were separated from those reporting good health or a level in between. In cases where proxy interviews were conducted (and, thus, the question was not posed), the participant was classified as having poor global health (as the vast majority of the proxy interviews are due to poor health, this is a reasonable substitution).

Impaired mobility was measured by two self-assessed questions (ability to walk 100 meters and ability to use stairs without difficulties). Those who were, by their own admission, unable to carry out or had difficulties with either of these activities were classified as having impaired mobility.

Musculoskeletal pain was assessed using an index comprising three items concerning musculoskeletal pain. In the questionnaire, the items were part of an extensive battery of questions on health problems. The question *Have you had any of the following illnesses or ailments during the past 12 months?* was followed by an extensive list of health problems. Those used in this index were: *pain in shoulders, pain in back, hip or sciatica, and pain in hands, elbows, legs or knees.* For each of the three items, the possible answers were: *No, Yes, mild problems, or Yes, severe problems.* The index was created by coding the answers as 0 (No), 1 (Yes, mild problems) and 3 (Yes, severe problems). These items were then added into an index that was, in
turn, dichotomized. Those with a score of 3 or higher (that is, at least three mild problems or one severe) were classified as suffering from musculoskeletal pain.

Psychological distress was assessed using a similar index, comprising five items from the list mentioned above: general fatigue, difficulties sleeping, nervous problems, depression/deep sadness, and mental illness. The index was constructed and dichotomized in the same way as the index measuring musculoskeletal pain. However, due to the inherently grave nature of mental illness, even those reporting mild problems were coded as three. In other words, those reporting at least three mild problems, one severe problem, or mental illness were classified as psychologically distressed.

8.3.3.2 Cognition

In Study II, the outcome is cognition. In the study, cognition is assessed using a short form of the Mini Mental State Examination (Folstein et al., 1975). The short form consists of five items:

- Registration: Registering and repeating three objects (one point total)
- Orientation: Which year/month/date is it now? What country are we in? (one point each)
- Delayed recall: Repeat the three objects from the first task (one point each)
- Attention/concentration: Subtract 7 from 100, repeat five times (i.e., 93, 86, 79, 72, and 65) (0.4 points each)
- Visual-spatial ability: The ability to correctly draw a copy of a geometric figure (one point)

Thus, the scoring ranges between 0 and 11, with values rounded to the closest integer. All missing values were treated as incorrect answers. Respondents who were unable to take the test due to dementia were given a total score of 0. Similar versions of the test have been described in detail by Parker, Gatz and Thorslund (Parker et al., 1996), and used empirically in several studies (Andel et al., 2007; Fors et al., 2006; Parker et al., 2005; Schön & Parker, 2008).

8.3.3.3 Mortality

In Study III and IV, mortality is the main outcome. In both studies, the information on mortality is gathered from the Swedish National Cause of
Death Registry. In Study III, the outcome is mortality during mid-life (i.e., between the ages 25 and 69). The reason for this is that the aim of the study is to explore the social determinants of premature mortality, and mortality before the age of 70 is a commonly used definition of premature mortality (OECD, 2003). As the data used only contained information on year of birth, all participants were assigned a birthday in the middle of their year of birth (June 15). In the analyses, all participants are left censored by their age at baseline and right censored on their 70th birthday (unless they died before that).

In Study IV, on the other hand, mortality during old age, between 1991 and 2002, is the outcome. Participants were followed from the age of 67-76 until their emigration, death or end of follow-up, whichever occurred first.
9. Results

9.1 Study I: Health inequalities among older adults in Sweden 1991 - 2002

Objectives: To explore health inequalities in several health domains among older adults aged 55 and older, in Sweden, and to analyse whether any changes in these health inequalities occurred between 1991-1992 and 2000-2002.

The analyses were based on all participants aged 55 and above from LNU 1991 and 2000 as well as from SWEOLD 1992 and 2002 (n= 4085). The associations between gender, social class, and four different health indicators (poor self-rated health, impaired mobility, pain, and psychological distress) in 1991/1992 and 2000/2002 were analysed.

The main results were threefold. First, the prevalence of all specific health problems, but not of poor self-rated health, increased between 1991/1992 and 2000/2002. Second, there were gender and socioeconomic differences in health during both periods. Women reported higher rates of impaired mobility, pain and psychological distress than men did. Manual workers were more likely than non-manuals to report poor health in all four domains. Finally, the magnitude of these inequalities did not change between the periods.

