Equality in Death?

How the Social Positions of Individuals and Families are Linked to Mortality

Jenny Torssander

Hör wandringsman statt stilla och bida
Här ligger drängen vid herrens sida
Estu så kloker och mycket förfarit
Säg mig: Hvem herren ell tienaren warit

Inskrift, Klara kyrkogård, Stockholm

Contents

Abstract

Socioeconomic positions of individuals are clearly associated with the chances of living a healthy long life. In four empirical studies based on Swedish population registers, two topics are examined in this thesis: The relationships between different indicators of social position and mortality, and the importance of family members' socioeconomic resources for the survival of the individual.

The overall conclusion from the separate studies is that no single individual socioeconomic factor gives a complete picture of mortality inequalities. Further, the socioeconomic resources of partners and adult children are important in addition to the individual ones. The specific results from each study include that:

I education, social class, social status and income are, to various extent, independently associated with mortality risk. Education and social status are related to women's mortality, and education, social class and income to men's mortality.

II one partner's social position is related to the other partner's survival, also when individual socioeconomic factors are statistically controlled for. In particular, men's mortality is linked to their wives' education and women's mortality to their husbands' social class.

III adult children's education is related to their parents' risk of dying, also when both parents' socioeconomic resources are taken into consideration. Further, the association between the offspring's level of education and parental mortality cannot be explained by characteristics that parents share with their siblings.

IV children's social class and income are related to parental mortality, but not as strongly as the education of the children. There is no relationship between a mother's own education and breast cancer mortality, while mothers seem to have better chances of surviving breast cancer if they have well-educated children.

Sammanfattning

Individers socioekonomiska position har ett tydligt samband med chansen att leva ett långt liv. I fyra kvantitativa studier av den svenska befolkningen studeras här två frågor: Vilken roll olika aspekter av socioekonomisk position spelar för individers överlevnadschanser och vilken betydelse familjemedlemmars socioekonomiska resurser har utöver de egna.

Den övergripande slutsatsen är att ingen enskild socioekonomisk faktor ger en fullständig bild av den sociala ojämlikheten i livschanser. Dessutom verkar det som om nära familjemedlemmars – partners och vuxna barns – socioekonomiska resurser påverkar individers dödsrisk. Mer detaljerat visar de fyra delstudierna att

I utbildning, social klass, social status och inkomst har – oberoende av varandra – ett samband med risken att dö under uppföljningsperioden. Utbildning och status är de faktorer som har störst betydelse för kvinnors överlevnadschanser och utbildning, klass och inkomst de faktorer som betyder mest för mäns överlevnadschanser.

II den gifta eller sammanboende partnerns socioekonomiska resurser har ett samband med individens dödsrisk utöver betydelsen av den egna positionen. Män som är sammanboende med välutbildade kvinnor har särskilt låga dödsrisker, och motsvarande gäller kvinnor som är sammanboende med män med en hög klassposition.

III föräldrar med välutbildade barn har lägre dödsrisk jämfört med föräldrar med barn med kortare utbildning, även givet skillnader i föräldrarnas egen utbildningsnivå, samhällsklass och inkomst. Sambandet mellan barns utbildning och föräldrars livschanser kvarstår även när hänsyn tagits till faktorer som föräldrar delar med sina syskon.

IV vuxna barns utbildningsnivå har ett tydligare samband med föräldrars överlevnad än barnens klassposition och inkomstnivå. Sambandet är dock inte starkare ju närmare varandra barn och föräldrar bor. Barns utbildning har ett samband med föräldrarnas mortalitet i flera dödsorsaker, även för bröstcancerdödlighet där det inte finns några skillnader efter mödrarnas egen utbildningsnivå.

Tack

Två personer utanför universitetet – Aina Jutterström och Ylva Werlinder – har betytt särskilt mycket för mig under perioder av motgång (och medgång) i arbetet med avhandlingen: Tack!

Tack till mina föräldrar, Lena och Janne Torssander, och svärföräldrar, Anita och Hasse Ericson, för ovärderlig praktisk hjälp under doktorandtiden, till mina bröder Anders och Olle Torssander, samt Tove Janarv, Lina och Christopher Ralston.

Ett extra tack till mamma!

Slutligen, tack till mitt hjärtas kärlek: Johan Eriksson, Ingrid och Julian Torssander. För att ni finns. Och Johan, igen, för all omtanke.

Frescati, september 2013

Jenny Torssander

Introduction

In Sweden and elsewhere, the better off you are socially or economically, the greater the chances of a healthy long life. This difference is not just a matter of the poorest and the richest, or the least and the most educated. Rather, each separate educational, occupational or income step is associated with increased life chances. University graduates live longer than people who drop out of education after upper secondary school, who in turn can expect to live longer than people with only a compulsory school education. In fact, the relationship between education and health can be established at even finer levels. Post-graduates, for instance, run a lower risk of dying than graduates from tertiary education (Erikson and Torssander 2009). The UK Whitehall studies of mortality among civil servants reveal a similar pattern for occupational class where each employment grade is related to additional length of life (Marmot and Shipley 1996). In some situations, the gains in survival may be greater at lower levels of social position. For example, the association between income and mortality in Sweden is nonlinear (Gerdtham and Johannesson 2004), so that the effect of additional income on mortality is greater when resources are scarce.

The overall purpose of this thesis is to explore the relationship between social position and death risk further, which is done in four separate studies. Study I focuses on different indicators of socio-economic position and analyses to what extent education, social class, social status and income have independent relationships with mortality or whether they rather capture similar aspects of social stratification. The subsequent studies take a comprehensive view of the importance of the socioeconomic resources of next of kin: Study II includes the socio-economic positions of cohabiting partners and examines how partners' positions are associated with mortality irrespective of the position of the individual. Studies III and IV further widen the family perspective on health inequalities and look at the importance of the resources of adult children for their parents' longevity. Hence, this thesis has two inter-linked themes: The relationship between different aspects of social position and a long life, and the importance of socioeconomic resources of next of kin over and above one's own resources.

Before presenting the results of the studies included, this introduction continues with a brief description of social inequalities in mortality in

Sweden, followed by a summary of common explanations for these inequalities. In conjunction with this, different indicators of social position and specific mechanisms will be discussed. The last section reviews the importance of the resources of family members for health and longevity.

Social Inequalities in Mortality in Sweden

Mortality is widely used in health inequality research as a marker of health in populations and is strongly associated with objective and subjective health measures (Idler and Benyamini 1997). But an early death is not always a consequence of health problems. Accidents with a fatal outcome are one example. Conversely, there are health conditions that reduce wellbeing but which do not necessarily result in premature mortality, such as some forms of musculoskeletal diseases (Fritzell and Lundberg 2007). Historically, however, increased longevity has gone hand-in-hand with better health for the population as living conditions and medical knowledge have improved. There is some evidence that chronic diseases and functional impairments among elderly people in Sweden are now becoming more common (Parker and Thorslund 2007) while other health indicators, like mortality, show a more positive trend.

Life expectancy at birth has increased by around 25 years in Sweden in the last hundred years and there are no signs that this rise has come to an end. Today, Swedish newborn girls can expect to live 83.5 years and boys 79.5 years (Statistics Sweden 2010). The increase in life expectancy has not been equal for all. Men's life expectancy at birth is increasing faster than women's, and the gender gap in life expectancy is therefore decreasing (Statistics Sweden 2010). During the last few decades, educational inequalities in mortality have increased (Shkolnikov et al. 2012; The National Board of Health and Welfare 2013). Comparing 1986 to 2007, differences in remaining life expectancy at the age of thirty between individuals with compulsory and tertiary education widened from 2 to 4.5 years for women and from 3.4 to 4.9 years for men (The National Board of Health and Welfare 2009). The mortality difference between these educational categories is thus greater than the gender difference.

Regarding historical social inequalities in mortality, a study from southern Sweden finds no socioeconomic gradient in mortality before the 1950s (Bengtssson and Dribe 2011). However, early descriptions of socioeconomic inequalities in adult mortality in Sweden speak against this hypothesis (see examples in Willner 2005, pages 45-46).

In the last few decades, increased socioeconomic inequalities in mortality have been observed in many other countries as well, for example in Finland (Tarkiainen et al. 2012), Norway (Strand et al. 2010), the UK (Davey Smith et al. 2002) and the US (Pappas et al. 1993; Montez and Zajcova 2013). One explanation for this trend is that the composition of social groups has changed. Secondary and tertiary education became more widespread in Sweden during the 20th century, and it is possible that the shrinking group of people with a low level of education are more

(negatively) selected and marginalised today. But since tertiary education has become more common, the group consisting of the well-educated is likely to be less positively selected than before. Hence, compositional change may not be the only answer to increasing social inequalities in mortality.

In a European comparison, the relative inequalities in mortality (i.e., death rate group 1 divided by death rate group 2) by education or income are not particularly small in Sweden or the other Nordic welfare states (Mackenbach et al. 2008). Due to low levels of average mortality, however, absolute mortality differences (death rate group 1 subtracted by death rate group 2) are small in Sweden (Huijts and Eikemo 2009; Vågerö and Eriksson 1997). Still, absolute inequalities are even smaller in some parts of Southern Europe (Mackenbach et al. 2008).