Figure 9.1 shows the associations between socioeconomic position and health found in the study.
Furthermore, the attributable risks of these health inequalities were calculated. That is, the proportion of health problems that would be eliminated if all social classes had the same rates of poor health as the most privileged group (i.e., higher and intermediate non-manuals). The results showed that between 16 and 37 percent of the health problems (depending on health domain and period) would be eliminated if all social classes had the same risk as the higher and intermediate non-manuals.

9.2 Study II: Childhood living conditions, socioeconomic position in adulthood and cognition in later life: exploring the associations

Objectives: To explore whether childhood disadvantage is associated with cognition in later life (age 77 and above) and, if so, whether the associations are mediated or modified by socioeconomic conditions in adulthood.

The analyses were based on retrospective self-reports on childhood living conditions made in the 1968 LNU survey and information on social class, education and cognitive performance from the 1992 and 2002 SWEOLD study. The data set comprised 970 observations.

The results showed that father’s social class during childhood, exposure to conflicts in the family during childhood, education, and social class in adulthood all had independent effects on cognitive performance in later life. Lower social class in childhood and/or in adulthood, exposure to conflicts in
the family during childhood and low education were all associated with lower levels of cognitive performance in old age.

These results support the notion that exposures to disadvantage during early life can have lifelong consequences for cognitive performance, regardless of educational and socioeconomic success in adulthood.

9.3 Study III: Childhood living conditions, marital status, social class in adulthood and mortality during mid-life: a cohort study

Objectives: To explore whether childhood living conditions affect the mortality risk during mid-life and, if so, whether the effects are mediated or modified by marital status or social class during adulthood.

The analysis is based on participants of the LNU 1968 study aged 25-69 (n=4082). The mortality incidence for these individuals was then tracked for 39 years using registry data.

The main findings were that childhood living conditions were associated with marital status and social class in adulthood. Marital status and social class were, in turn, associated with mortality during mid-life. However, childhood living conditions were not directly associated with mortality during mid-life, when adjusting for marital status and social class in adulthood.

Thus, the results suggest that childhood disadvantage may serve as a starting point for subsequent detrimental life-course trajectories that, eventually, increase the likelihood of an early death.

9.4 Study IV: Socioeconomic inequalities in old-age mortality: the impact of mid-life income and old-age pension

Objectives: To study the association between income in mid-life, old-age pensions and mortality risk during old age. Furthermore, the study aims to explore whether income inequalities in old-age mortality can be explained by differences in early childhood conditions, education or marital status.

The study is based on the UBCoS study, and includes all individuals born alive at Uppsala Academic Hospital between 1915 and 1924 who had re-
tired, but not emigrated, by 1991 (n=4156). Information on social and biological conditions as well as on mortality is gathered from registries.

The results show that both income during mid-life and income during retirement were associated with old-age mortality. Mutually adjusted models showed that income in mid-life had more influence on women’s old-age mortality, whereas income during retirement had more influence on men’s mortality risk during old-age. The results also showed that differences in education and marital status explained a substantial proportion of the income inequalities in old-age mortality.

These findings suggest that, even though part of the income inequalities in old-age mortality stem from experiences earlier in the life course, income during retirement has an effect on the mortality risk in later life. These results suggest that income inequalities in later life may still be, at least in part, modifiable by social policy.
10. Discussion

10.1 Health inequalities in later life

The results of the present thesis uniformly show that health inequalities persist into old age. Poor health, mortality, and lower levels of physical and cognitive functioning are consequently more prevalent among individuals with lower socioeconomic positions than among individuals with higher socioeconomic positions. This pattern emerges regardless of the indicator of socioeconomic position used (Study I uses household social class, Study II uses individual social class and education, Study III uses individual social class, and Study IV uses household income). The pattern is also present in both data sets used in the thesis.

Thus, it seems clear that there are substantial socioeconomic inequalities in health among older adults in contemporary Sweden. Furthermore, the results from Study III show that the likelihood of living long enough to experience old age is socially patterned. Individuals from lower socioeconomic positions have a greater likelihood of dying before reaching old age (i.e., the age of 70 or above) than do individuals with higher socioeconomic positions. Thus, the health inequalities observed among older adults are, in a sense, likely to be underestimated, as they do not account for inequalities in premature mortality.