The intermediate levels of relative mortality inequalities in Sweden have been described as a public health 'puzzle' (Bambra 2011) and a 'paradox' (Mackenbach 2012) since welfare states aim at equality and universalism and a consequence should be smaller inequalities. Yet another way of making a comparison is to look at mortality among those who are worst off in a society. For example, among men, manual workers in Sweden have a low mortality compared to manual workers in other European countries (Lundberg et al. 2008a). But having a job is generally better for your health and longevity than being unemployed (Roelfs et al. 2011). Given their initial health status, the risk of mortality of unemployed Swedes was fifty per cent higher than the mortality of the employed (Gerdtham and Johannesson 2003).

The mortality of a complete cohort – absolute and relative rates

The studies in the present thesis include only the parts of the population that are – if not privileged – at least not severely deprived on average. To add to this picture, the absolute and relative mortality rates between 2001 and 2007 for the complete cohort of individuals born in 1950 and alive and registered in Sweden in the end of the year 2000 are shown in Table 1 (page 6). Mortality in this age group (51-57) is much more common among men than women; male deaths stand for two thirds of the total number of deaths, a pattern that can partly be explained by socially embedded behavioural factors (Hemström 1998).

The part of the population that is excluded in Studies I-IV has, on average, a high mortality rate. The small share of the population for which information on level of education is missing (0.7 per cent in this cohort) has a relatively high death risk, especially among men. Unregistered individuals, where we have no data at all, have most probably an even higher mortality rate.

Relative educational inequalities in mortality are more or less equally great for women and men in the cohort of 1950 (for some educational categories even higher for women), while absolute educational inequalities are greater for men. The death rates of women with at least two years of secondary education are lower than the death rates of men in all educational groups. Hence, only women with compulsory and shorter secondary education can on average expect to have a higher mortality rate than men (regardless of their level of education).

Those with no educational information constitute less than one per cent, and the exclusion of these individuals will hence not severely impact any inequality figures. The group of individuals which are not gainfully employed is, however, much larger (almost 17 per cent in this cohort). To be classified as gainfully employed you have to have paid work for at least one hour during a survey week in November (Statistics Sweden 2005). Both men and women who are not employed according to this broad definition have high mortality rates. Some individuals in this group are homemakers or students, while others are registered as unemployed (also distinguished in Table 1 with comparatively high mortality rates). Individuals with partners and children (analysed in Study II and III-IV respectively) have relatively low mortality risks. To summarise, the individuals who are excluded have on average a high mortality rate and the overall inequalities are thus greater than among the people examined in this thesis.

Table 1 Number of deaths (2001-2007), person-years, and mortality rates (deaths per 1,000 person-years) for individuals aged 50, living in Sweden in the year 2000. In addition, absolute differences (rate group i - rate reference group) and relative differences (rate group i / rate reference group) are included.

	Women (N=59,692)					Men (N=61,425)				
	No. of deaths	No. of person-years	Mort. rate	Absolute diff.	Relative diff.	No. of deaths	No. of person-years	Mort. rate	Absolute diff.	Relative diff.
Education										
Compulsory	361	79,436	4.54	2.70	2.47	647	108102	5.99	3.32	2.24
Short secondary	423	149,138	2.84	1.00	1.54	631	120237	5.25	2.58	1.97
Long secondary	115	43,845	2.62	0.78	1.42	241	66251	3.64	0.97	1.36
Short tertiary	125	61,529	2.03	0.19	1.10	165	55418	2.98	0.31	1.12
Long tertiary	141	76,481	1.84	ref	ref	184	68913	2.67	ref	ref
No information	10	2,231	4.48	2.64	2.43	33	2673	12.35	9.68	4.63
Gainfully employed										
Yes	701	342,646	2.05	ref	ref	1129	357191	3.16	ref	ref
No	474	70,015	6.77	4.72	3.30	772	64403	11.99	8.83	3.79
Unemployed										
Yes	92	26,803	3.43	0.62	1.22	195	32936	5.92	1.53	1.35
No	1,083	385,858	2.81	ref	ref	1706	388657	4.39	ref	ref
Having a partner										
Yes	608	270,352	2.25	ref	ref	773	276091	2.80	ref	ref
No	567	142,309	3.98	1.73	1.77	1128	145502	7.75	4.95	2.77
Being a parent										
Yes	926	360,599	2.57	2.21	1.86	1288	341693	3.77	3.90	2.03
No	249	52,062	4.78	ref	ref	613	79900	7.67	ref	ref
Total	1,175	412,661	2.84	-	-	1901	421593	4.51	-	-

In the studies included (I-IV), social inequalities in mortality are presented in the form of hazard ratios which are a relative measure. Even though absolute measures are perhaps preferable when comparing countries and time periods, relative measures from multivariate models give a good description of the risk of dying in one group compared to another (given controls). Still, it is useful to know what a relative risk actually translates into with regard to survival, which is illustrated in Table 2.

Table 2 Mortality rates in ages 51-57 (per 1,000 person-years), % survived, and partial life expectancy (of maximum seven years). Compulsory vs. longer tertiary education.

	Men		Women	
	Compulsory	**Tertiary**	**Compulsory**	**Tertiary**
Mortality rate	5.99	2.67	4.54	1.84
Relative mortality rate	2.24	ref	2.47	Ref
% survived	95.87%	98.13%	96.85%	98.71 %
Partial life expectancy*	6.89 y	6.95 y	6.91 y	6.96 y

*Max 7 years, calculated from 1-year age-specific mortality rates.

The difference in the share of individuals who survived until the end of year 2007 in the two educational groups is about 2 percentage points for both women and men. The difference in partial life expectancy, i.e. a summary of mortality conditions within this age range, amounts to 0.73 months between the least and the most educated men, and 0.60 months for women in the corresponding groups. Since the risk of dying is low in these age groups, no considerable differences in life expectancy within the restricted time period were to be expected. For the individual, the difference may seem negligible, but from a population perspective the difference is substantial. If all men with compulsory education in this birth cohort (n=15,781) experienced the same mortality rate as tertiary educated men, a total of about 960 years of life would be saved. The corresponding figure for women is 580 years.

For parametric models, hazard ratios can be translated into predicted median survival time (Cleves et al. 2002). The relative differences in mortality rates between the lowest and highest educational levels in Table 1 roughly correspond to a ten-year difference in median survival time, *if* the relative risk difference remains this great over time. Social inequalities in mortality are, however, smaller in the older age groups where most deaths occur, and the long-run difference is therefore likely to be smaller as well.

All-cause mortality is the main outcome in Studies I-IV, but it should be noted that social inequalities in mortality vary strongly according to the cause of death. Large class differentials are found when the underlying causes of death are classified as mental and behavioural

disorders, external causes and diseases of the respiratory system. Furthermore, smaller (or even no) differences are noticed, for example, in breast cancer mortality (Erikson and Torssander 2008). Still, social inequalities in the Swedish population are marked in the vast majority of causes of death.

Explaining social inequalities in health and mortality

The twofold risk of dying in your early and mid-fifties that people with a low level of education compared to those with a higher level of education run and which is shown in the tables above is one example of social inequalities in mortality. Explanations for the existence of such inequalities are numerous[1] and there are a number of dividing lines. One is whether there are specific mechanisms linking social inequalities to health inequalities, or if there is one general underlying explanation. Another dividing line is to what extent the association is causal or due to selection.[2]

Social health inequalities as a result of direct selection imply that social position is a consequence of an individuals' health rather than that the position causes either health advantages or disadvantages. Empirical support for direct selection as a major explanation for the relationship between social class, and middle and old age mortality is limited (Blane et al. 1993). For income, however, selection (i.e., an effect of health on income) clearly contributes to the health and mortality gradient (Deaton 2003; Smith 1999).

Selection and causation are not mutually exclusive. It has been suggested that health and social disadvantage "evolve together" and reinforce one another across the life course (Vågerö and Illsley 1995). Negative life events during childhood could result in ill health, which, in turn make educational and labour market achievements difficult. The adult life position may further reinforce health problems. Thus, the causation-selection relationship is intrinsic. Indirect selection, that people have different abilities and capabilities for high positions and good health, is another possibility. For example, it has been suggested that personality traits may partly account for health inequalities (Mackenbach 2010).

Theories that view social positions as fundamental underlying causes of health inequalities emphasize the prevailing patterns of inequalities across social positions in time and space. Even though the labour market and educational systems change, as well as the cause-of-death structure, social differences in mortality remain. Social positions are therefore 'fundamental causes' or key factors according to this theory (Link and Phelan 1995). The primary argument is that advantaged social positions give access to flexible resources (Phelan et al. 2010) that make those who

---

[1] This research area is extensive, and I only intend to give a short overview of the most common explanations here.

[2] For summaries of explanations see Bartley 2004, Bambra 2011, Mackenbach 2012 or MacIntyre 1997.

occupy these positions able to adjust their lives to be healthy and safe whatever the circumstances.

A common categorization of causal explanations that emphasizes more specific – but still broad – pathways is the materialist, psychosocial, and behavioural models. The distinction between them is not clear-cut, and they are indeed interrelated (Singh-Manoux 2005), but many researchers use this division in their explanatory analyses of inequalities in mortality (e.g., Khang et al. 2009; Skalická et al 2009; van Lenthe et al. 2004).

Materialist explanations focus on what material resources enable or restrict. Similar to the fundamental cause theory, focus is on sources early in the causal chain. Besides monetary assets, material explanations include employment, housing, environmental exposures and work hazards, and access to public services (under the heading neomaterial, see Bartley 2004). Even though absolute poverty is not the major force of social health inequalities in high-income countries, material circumstances have an important explanatory value in socioeconomic mortality differentials compared to behavioural and psychosocial factors in several studies (Schrijvers et al. 1999; Khang et al. 2009; van Oort et al. 2005). But the different explanatory models are as already mentioned related, and a strict distinction between them may lead to too simplistic conclusions. For instance, material circumstances are connected to psychosocial conditions. One influential example is Wilkinson's (1996) suggestion that the relative income position affects health and mortality through perceptions of one's own position in the hierarchy.

Thus, psychosocial explanations deal with how social inequalities have implications for how people feel, which in turn have either positive or negative health consequences. The relative position is viewed as the underlying reason for an individual's health because of the biological consequences of feeling relatively deprived (Wilkinson 1996; Marmot 2004). These types of psychosocial explanations focus on the experiences of social comparisons. More specific psychosocial models give emphasis to psychosocial work hazards, emotional and social support, and stress (Adler and Snibbe 2003; Bosma et al. 1998a, b; Matthews et al. 2010). Studies report that people with scarce socioeconomic resources encounter more stressful situations (transitory and chronic ones) and may also have fewer possibilities to deal with such situations (Matthews et al. 2010; McLeod and Kessler 1990). However, it has also been shown that socioeconomically advantaged people report more stress than their less advantaged counterparts in some studies (Krueger and Chang 2008; Schieman et al. 2006), but not all (Sherman et al. 2012).

As regards mortality differences between social groups, results for psychosocial factors are mixed. The empirical evidence is weak for stress as a mediator between social position and mortality, while psychosocial

resources like control and self-esteem have a greater explanatory value (see review in Matthews et al. 2010). Differences in socioeconomic measurements, psychosocial factors, and health measures, however, make comparisons difficult.

Health behaviour or lifestyle is one of the more proximal social causes of health status. The behavioural model stresses that social positions are related to health through behaviour that is either harmful or helpful. One possibility is that individuals that occupy less advantaged positions are less able to understand health information or at least less capable of following them (Cutler and Lleras-Muney 2010). Such reasoning may possibly have non-causal implications if people end up in certain positions as a mere result of (stable) personal characteristics, i.e., a form of selection.

Another perspective of the behavioural model emphasizes instead that unhealthy living is a consequence of social disadvantage. Examples are that behavioural 'cultures' vary across social groups (Bartley 2004), the capabilities to respond to health information vary as well (Cutler and Lleras-Muney 2010) or constitute a hindrance because of the local environment and lack of facilities (MacIntyre et al 1993). Hence, behavioural explanations are sometimes considered individual and sometimes structural. Exactly how disadvantage translates into unhealthy behaviour, and advantage into healthy behaviour, is not established. Empirical analyses tend to focus on individual explanations (e.g. Cutler and Lleras-Muney 2010), and more theoretically oriented studies on structural explanations or the relationship between agency and structure (e.g. Cockerham 2005). It has also been suggested that disadvantaged groups have less to gain from engaging in healthy behaviour(s) in terms of survival compared to their more advantaged counterparts (Lawlor et al. 2003) and that they therefore take on healthy lifestyles to a lesser extent.

For all-cause mortality, health behaviour accounts for between 12 and 54 per cent of socioeconomic mortality differences or even up to 72 % when repeated assessments of behaviours are used (Stringhini et al. 2010). But behaviours are interrelated with material and psychosocial explanations. Poor psychosocial circumstances could, for example, trigger unhealthy lifestyles (Marmot 2004).

The explanatory value of different models may vary across situations. One approach that aims to combine various explanations is life course epidemiology (Davey Smith 2003), emphasizing that different processes may operate for different diseases, at different periods, in different contexts, and accumulate over time. The institutional setting may also matter. For example, the generosity of social welfare is negatively related to mortality (Lundberg et al. 2008b), but does not, as mentioned, necessarily result in small relative health inequalities (Bambra 2011).

Socioeconomic indicators and specific explanations

Social (or socioeconomic) position is used as an overarching term for objectively defined positions in the stratification systems that individuals can occupy. Four indicators of an individual's social position are recognized in the present thesis: education, social class, social status, and income. Since these measures reflect different aspects of social stratification, they plausibly have specific effects on health and length of life. On top of this, there are at least three factors that influence each indicator's relationship with mortality. First, the socioeconomic measurements are related to each other in a certain time order from educational attainment, via occupational position (which is the basis for class and status as defined here), to income. Thus, there are differences in their indirect and direct effects on health and mortality. Second, the indicators are to various degrees affected by health status. Attained education will remain unchanged if an individual becomes ill later on in life, while income may drop. Third, the relationship between each one of the indicators and mortality are not necessarily explained by background factors to a similar extent. For example, educational attainment is to a greater extent explained by parents' socioeconomic resources than social class and income (Erikson, unpublished).

As noted previously, the broader explanatory models are interrelated. Separating these, and the effects of each socioeconomic indicator, is no straightforward task. In Study I, where we compare how different socioeconomic measures are related to mortality, focus is on associations and no explicit tests of explanations are carried out. There are, however, some previous studies that evaluate the explanations for more than one indicator of socioeconomic position. For example, in a comparison of material, psychosocial and behavioural models, income inequalities in mortality were mostly explained by material factors and educational inequalities by behavioural factors (Skalická et al 2009). There are a number of specific mechanisms put forward in the literature, which will be discussed below for each measure of social position used in the thesis.

Education

As a starting point for labour market achievement, education can be viewed as a key stratification variable. Education also signals family background since socioeconomic circumstances during childhood are associated with educational outcomes (Breen and Jonsson 2005).

In this thesis, level of education is considered and not years of education (which is the other main alternative). Using the highest attained educational level assumes that the level of education matters

more than the actual number of years spent in school. This assumption is not correct if another year of education – no matter the level – improves health. Some of the mechanisms, however, refer to level-specific assets that may increase the chances of a healthy and long life, like access to advantaged labour market positions (so called 'sheepskin effects'). Yet another set of mechanisms implies that it is the quality of education that matters, which does not exclusively correspond to the level of education (nor to the number of years of education). In the Swedish case, with the tracking of vocational and academic secondary schooling, the number of years of education is not fully suitable. In other countries, research on 'sheepskin effects' shows mixed results (Cutler and Lleras-Muney 2006; Liu et al. 2013)

Health knowledge is often mentioned in relation to educational inequalities in mortality. Empirically, there are small (but not negligible) differences in specific knowledge about unhealthy or risky behaviour across educational groups. Using a variety of data sets from the UK and the US, Cutler and Lleras-Muney (2010) estimate the average explanatory power of specific health knowledge to the educational gradient in mortality at 12 per cent. Given that almost everyone knows that, for example, smoking is harmful, this is perhaps surprising. A greater explanatory value is suggested for 'conceptual thinking' which may increase the chances that knowledge can be utilized for changing to, or maintaining, a healthy lifestyle (Cutler and Lleras Muney 2010). A related suggestion is that intelligence is crucial to the relationship between education (or social position at large) and health (Gottfredson 2004). However, intelligence seems to have a limited influence on the educational gradient in mortality (Link et al. 2008) or alternatively only significant in terms of the increase in cognitive abilities that are the result of more years in school (Lager et al. 2012). Thus, the causal pathway could more accurately be that education supports cognition which in turns increases "the ability to act on health-knowledge" (Pampel et al. 2010).

An important feature of education mentioned above is its consequences for subsequent socioeconomic achievements, like better jobs and higher incomes. A part of the association between education and mortality is accounted for by occupational class and income (Geyer et al. 2006; Skalická et al. 2009). Still, for both women and men, an educational effect is left after these controls. Economists, and subsequently also public health researchers (e.g. Mackenbach 2010), have argued that preferences and personality confound the relationship. The starting point was Fuch's (1982) article on time preferences, education and health. But differences in estimating the value of the future or risk aversion do not seem to explain the educational gradient in recent data (Cutler and Lleras-Muney 2010).

In comparison with the other socioeconomic measurements, education is almost stable across adult life. Reversed causality is, however, possible in early years as childhood health may influence educational achievements (Smith 2009; Case and Paxson 2010), but health problems in adulthood and among the elderly will not change people's level of education. One set of studies that try to solve the issue of causality use schooling reforms. The results from these vary (Fischer et al. 2013; Grossman 2004; Mazumder 2012) even within countries (Lager and Torssander 2012; Meghir et al. 2012). A drawback with the Swedish reform is that prolonged compulsory schooling did not increase the number of years of education for those who were anyway planning to continue into higher education, or even reduce the total number of years in school for these pupils (cf. Lager and Torssander 2012).

During the 20th century, the education system in Sweden has undergone several organizational changes. Opportunities for pupils to continue to secondary and tertiary education have been enhanced and transition rates with regard to these levels massively increased (Erikson and Jonsson 1996). Because of the educational expansion, comparisons of causes and consequences of education between birth cohorts and time periods may not be straightforward.

Occupation-based measures

There are several ways in which occupations can be classified. Two of them are social class and social status. Even though class and status are derived from the same source (i.e., occupation) they partly capture different features of people's labour market positions. While class has its roots in employment relationships, status – as defined here – is derived from interactional patterns between (individuals holding different) occupations. In other words, class is concentrated on how people work and status on how people socialize. Therefore, the relationship between class and status on the one hand and mortality on the other may be explained by different mechanisms.