10.2 Childhood, adulthood and health inequalities in later life

Another theme that emerges throughout the thesis is the importance of life-course living conditions for health in later life. Moreover, the different studies illustrate the complex pathways through which earlier experiences affect health later in life. In Study II, the results show that childhood living conditions have both direct effects on cognition in later life, and effects that are mediated through education and social class in adulthood. In other words, some of the effect of childhood living conditions on late life cognition acts directly and is, thus, unmodified by education and social class in adulthood, and some of the effect acts through education and social class in adulthood. That is, an advantaged childhood increases the propensity to achieve a
higher level of education and a more privileged social class in adulthood, which, in turn, affects cognitive abilities in later life. In terms of the theoretical models described in Chapter 5.1, the results from Study II support the final, full model. Social disadvantage during childhood seems to serve as a critical exposure and as a starting point for a subsequent chain of exposures to risk factors stretching throughout the life course.

In Study III, on the other hand, there is no evidence of a direct effect of childhood disadvantage on the risk of mortality during mid-life. The effects of childhood disadvantage on mortality during mid-life seem to be mediated through adult living conditions. The study shows that some indicators of childhood living conditions increase the likelihood of achieving a lower social class and/or being unmarried in adulthood. These conditions are, in turn, associated with a higher risk of mortality during mid-life.

10.3 Limitations

As with all empirical research, the present results should be interpreted with caution. Conducting flawless empirical research is akin to unbinding the Gordian knot, virtually impossible. This predicament leaves the research community with two options; give up or do as well as possible, while acknowledging the inevitable shortcomings. This thesis is an attempt at the latter. Thus, the following is an account of shortcomings that may constrain interpretation of the results.

10.3.1 Selection

In these studies, the main source of potential bias is non-response. That is, as the non-respondents tend to differ systematically from the respondents in terms of health and/or socioeconomic conditions, the results are likely to be biased. The non-response rates of the studies included here are relatively low.

The 1968 LNU survey had a non-response rate of 9.2%. The non-response rates of age groups 55-75 in LNU 1991 and 2000 (i.e., those included in Study I) were 26.9%, and 27.3%. The corresponding non-response rates for SWEOLD were 4.6% in 1992 and 15.6% in 2002.

The UBCoS study, on the other hand, is a registry study. In this study, only 2.7% of the eligible participants were untraceable throughout the registries. Thus, while it is likely that selective non-response biases the results somewhat, it is unlikely that it substantially distorts the associations found.
10.3.2 Misclassification

Misclassifications may be differential or non-differential. Differential misclassifications occur when the misclassification of an independent variable is dependent on the dependent variable and vice versa. Non-differential misclassifications, on the other hand, occur when the misclassification of an independent variable is unrelated to the dependent variable and vice versa (Rothman, 2002). A certain degree of non-differential misclassification is likely to affect all variables in the studies. The consequence of such misclassification is a bias of the effects (were there any) toward the null. In other words, non-differential misclassification attenuates the results (Rothman, 2002). For example, it has been suggested that women are more susceptible than men to misclassification of social class when using conventional social class schema, as they are less able to adequately distinguish between female occupations than between typically male occupations. Such misclassifications may lead to weaker observed social gradients in health among women (G. Sen et al., 2002). Such misclassifications could thus affect the results of Study I, II and III of the present thesis (although Study I might be less afflicted as it uses household class). The results, on the other hand, do not show substantially weaker associations between social class and health for women than for men. This does not necessarily imply that the results for women are not diluted by misclassification. However, the results from a methodological study by Ljung and Hallqvist (2007) did not support the notion that inflated misclassifications of women’s social class would lead to a more severe underestimation of the social gradient in health among women.

Differential misclassifications, on the other hand, may actually affect the patterns of the results. In the present thesis, differential misclassification is, perhaps, most likely to afflict the measures of health in Study I, and the measures of childhood living conditions used in Study II and III.