Class

The social class schema used throughout this thesis is the commonly used Erikson-Goldthorpe class schema (EGP, Erikson and Goldthorpe 1992), which is similar to the Swedish socioeconomic classification (SEI, Statistics Sweden 1982). In the EGP class schema, distinction is initially made between self-employed (including farmers) and employees. Thereafter, employees are categorized according to their relationship with their employer through explicit or implicit 'employment contracts' illustrating the working relationship between employers and employees. These relationships are characterized by service relationships, labour

contracts or a mix between the two (for more details see Erikson and Goldthorpe 1992). In principle, this categorization coincides with a manual/non-manual division of labour, and sub-categories thereof. The Swedish socioeconomic classification takes instead standard educational requirements into consideration in this last step of categorization, but the empirical differences between the Swedish socioeconomic classification and EGP are very few (for a more elaborated discussion on this topic, see Tåhlin 2007).

Specific explanations regarding the relationship between *class* and health[3] often relates to working life. The conditions in which people work affect their health in various ways; such as risks in specific occupations leading to accidents and exposure to chemicals. In line with the definition of social class used here, general employment relationships and conditions are of particular interest. Both job security, related to the terms of employment, and control over work are linked to health (Bosma et al. 1997; Sverke et al. 2002), and these characteristics differ across social classes.

One model that has been particularly influential in this research area is Karasek's and Theorell's (1990) job strain model where it is suggested that a combination of high demands and low control increases the risk of disease, in particular coronary heart disease (Hemingway and Marmot 1999). It has also been suggested that health risks from poor working conditions are greater for individuals with low social positions since economic rewards may have a buffering effect (Lynch et al. 1997). This has similarities with another well-known psychosocial work model; the imbalance between efforts and rewards (Siegrist 1996).

Physical working conditions are class-related as well (Lundberg 1990; Schrijvers et al. 1998). These may relate to specific occupational hazards or be more general for an occupational class, like for example noisy, dirty environments or uncomfortable, heavy working postures.

But working conditions cannot explain the entire relationship between class and morbidity or mortality (Lundberg 1991). Material conditions, i.e. the indirect effect of class via income, is another explanation. There may yet be other specific explanations on a causal pathway between class and health/mortality, for instance, behaviour as a result of class distinction (Bourdieu 1987; Pampel et al. 2010) where lifestyles are viewed as social practices (Cockerham et al. 1997). Whether distinctions related to health behaviours are most evident between class boundaries

---

[3] Health (e.g., self-rated) is a more common outcome than mortality when class and working conditions are considered. The effect on mortality may be weaker if working conditions mainly impact health and not necessarily length of life. Still, psychosocial working conditions are also studied in relation to cardiovascular diseases which are related to mortality.

or other social borders – for example status – can nevertheless be discussed.

Even though physical and mental job demands affect health, having a job at all is associated with better health and increased survival (Roelfs et al. 2011). Entry into the labour market may be impeded by ill health and ill people are perhaps more prone to unemployment. However, individuals with non-manual jobs have a better chance of staying in employment if they get sick (Bartley and Owen 1996).

Further, health-related social mobility (once the individual has entered the labour market) can widen class inequalities if those who move down a class suffer poorer health than the group they left, and those who move up a class enjoy better health. In such a case, health is a determinant of social position, but some studies point towards the overall class gradient not being greatly affected by health selection (Blane et al. 1993; Chandola et al. 2003; Vågerö and Lahelma 1998).

Status

Besides social class schemes, another standard of categorizing occupations in social stratification research is the use of different continuous scales. The most common scaling approaches relate to average income and educational levels within occupations (Duncan 1961; Ganzeboom et al. 1992), prestige (Treiman 1977), and social interaction patterns (e.g. Bottero and Prandy 2003; Prandy and Lambert 2003). The last example – a relational scale based on interaction patterns between incumbents of occupations – is here used as a measure of social status. Such a scale can either be based on friendship ("Cambridge scale", Prandy 1990) or partnership ("CAMSIS scale", Prandy and Lambert 2003) with similar results.

The scale used in Studies I and II is derived from occupational associations between cohabiting or married partners (i.e., a CAMSIS scale). The starting point for the construction of this scale is a two-dimensional table, where the rows and columns represent each of the two partners' occupations and the cell frequencies how common specific combinations of spouses' occupations are. With statistical techniques like correspondence analysis or similar methods it is possible to translate these frequencies into distances, that is, distances within social structures or *social distances*. In other words, the commonness (or uniqueness) of occupational combinations will reflect interaction patterns and one major dimension in these associations is expected to relate to social inequalities.[4]

---

[4] Paul Lambert has constructed the scale used in Studies I and II, for details see http://www.camsis.stir.ac.uk/overview.html

Initially, interaction scales were interpreted as measures of "generalized advantage or disadvantage" (Prandy 1990). Similar scales have, however, later been defined as measures of social status expressing "social superiority, equality and inferiority" (Chan and Golthorpe 2007). Following the Weberian distinction between class and status, Chan and Golthorpe (2004; 2007) argue that while class refers to social relationships in economic life, status is expressed in patterns of close social relationships between friends or partners. The underlying assumption of this interpretation is that people tend to form close social relationships with status equals, i.e. with individuals of a similar social standing. In Studies I and II, we follow this interpretation, but it should be noted that there is no general agreement regarding what these social interaction patterns actually reflect.

Some of the specific explanations suggested for social class are perhaps more valid for status. One example is lifestyle. The creators of the Cambridge scale wrote: "It may be that policemen and skilled workers … interact with each other as equals, yet their relations to the productive system are different" (Stewart et al. 1980, page 28; also cited in Bartley 2004). Hence, it is assumed that occupations that tend to group together within partnerships are of similar social standing. Further, if lifestyles are shared by status groups, health behaviour may be closer to status than to class.

There are a few studies comparing class and status with regards to health. It has been shown that the Cambridge scale accounts for more of the variation in mortality (Prandy 1999) and coronary heart disease risk factors (Chandola 1998) than the EGP class schema does. Two studies that compare status and class in their relation to health behaviours find that these are more closely related to status than to class (Bartley et al. 1999; Sacker et al. 2001), but these compare a household status measure to an individual class measure (cf. Vågerö 2000).

Still, there are some indications that the relationship between status and health reflects behaviours and lifestyles. It is not unlikely that people of similar status behave similarly. Status is derived from concrete social experiences, and these experiences may include acceptance and opportunities to behave (un)healthily. Yet, more research is needed on possible differential effects of status and class on morbidity, mortality and the pathways.

Another specific explanation could be the experience of superiority and inferiority (which the relational status measure is supposed to reflect). Status is a pure rank measure, which class is not, which is why it fits well with explanations connected to the hierarchical experience of social standing (cf. Wilkinson 1996; Marmot 2004). "The status syndrome" (Marmot 2004), however, refers to feelings related to *any*

dimension of socioeconomic position, and makes no direct distinction between education, class, status, or income.

Yet another idea of a specific explanation for status may be social network mechanisms. As noted above, status is based on social interaction patterns. These interactions may influence health in a number of ways, for example through the transmission of resources and information (Berkman and Glass 2000). Compared to the other dimensions of social position, status may have a greater explanatory power of such transmissions than education or class. Whether this is the case has not been explicitly examined. Like other occupational measures, it is also to be expected that some of the association between status and mortality goes through material (or other income-related) circumstances.

Income

Compared to education, class, and status, income is the socioeconomic indicator that most directly reflects material circumstances. Income is one of many measurements of economic conditions. More tangible (but also more rough) indicators like access to a car or housing standards are sometimes used as markers of material circumstances (Galobardes et al. 2006), but seldom in Sweden since these kinds of measures are more relevant in low or middle-income countries. Wealth is another economic measure which has been shown to be related to health (Semyonov et al 2013), but this is not covered in the present thesis.

Income as a measure of economic resources is widely used in health inequality research, but also in research on income loss as a consequence of ill-health (Deaton 2003), highlighting that the relationship between income and health is reciprocal. Among various income measures, household income yields greater health differences than individual income (Fritzell et al. 2004; Geyer 2011), but resources may not be equally distributed within a household (Bennett 2013). As a mere measure of consumption potential, household economic resources are a better indicator than an individual component. Individual income, on the other hand, can also be seen as a labour market reward (cf Hemström 2005; Siegrist 1996; Toivanen 2011) signifying both money itself and a social value.

In this thesis, individual income from work (labour income) is used in Studies I-III. This income measure includes wages, self-employed income and tax-related benefits (for example sickness benefits and parental allowance) on an annual basis (Statistics Sweden 2005). Hence, income from work represents both job rewards and consumption possibilities. Income from work is thus a broader concept than wages but a narrower concept than total income. In Study IV, disposable income (of self, partner and children) is used since the aim in that study

is to reflect economic circumstances in general rather than work-related rewards.

Volatility in income over the life course is another matter of concern. Lifetime income is sometimes preferred, but there is often a lack of such data. Yet, the discrepancy between annual income and lifetime income is mainly due to incomes before age 30, at least for men (Björklund 1993). But in comparison to education and occupation income is a less stable measure. In Studies I and III, income over a longer time period, i.e. ten years, was considered to reduce the volatility concern.

Ill-health is one explanation for the relationship between income and mortality (Smith 1999), since health has an impact on productivity in the labour market. An effect in the other direction – from income to health – may also be plausible. Evaluations of cash transfer programs demonstrate that financial support has a positive health effect on children (Gertler 2004) and adults (Behrman and Parker 2013). Further, exogenous rises in income due to changes in the pension system in South Africa was shown to improve the health of the recipient and of his or her family (Case 2002; 2004). But there are also suggestions that money is insignificant to health and length of life. Inheritance did not significantly increase the health of the receiver (Meer et al. 2003), and a recent experimental study from Sweden found no long-term effect of lottery winnings on morbidity or mortality (Cesarini et al. 2013; cf Lindahl 2006).

Besides experimental designs, two recent longitudinal observational studies evaluated the impact of household economic resources on health. In one of them, a causal effect was suggested (Aittomäki et al. 2012), but was less clear in the other (Halleröd and Gustafsson 2011).

In some ways, money is indeed insignificant – or even unhelpful – as regards health. It is costly to smoke, eat too much and drink too much (even though some cheap food is unhealthy). People smoke less and exercise more during recessions (Ruhm 2000). But money makes it possible to live in a good area and can be useful in difficult and/or unpredictable situations and may therefore be important to health. Still, if such mechanisms operate in Sweden and similar contexts, lottery winners' health and longevity would perhaps increase as well. On the other hand, a link between risk-taking behaviour and gambling would point towards a deterioration in health. There is also another set of income-specific mechanisms that is likely not to be captured by income that does not originate from labour. It is perhaps not only about what money can buy, but also about how money is received and perceived. As a labour market reward, income is not simply a material resource, but also a symbolic one. Low-income positions may be more distressing than high-income positions, due to feelings of inferiority (Kawachi et al. 2010).

The materialist and symbolic explanations are related to distinctions between absolute and relative income effects (Kawachi et al. 2010). For people who have their basic needs fulfilled, increasing absolute levels of income may not prolong their lives. The opposite would be expected for the relative rank hypothesis as long as the individual's income increases in relation to other people's income. Relative income is therefore often associated with psychosocial explanations. Still, any income increase would extend the possibilities to buy goods and services in relation to what others can afford. The line between materialist and psychosocial explanations for income inequalities in health is therefore not clear-cut.

There may be a number of specific explanations that are not easily identified with a specific socioeconomic indicator, but rather can mediate the relationship between many of them and health. One example is psychosocial consequences of rank which may be suitable for both status and (relative) income position. Control over life is another type of explanation that may be of a more general character, as well as "flexible resources" (Phelan et al. 2010) which might be linked to many socioeconomic dimensions. Still, each measure also captures specific components of social position and social inequality.

Since three out of four papers in this thesis deal with the social positions of family members, I will in the next section briefly summarize research on the family, social position and health/mortality.

The family and inequalities in health and mortality

Both parenthood and partnership are associated with better health and longer lives (Macintyre 1992; Manzoli et al. 2007; Weitoft et al. 2004). In Table 1 in this introduction (see page 6), it is shown that men without a partner are almost three times more likely to die during the follow-up compared to men with a partner. The corresponding risk for women without a partner is almost two.[5] The low mortality of individuals living with a partner is partially due to a health selection process into family formation where people with health problems have lower probabilities of (re)marrying and staying married. Besides selection, there are also protective effects of having a partner (Wyke and Ford 1992; Lillard and Panis 1996) and detrimental effects of separation or the death of a spouse (Martikainen and Valkonen 1996; Hart et al. 2007). Marital status differences in survival have often been found to be greater for men than for women (e.g. Hu and Goldman 1990; Lillard and Panis 1996), although, a more recent meta-analysis revealed no overall significant gender differences (Manzoli et al. 2007).

Being a parent is associated with low mortality as well (e.g., Weitoft et al. 2004; Koskinen et al. 2007). Table 1 shows that individuals who have not become parents before the age of fifty have about two times higher death risks compared to those with at least one child. However, the pattern between parity and mortality is sometimes found to be U-shaped with the lowest death risks for individuals with two or three children (Hurt et al. 2006; Kendig et al. 2007; Tamakoshi et al. 2010). Health may be the explanation for high mortality among low and high-parity parents. Ill-health can cause subfecundity or sterility (resulting in none or few children), and numerous pregnancies may have negative physiological consequences for females (Green et al. 1988). Social selection into parenthood and family size could also be a factor, and not all studies demonstrate excess mortality for high-parity parents (Grundy and Kravdal 2008) which indicates that the social context matters.

It has also been suggested that the beneficial effects of parenthood are confounded by marital status. In an attempt to tease out the health effects of being a parent and being married, Kendig et al. (2007) find that positive consequences of parenthood on health pertain to health behaviours but not for general health when marital status is controlled for. However, Koskinen et al. (2007) also found a negative correlation

---

[5] The partner indicator in Table 1 is partly misleading since there is no registration of cohabiting partners *without* children for this time period (Statistics Sweden 2005). However, this group is included in Studies II-IV, where earlier census information was used.

between number of children and mortality *within* the group of married or cohabiting individuals which indicates that both parenthood and partnership are important distinctions.

That there is a link between family status and health status is thus well established. We also know that the socioeconomic position of family members – in particular parents and partners – is related to the individual's mortality risk. It should furthermore be noted that socioeconomic position and family status are intertwined. For example, the adjustment of socioeconomic position reduces the excess mortality of the unmarried (Drefahl 2012).

Research on other people's resources for health and length of life mostly focuses on parents or spouses. The socioeconomic position of parents is related to their offspring's health and mortality (Davey Smith et al. 1998; Östberg 1996) as well as their educational attainment (Erikson and Jonsson 1996) and later incomes (Blau and Duncan 1967; Hällsten forthcoming). For couples, household socioeconomic position is linked to the survival of both partners (e.g. Erikson 2006 for household class), probably because living conditions and material resources are to some extent shared within the family. Shared environmental factors could also include housing, health care services and social networks.

Partners

Attention has also been paid to specific partner resources, not only household position in general. Some studies have attempted to sort out the effect of different dimensions of a partner's socioeconomic position on health, with control for the individual's own resources (Skalická et al. 2009; see also Study II in the present thesis and further references therein). There are also a number of studies about the importance of a partner's level of education for health and length of life (e.g., Monden et al. 2003; Jaffe et al. 2006; Kravdal 2008) without control for other socioeconomic factors like occupation or income. Studies on partners' education where financial resources are included as well (e.g. Skalická et al. 2009, Study II) indicate that couples may not only share material circumstances; but that there could be 'spillover effects' for education as well.

It is well established that people have a tendency to marry within their socioeconomic group (Kalmijn 1998) and associations in health and health behaviours within couples are clear (Meyler et al. 2007; Nilsen et al. 2012). A main question is therefore whether the relationship between partners' resources and individual health is mainly driven by assortative mating (that equals meet equals) or if it to some extent reflects a causal effect. Regardless of socioeconomic resources, it is possible that the

choice of partner reflects other health-related characteristics, like lifestyle. But there are also suggestions that partners actually influence each other's health behaviour. When one partner changes lifestyle, the other partner is likely to follow (Falba and Sindelar 2008). In a similar vein, an 'unhealthy' partner tends to adapt his or her behaviour if it diverges from that of the other partner (Homish and Leonard 2008).

As discussed previously, health-selection is an alternative to causal explanations to the relationship between individual social position and health. The main non-causal option for the association between partner's position and health may be assortative mating. Reversed causality – which is particularly evident from income to health – is a less straightforward answer when it comes to partners' socioeconomic resources. Even if ill-health reduces own income, this is not necessarily the case for one's partner's income. It is likewise unlikely that a partner will exit the labour market in such a case. An exception could be if one partner reduces his or her working hours (or even quits a job) to take care of a sick spouse.

Some causal explanations of health inequalities are less likely to explain the relationship between partner's resources and individual health. One example is working conditions, which is to a great extent an individual factor with limited spillover effects on partners. Material explanations for social health inequalities are as already indicated more applicable to partner effects, highlighting the importance of shared household resources for health (Smith and Zick 1994). Psychosocial consequences of shared financial resources may, however, diverge from consequences of individual resources. The symbolic side of labour market rewards may be closer related to own health than to one's partner's health.

To sum up, some mechanisms that link individual social position to health/mortality may also be related to partner resources. Material conditions and health knowledge are two examples. The problem of assortative mating is an issue that needs to be considered, while reversed causality might be less challenging. Even though the health problems of next of kin could be a burden, it is probably not the major explanation for the link between partner position and individual health. Moreover, one specific channel for partner influence could be active or passive imitation of one partner's health behaviour (Kravdal 2008). Yet another suggestion is the impact of social control; that partners control each other's health behaviour (Umberson 1992).

Adult children

The long-term socioeconomic influence from parents to children has been described as a 'cycle of disadvantage' (Blaxter and Paterson 1982) – a metaphor for how health deprivation recurs in successive generations. If this is actually a cycle, the disadvantage (or advantage) would return to the parents themselves. For example, if an adult child suffers poor health or social/economical problems, the possibility of helping an ageing parent is more strained. This is perhaps most evident for truly disadvantaged children, but may also look like a ladder; a stepwise increase where additional child resources gain parental health and longevity. This half of the 'cycle' is usually overlooked in research on social inequalities in health.

It is generally agreed that the earlier generation affects the later generation. The time order supports this, but the causal direction is not explicitly tested and reversed causality seldom discussed. Even though the main direction is likely to be from parents to children, influences from children to parents are also possible. With a few exceptions (Zimmer et al. 2002/2007 for Taiwan, Friedman and Mare 2010 for the U.S., and Studies III and IV in this thesis), adult children's resources are not considered in health inequality research.

The often strong and long-lasting relationship between parents and children functions as a unique source of social integration. In his classic study on suicide, Durkheim (1897) stressed the importance of parent-child relationships for low suicide rates. Children generate meaningfulness, but also constraints and obligations, which may have an impact on some causes of mortality (Umberson 1987). Following up on this, you may ask whether only the mere presence of children, but also their resources and possibilities – many of which are linked to children's social positions – has an impact on their parents' health.