It is plausible that the self-reported health items in Study I might be misclassified in accordance with ‘the modesty of the poor as well as the dissatisfaction of the rich’ (Johansson, 1979). That is, that those individuals holding higher socioeconomic positions may expect better health and thus report health problems at lower thresholds than those holding lower socioeconomic positions. Such misclassifications may attenuate the observed social inequalities in health. However, a methodological study on the associations between self-reported and observed physical function revealed no clear patterns according to socioeconomic position (as indicated by achieved education), suggesting that substantial differential misclassification is unlikely (Fors et al., 2006).
Study II and III use retrospective self-reports of childhood living conditions. Such retrospective reports might be subject to recall bias, which could, potentially, bias the results. Both studies use retrospective reports of childhood living conditions as independent variables and educational, occupational, and marital status in adulthood as dependent variables. It is conceivable that respondents who are unhappy with their living conditions in adulthood could be liable to attribute their failures to a disadvantaged childhood. That is, respondents with less privileged social conditions in adulthood could have a higher propensity to report difficulties during childhood and, thus, generate or embellish an association between living conditions in childhood and adulthood. However, as the results are congruent with the theoretical assumptions, as well as with the results from previous studies, this is unlikely to be a substantial problem.

10.3.3 Confounding
A confounding factor is a factor that affects both the independent and the dependent variable, which is why omission may create spurious associations. In the present case, a confounding factor would be a factor that affects both the social conditions and the health outcome. One such factor that has been suggested in the literature is intelligence. As intelligence might affect both socioeconomic success and health, it is possible that the association between socioeconomic conditions and health could be, in part, a spurious one (Gottfredson, 2004). However, as discussed in Chapter 4.4.4.2, it is unlikely that the association between socioeconomic conditions and health could be fully explained by differences in intelligence.

10.4 Policy implications
The present findings have several, potential implications for social policy. First, the results clearly show that there are substantial inequalities in mortality, cognition and health among older adults in Sweden, as well as in the likelihood of surviving to old age. Thus, it seems there are economic and moral imperatives for social policies aimed at eliminating health inequalities among older adults.

Second, the results from the thesis shows that health inequalities in later life are the result of life-long processes of accumulation. Childhood conditions seem crucial in determining the trajectories of such processes. Childhood disadvantage seems to be detrimental to health in later life, both due to direct effects on health in later life and as it is a powerful determinant of socioeconomic conditions in adulthood that, in turn, affect health and mortality in later life. Hence, these results stress the urgency of social policies aimed at alleviating early life disadvantage.
Esping-Andersen (1999) has argued that two sources of substantial differences in life chances stand out: a) the risks associated with poverty and familial disruption during childhood; b) educational differences. These suggested factors resonate firmly with the present findings. Childhood living conditions affect educational achievement. Educational achievement affects socioeconomic position in adulthood which, in turn, affects health in later life. Thus, effective social policies aimed at childhood disadvantage and inequalities in educational achievement are likely to diminish health inequalities throughout the entire life course. Whereas it may seem intuitively wrong to allocate resources to the young in order to improve conditions for the old, it makes sense both on an individual and on a societal level. Gerontologists Baltes and Smith (2003, p. 124) wrote:

In other words, there may be some danger inherent in pushing an exclusive old-age focus. Such focus potentially limits the resources necessary for improving the state of earlier phases of life, namely childhood and adolescence. These early life phases lay the foundations for subsequent life span development and for future resources necessary to support old age. Perhaps the time has come to think about the younger ages in order to serve old age.

However, stressing the importance of social policies aimed at early life disadvantage does not, necessarily, entail political ignorance of later life conditions. The results of the present thesis show that socioeconomic conditions in adulthood and during old age are both associated with mortality and health in later life. Thus, social policies aimed at reducing exposures to socially stratified risk factors in adulthood (e.g., income inequalities, hazardous working conditions, material deprivation, residential segregation) are also likely to decelerate the accumulation of health inequalities.

Finally, the results from Study IV show that income during old age has an effect on mortality risk that is independent of income in mid-life and socioeconomic conditions in childhood, suggesting that egalitarian pension schemes could serve to mitigate health inequalities in later life.

In conclusion, the present findings suggest that simultaneous social policy interventions aimed at different life stages, with a special emphasis on early life, may prove to be the most efficient way to fight health inequalities in all age groups.
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12. References