The cultural anthropologist Margret Mead described the late-modern society as a 'prefigurative' culture where parents learn from their children (Mead 1970; Côté 1996). This framework can be contrasted with the 'postfigurative' period where children were primarily influenced by their parents and not the other way around. "In today's accelerating rate of scientific discovery", Mead writes (1970:79), "the old are outmoded rapidly […]". When it comes to health knowledge and information about the latest treatments, the resources of younger family members may therefore be important.

A critical point is that adult children and their ageing parents seldom live together in Sweden today. Therefore, we may in part need other kinds of explanations than when own or household members' resources are considered. In Studies III and IV, I turned to social network theories to explain the relationship between adult children's socioeconomic

position and their ageing parents' survival. In this literature, social relationships are supposed to matter for health in a number of ways where social support, social constrains and access to resources are some examples (Berkman et al. 2000). Partners living in the same household may be the key persons here, but the resources of other family members can also be incorporated. To know someone who knows how to "work the system" (e.g., how to find a good doctor) is one example of how individuals can benefit from family members outside the household. Adult children might tell or remind parents what to do, or administer contacts. There may also be types of indirect influence, for example through "internalization of norms" which have earlier been suggested for marital partners (Umberson 1987).

Support to parents is not necessarily linked to the socioeconomic positions of children. College graduates are not more likely to (practically or emotionally) support their ageing parents compared to their less well-educated siblings (Friedman and Seltzer 2010). But parents of highly educated children may have access to a greater pool of resources.

A natural objection to any suggestion of impact from children's resources on parents' health is that the association simply reflects parental characteristics that influence both children's socioeconomic attainments and parents' health/survival. Such a statement is realistic and resembles the case of selection for individual socioeconomic position and health. To the extent that parents' health influences children's attainments, reversed causality could be a matter of concern as well.

If a causal effect of children's resources is present, this may apply to certain aspects of socioeconomic position. Given children's educational level, the additional impact of their occupational class and income is small (but not negligible, see Study IV). Thus, it seems as if access to material resources is not a key explanation for the relationship between adult children's position and parents' mortality.

To summarize, the explanations for the relationship between the social position of family members and own mortality may not always overlap with the understanding of individual position and mortality. A combination of social network theories and health inequality explanations may be useful. Furthermore, confounding factors in terms of parental characteristics should also be considered in the relationship between children's social position and parents' survival, and issues of assortative mating when it comes to partner position. Even though the inclusion of social position of several family members can increase our understanding of health inequalities, it also makes it more difficult to evaluate the importance of various mechanisms. But the picture of health inequalities will be more complete.

A note on data and methods

The empirical work in this study is based on several registers of the Swedish population connected to each other through personal identification numbers. The central ones are the Censuses, with socio-economic and partnership information, annual registers of income, education, and occupation, the Multi-generation Register connecting parents to children, and the Cause of Death Register.

The nature of register data has many advantages, like the completeness, the small amount of missing data and the extensive possibilities to follow individuals over time and link family members to each other. But since the purpose of the registers is administrative (they are not collected for research), the possibilities to test specific mechanisms are somewhat restricted. We know about people's level of education but not their actual knowledge. We have information about their occupational class but not their individual working conditions. We can identify children and their resources, but whether they actually help their parents is unknown. With richer survey information, however, the number of individuals is usually too small to compare different dimensions of socioeconomic position of the individual and the family simultaneously. This is necessary because of socioeconomic assortative mating and the intergenerational socioeconomic influence from parents to children. Even though parent characteristics beyond socioeconomic resources (abilities, personalities or values) may have an impact, socioeconomic factors are quite possibly key confounders. When it comes to partner associations, socioeconomic assortative mating is to a considerably extent controlled for here since both partners' education, class or status, and income is included in the analyses. The extensive information of several aspects of social position of the individual and the family hopefully mitigates the absence of direct tests of explanations.

Some methodological and statistical points should also be brought up. In Studies I-IV, hazard ratios of dying for independent variables ($\exp(b)$) are estimated with Cox proportional hazards regression (Cox 1972). All analyses were performed with Stata's (version 11 and 12) stcox command. The hazard ratio corresponds to the relative risk of dying during an instantaneous moment in time (Allison 1984). Since mortality is strongly age-dependent, age is used as the underlying time variable in the regression models.

The Cox regression is semiparametric which means that the intercept/baseline hazard is not estimated but the b-coefficients are. Hence, there is no assumption about how the baseline hazard changes over time. What is assumed, however, is that the hazard ratio is constant for any two individuals at any time point. Whether this assumption holds

or not can be tested, for example, with analyses of residuals (Cleves et al. 2002). The proportional hazards assumption was not always met in Studies I-IV when all ages where grouped together in one analysis. Estimates should therefore be viewed as averages over time (i.e., age). In none of the cases, however, did the hazards cross so that one group had a higher mortality risk at some ages but lower at other ages compared to a reference category.

The rationale for using Cox proportional hazard regressions was to estimate the socioeconomic effects without specification of the baseline age hazard. However, I consistently compared the results with other possible models as well (e.g., Gompertz, Poisson and piece-wise constant exponential regressions). There were no major deviations from the Cox model parameter estimates. Hence, the choice of statistical model is not driving the results in this thesis.

Multicollinearity – that two or more of the independent variables are highly correlated – is both a problem and a key feature of this thesis. Different measures of socioeconomic measures are naturally correlated, and sometimes highly correlated. The two occupation-based measures, class and status, are as expected largely overlapping and it is therefore difficult to include them both in health inequality research on smaller samples. The large number of individual cases in the analyses here reduces this problem to some extent. Still, we cannot solve this issue completely. In Studies III and IV (with fewer cases and more socioeconomic variables of family members included than in Studies I and II) it was not effective to include both class and status. Hence, the more common measure – class – was chosen. Still, Studies I and II suggest that we should not always be content with a single occupational measure when studying social inequalities in mortality.

The main outcome in the studies is all-cause mortality. You could argue that since there is great variation in social inequality in mortality across causes of death (e.g. Erikson and Torssander 2008), all-cause mortality will not give a complete picture or even hide some patterns (for example in causes of deaths where there are no or opposite differences between social groups). But inequality in all-cause mortality may reflect a general frailty or 'susceptibility' (Cassel 1976) of individuals in a low social position. Moreover, the reason to focus on all-cause mortality here is partly practical. Because of detailed socioeconomic information, too much distinction of causes of death would involve a less transparent result description (yet, a few causes/cause groups are included in Papers II and IV).

It is possible that important but unmeasured factors might specifically confound the relationship for certain causes of death. Hence, a strong relationship between social position and some causes will not uncover the true mechanisms. This said, I still believe that cause-specific analyses

can help us to move forward and enhance our understanding if they are carefully interpreted. Therefore, such analyses should be included in further research on the importance of family members' resources and individual health/mortality.

Lastly, a weak point with this thesis is that social and family statuses mostly cover only one point in time. The accumulation of experience is better dealt with elsewhere (for example Hallqvist et al. 2004 and Kjellsson 2013 for adult class accumulation and health; and Blomgren et al. 2012 for family status history and mortality). It should also be made clear that naturally, health inequalities exist across other dimensions apart from the socioeconomic ones, for example gender and country of birth. These inequalities are well covered in other Swedish theses (e.g. Hemström 1998 for gender, and Hollander 2013 for immigration).

Summary of the four studies

There are several socioeconomic groups that people can fit into. In *Study I*, four dimensions of socioeconomic position are compared in their relation to mortality: Education, social class, social status, and income. If analysed one by one, all of these measures are linked to the risk of dying. When analysed simultaneously, there is a clear independent mortality effect of the measures education, class and income for men, and education and status for women. Two conclusions can be made: That social inequality in mortality varies according to socioeconomic indicator and gender, and that one single socioeconomic measure cannot be assumed to capture the whole picture of social inequalities in mortality.

Study II implies that it is fruitful to look beyond individual social position. For cohabiting or married individuals, the closest 'significant other' is probably the partner. Adding the partner's position to the analyses in Study I reveals that the wife's level of education and the husband's social class and income are related to mortality given own socioeconomic position. If not solely due to assortative mating – that equals marry equals in terms of lifestyle or other health-related conditions – this study suggests that the socioeconomic resources of partners should be included in analyses and explanations of health inequalities.

The latter studies (III and IV) examine a more unexplored topic, namely the importance of adult children's socioeconomic resources for parents' survival. Even though no clear answer could be given why such a robust independent relationship between adult children's education and parents' mortality exists, mechanisms are suggested and to some extent indirectly tested. *Study III* focuses on children's education. A clear net association between children's education and parents' mortality was established after control for parents' education, class, and income. The association remained within a sibling fixed-effects context taking factors shared by siblings into consideration.

Study IV adds children's labour market position and income, where education seems to be the key variable in the relationship between children's socioeconomic resources and parents' survival. Study IV also includes information about the geographical distance between child and parent, which did not interact with children's education. This may cautious against causal explanations. In cause-specific analyses, it was shown that children's education was associated with most analysed causes of death, also with mothers' risk of dying in breast cancer which was not associated with the mother's own education.

Contributions
Studies I and II are a joint assignment with Robert Erikson as the second author. Erikson and Torssander have together decided on the design of these studies. Torssander has conducted the analyses but both authors have contributed to the text and to the final product during the review process. The two last studies (III and IV), and this introduction, are individual work done by Torssander.

Ethical considerations
The empirical work in this thesis has been ethically approved by Regionala etikprövningsnämnden (the Regional Ethical Review Board in Stockholm (Decision 2005/556-31). The individual data files have been stored at Statistics Sweden and only assessed by a remote desktop connection. All personal identification numbers were replaced with serial numbers by Statistics Sweden and never seen by the author.

Concluding discussion

It is generally agreed that no single measure is enough to cover all aspects of social stratification, and that different socioeconomic factors have specific links to health and longevity. Study I supports this interpretation. What can be learnt additionally from Study I is that class and status quite possibly have different implications on health, and that class is more closely linked to men's mortality and status to women's mortality when education and income are adjusted for.

What status actually denotes is yet uncertain. Since the status measure here is empirically derived from interaction patterns, there is no in advance given interpretation. Naturally, whether these interaction scales are best described as "generalized advantage/disadvantage" (Prandy 1990) or as "social superiority, equality and inferiority" (Chan and Golthorpe 2007) can be discussed. It can also be noted that we know much less about the link between status and health compared to class and health, and that the suggested differential pathways need to be further tested with both measures included.

The result for labour income in Study I (an independent effect for men) should be viewed in the context of reversed causality issues, even though income over a longer time period was used and individuals had to be active in the labour market at the beginning of the follow up. Furthermore, it is possible that different income measures partly have other effects. Household disposable income is more closely linked to consumption possibilities than individual income from work generally is. Thus, the result is not necessarily transferable to other measures of income.

Several researchers have previously emphasized the value of including the family in health inequality research (e.g. Lawlor and Mishra 2009). It has, for example, been suggested that for young people the family "should occupy a key place on the research agenda" (Sweeting and West 1995, page 174). Social background and household conditions are often considered in contemporary research, but specific resources of significant others in adult and old-age life are only occasionally included. How the social positions of partners are linked to mortality was systematically examined in Study II. Here, it is shown to be meaningful with rather detailed socioeconomic information on both partners. Furthermore, Study II draws attention to the fact that a broader perspective of social position – including the resources of cohabiting partners – is needed in health inequality research. Overall household measures may not be useful for sorting out partner effects, which seems to be particularly clear for certain combinations of gender and type of resource.

Explanations of health inequalities naturally begin with the individual and her position. If an effect of partner socioeconomic position mainly operates through increasing the individual's resources and possibilities, partner position is rather easily integrated into standard explanations of health inequalities. But there may also be specific pathways for partner effects. One example is active or passive imitation of behaviours (cf. Kravdal 2008).

Studies III and IV suggest that even socioeconomic resources of next of kin outside the household may be of importance. That adult children's education might affect parents' mortality – net of parents' socio-economic resources – is a novel result. To my knowledge, there are only a couple of other studies that examine the relationship between children's education and parents' health (Friedman and Mare 2010 for the US and Zimmer et al. 2002/2007 for Taiwan), but in contexts were parents' wealth matter more for children's education than in Sweden. Higher education and health care are available to all Swedes, which would otherwise be important confounders of the relationship between children's education and parents' health and survival.

Still, the relationship between children's education and parents' mortality might be all about pre-existing parental characteristics that I am unable to consider in the analyses. More empirical research, including parental characteristics beyond socioeconomic resources (but yet likely to affect children's attainments and parents' longevity) is needed before stronger conclusions can be drawn. The results from the family fixed effect model in Study III, however, indicate that an intergenerational influence from children to parents is possible.

If future research further establishes the importance of the 'social foreground' for health and length of life, this would call for an understanding of health inequalities that systematically includes the resources of next of kin – partners as well as adult children. Some explanations might be common to individual, partner, and child resources, but additional ones may need to be included. As discussed previously, social network theories could be useful when resources outside the household are considered. We should also consider the limited possibilities to use one's own resources when seriously ill (cf. Study III).

What is more, selection and reversed causality issues differ from situations when only individual circumstances are taken into account. Sometimes, such processes are even less problematic. For example, one partner's education is not directly affected by the childhood health of another partner.

To further disentangle the contribution of individual and familial resources – as well as these resources' links to health – is a complex task for future research. Even if unmeasured confounders will make this

difficult, a causal relationship has to be empirically excluded rather than hypothetically dismissed. A broader perspective of social position – including the resources of close family members – is useful in descriptions as well as for our understanding of differences in health and length of life. Research on family status and health should more often be integrated with research on social position and health. Furthermore, family members' resources may not only be important for individual health but may also have consequences on health inequalities at large. If families where all members are socioeconomically (dis)advantaged become more common over time, health inequalities are likely to increase.

The answer to why social circumstances "get under the skin" (Taylor et al. 1997) cannot be found in this thesis. What can be found, however, is a clearer picture of the relative importance of different dimensions of social position, and a systematic exploration of how resources of close others – partners and children – are associated with chances of surviving. I hope that this is a starting point for integrating familial resources into explanatory models, and further evaluating these empirically. This time, we should not only look back at the older relatives, but also forwards at the younger generation.

Acknowledgements

References

Adler NE & Snibbe AC. 2003. The role of psychosocial processes in explaining the gradient between socioeconomic status and health. *Current Directions in Psychological Science* 12: 119-123.

Aittomäki A, Martikainen P, Laaksonen M, Lahelma E & Rahkonen O. 2012. Household economic resources, labour-market advantage and health problems: A study on causal relationships using prospective register data. *Social Science & Medicine* 75: 1303-1310.

Allison P. 1984. *Event history analysis: Regression for longitudinal event data.* Beverly Hills, California: Sage publications.

Bambra C. 2011. Health inequalities and welfare state regimes: Theoretical insights on a public health 'puzzle'. *Journal of epidemiology and community health* 65: 740-745.

Bartley M & Owen C. 1996. Relation between socioeconomic status, employment, and health during economic change, 1973-93. *BMJ* 313: 445-449.

Bartley M, Sacker A, Firth D & Fitzpatrick R. 1999. Understanding social variation in cardiovascular risk factors in women and men: The advantage of theoretically based measures. *Social Science & Medicine* 49: 831-845.

Bartley M. 2004. *Health inequality: An introduction to theories, concepts and methods.* Cambridge, UK: Polity Press.

Bengtsson T & Dribe M. 2011. The late emergence of socioeconomic mortality differentials: A micro-level study of adult mortality in southern Sweden 1815–1968. *Explorations in Economic History* 48: 389-400.

Bennett F. 2013. Researching within‐household distribution: Overview, developments, debates, and methodological challenges. *Journal of Marriage and Family*, 75: 582-597.

Berkman LF & Glass T. 2000. Social integration, social networks, and health. Pp 137-183 in Berkman & Kawachi (eds) *Social epidemiology.* New York: Oxford University Press.

Berkman LF, Glass T, Brissette I & Seeman TE. 2000. From social integration to health: Durkheim in the new millennium. *Social Science & Medicine* 51: 843-857.

Behrman JR & Parker SW. 2013. Is Health of the Aging Improved by Conditional Cash Transfer Programs? Evidence From Mexico. *Demography*, 50: 1363-1386.

Björklund A. 1993. A comparison between actual distributions of annual and lifetime income: Sweden 1951–89. *Review of Income and Wealth*, 39: 377-386.

Blane D, Davey Smith G & Bartley M. 1993. Social selection: What does it contribute to social class differences in health? *Sociology of Health & Illness*, 15: 1-15.

Blau PM & Duncan OD. 1967. *The American Occupational Structure.* New York: John Wiley & Sons.

Blaxter M & Paterson E. 1982. *Mothers and daughters: A three-generational study of health attitudes and behaviour.* London: Heineman.

Blomgren J, Martikainen P, Grundy E & Koskinen S. 2012. Marital history 1971–91 and mortality 1991–2004 in England & Wales and Finland. *Journal of Epidemiology and Community Health*, 66: 30-36.

Bosma H, Marmot M, Hemingway H et al. 1997. Low job control and risk of coronary heart disease in Whitehall II (prospective cohort) study. *BMJ: British Medical Journal*, 314: 558.

Bosma H, Stansfeld SA & Marmot M. 1998a. Job control, personal characteristics, and heart disease. *Journal of occupational health psychology*, 3: 402.

Bosma H, Peter R, Siegrist J & Marmot M. 1998b. Two alternative job stress models and the risk of coronary heart disease. *American Journal of Public Health*, 88: 68-74.

Bottero W & Prandy K. 2003. Social interaction distance and stratification. *The British journal of sociology*, 54: 177-197.

Bourdieu, P. 1987. What makes a social class? On the theoretical and practical existence of groups. *Berkeley Journal of Sociology*, *32*: 1-17.

Breen R & Jonsson JO. 2005. Inequality of opportunity in comparative perspective: Recent research on educational attainment and social mobility. *Annual review of sociology*, 223-243.

Case A. 2002. Health, income and economic development. Pp. 221-41 in Proceedings of the World Bank Conference on Development Economics, 2001/2002.

Case A. 2004. Does money protect health status? Evidence from South African pensions. In *Perspectives on the Economics of Aging* (pp. 287-312). University of Chicago Press.

Case A & Paxson C. 2010. Causes and consequences of early-life health. *Demography*, 47: 65-85.

Cassel J. 1976. The contribution of the social environment to host resistance. *American Journal of Epidemiology,* 104: 107-123.

Cesarini D, Lindqvist E, Östling R & Wallace R. 2013. Estimating the causal impact of wealth on health: Evidence from Swedish Lottery Players. *Unpblished working paper.*

Chan TW & Goldthorpe JH. 2004. Is there a status order in contemporary British society? Evidence from the occupational structure of friendship. *European Sociological Review*, 20: 383-401.

Chan TW & Goldthorpe JH. 2007. Class and status: The conceptual distinction and its empirical relevance. *American sociological review*, 72: 512-532.

Chandola T. 1998. Social inequality in coronary heart disease: a comparison of occupational classifications. *Social Science & Medicine*, 47: 525-533.

Chandola T, Bartley M, Sacker A, Jenkinson C & Marmot M. 2003. Health selection in the Whitehall II study, UK. *Social Science & Medicine*, 56: 2059-2072.

Cleves M, Gould W & Gutierrez R. 2002. *An Introduction to Survival Analysis using Stata. Revised edition.* College Station, Texas: Stata Press.

Cockerham WC, Rütten A & Abel T. 1997. Conceptualizing contemporary health lifestyles. *The Sociological Quarterly*, 38: 321-342.

Cockerham WC. 2005. Health lifestyle theory and the convergence of agency and structure. *Journal of Health and Social Behavior,* 46: 51-67.

Côté JE. 1996. Sociological perspectives on identity formation: The culture–identity link and identity capital. *Journal of adolescence*, 19: 417-428.

Cox DR. 1972. Regression models and life-tables. *Journal of the Royal Statistical Society. Series B (Methodological)*, 187-220.

Cutler DM & Lleras-Muney A. 2006. Education and health: evaluating theories and evidence. *National Bureau of Economic Research,* Working Paper No. 12352.

Cutler DM & Lleras-Muney A. 2010. Understanding differences in health behaviors by education. *Journal of health economics*, 29: 1-28.

Davey Smith G, Hart C, Blane D & Hole D. 1998. Adverse socioeconomic conditions in childhood and cause specific adult mortality: Prospective observational study. *BMJ,* 316: 1631.

Davey Smith G, Dorling D, Mitchell R & Shaw M. 2002. Health inequalities in Britain: Continuing increases up to the end of the 20th century. *Journal of Epidemiology and Community Health*, 56: 434-435.

Davey Smith G. 2003. *Health inequalities: Lifecourse approaches.* Bristol: Policy Press.

Deaton A. 2003. Health, Inequality, and Economic Development. *Journal of Economic Literature*, 41: 113-158.

Drefahl S. 2012. Do the Married Really Live Longer? The Role of Cohabitation and Socioeconomic Status. *Journal of Marriage and Family*, 74: 462-475.

Duncan, OD. 1961. "A Socioeconomic Index for All Occupations", pp. 109-138 in Reiss et al. (eds.) *Occupations and Social Status* New York: Free Press.

Durkheim E. 1979 [1897]. *Suicide: A Study in Sociology.* New York: The Free Press.

Erikson R & Goldthorpe JH. 1992. *The constant flux: A study of class mobility in industrial societies.* Oxford: Clarendon Press.

Erikson R & Jonsson JO (eds.) 1996. *Can Education be Equalized? Sweden in Comparative Perspective.* Boulder, Co.: Westview Press

Erikson R & Jonsson JO. 1996. The Swedish Context: Educational Reform and Long-term Change in Educational Inequality. Pp 65-93 in Erikson & Jonsson (eds.) *Can Education Be Equalized?* Boulder, Co: Westwiew Press.

Erikson R. 2006. Social class assignment and mortality in Sweden. *Social Science & Medicine*, 62: 2151-2160.

Erikson R & Torssander J. 2008. Social class and cause of death. *The European Journal of Public Health*, 18: 473-478.

Erikson R & Torssander J. 2009. Clerics die, doctors survive: A note on death risks among highly educated professionals. *Scandinavian journal of public health*, 37: 227-231.

Erikson R. Unpublished tables (2013).

Falba TA & Sindelar JL. 2008. Spousal concordance in health behavior change. *Health services research*, 43: 96-116.

Fischer M, Karlsson M & Nilsson T. 2013. Effects of Compulsory Schooling on Mortality: Evidence from Sweden. *International Journal of Environmental Research and Public Health*, 10: 3596-3618.

Friedman EM & Mare R. 2010. Education of children and differential mortality of parents: Do parents benefit from their children's attainments. *California Center for Population Research On-Line Working Paper Series.* PWP-CCPR-2010-011.

Friedman EM & Seltzer JA. 2010. Providing for older parents: Is it a family affair? *California Center for Population Research: On-line Working Paper Series.* PWP-CCPR-2010-012.

Fritzell J, Nermo M & Lundberg O. 2004. The impact of income: Assessing the relationship between income and health in Sweden. *Scandinavian Journal of Public Health*, 32: 6-16.

Fritzell J & Lundberg O. 2007. "Health, inequalities, welfare and resources." Pp. 1-18 in Fritzell and Lundberg (eds.) *Health inequalities and welfare resources.* Bristol: Policy Press.

Fuchs VR. 1982. Time preference and health: An exploratory study. NBER Working Paper No. 539

Galobardes B, Shaw M, Lawlor DA, Lynch JW & Davey Smith G. 2006. Indicators of socioeconomic position (part 1). *Journal of Epidemiology and Community health*, 60: 7-12.

Ganzeboom HB, De Graaf PM & Treiman DJ. 1992. A standard international socio-economic index of occupational status. *Social Science Research*, 21: 1-56.

Gerdtham UG & Johannesson M. 2003. A note on the effect of unemployment on mortality. *Journal of health economics*, 22: 505-518.

Gerdtham UG & Johannesson M. 2004. Absolute income, relative income, income inequality, and mortality. *Journal of Human Resources*, 39: 228-247.

Gertler P. 2004. Do conditional cash transfers improve child health? Evidence from PROGRESA's control randomized experiment. *The American Economic Review*, 94: 336-341.

Geyer S, Hemström Ö, Peter R & Vågerö D. 2006. Education, income, and occupational class cannot be used interchangeably in social epidemiology. Empirical evidence against a common practice. *Journal of Epidemiology and Community Health*, 60: 804-810.

Geyer S. 2011. Income, income, or income? The effects of different income measures on health in a national survey. *Journal of epidemiology and community health*, 65: 491-496.

Gottfredson LS. 2004. Intelligence: is it the epidemiologists' elusive "fundamental cause" of social class inequalities in health? *Journal of personality and social psychology*, 86: 174-199.

Green A, Beral V & Moser K. 1988. Mortality in women in relation to their childbearing history. *BMJ: British Medical Journal*, 297: 391-395.

Grossman M. 2004. The demand for health, 30 years later: A very personal retrospective and prospective reflection. *Journal of Health Economics*, 23: 629-636.

Grundy E & Kravdal Ø. 2008. Reproductive history and mortality in late middle age among Norwegian men and women. *American Journal of Epidemiology*, 167: 271-279.

Halleröd B & Gustafsson JE. 2011. A longitudinal analysis of the relationship between changes in socio-economic status and changes in health. *Social Science & Medicine*, 72: 116-123.

Hallqvist J, Lynch J, Bartley M, Lang T & Blane D. 2004. Can we disentangle life course processes of accumulation, critical period and social mobility? An analysis of disadvantaged socio-economic positions and myocardial infarction in the Stockholm Heart Epidemiology Program. *Social science & medicine*, 58: 1555-1562.

Hällsten M. Forthcoming. The Class-Origin Wage Gap: Heterogeneity in Education and Variations across Market Segments. Accepted for publication in the *British Journal of Sociology*.

Hart CL, Hole DJ, Lawlor DA, Davey Smith G & Lever TF. 2007. Effect of conjugal bereavement on mortality of the bereaved spouse in participants of the Renfrew/Paisley Study. *Journal of Epidemiology and Community Health*, 61: 455-460.

Hemingway H & Marmot M. 1999. Evidence based cardiology: Psychosocial factors in the aetiology and prognosis of coronary heart disease: Systematic review of prospective cohort studies. *BMJ: British Medical Journal*, 318: 1460-1467.

Hemström Ö. 1998. *Male susceptibility and female emancipation: studies on the gender difference in mortality.* Stockholm: Doctoral dissertation.

Hemström Ö. 2005. Health inequalities by wage income in Sweden: The role of work environment. *Social Science & Medicine,* 61:637-647.

Hollander A-C. 2013. *Social inequalities in mental health and mortality among refugees and other immigrants to Sweden.* Thesis, Karolinska Institutet, Stockholm.

Homish GG & Leonard KE. 2008. Spousal influence on general health behaviors in a community sample. *American Journal of Health Behavior*, 32: 754-763.

Hu Y & Goldman N. 1990. Mortality differentials by marital status: An international comparison. *Demography*, 27: 233-250.

Huijts T & Eikemo TA. 2009. Causality, social selectivity or artefacts? Why socioeconomic inequalities in health are not smallest in the Nordic countries. *The European Journal of Public Health*, 19: 452-453.

Hurt LS, Ronsmans C & Thomas SL. 2006. The effect of number of births on women's mortality: Systematic review of the evidence for women who have completed their childbearing. *Population studies*, 60: 55-71.

Idler EL & Benyamini Y. 1997. Self-rated health and mortality: A review of twenty-seven community studies. *Journal of health and social behavior*, 38: 21-37.

Jaffe DH, Eisenbach Z, Neumark YD & Manor O. 2005. Does one's own and one's spouse's education affect overall and cause-specific mortality in the elderly? *International journal of epidemiology*, 34: 1409-1416.

Kalmijn M. 1998. Intermarriage and homogamy: Causes, patterns, trends. *Annual review of sociology*, 24: 395-421.

Karasek R & Theorell T. 1990. *Stress, productivity, and the reconstruction of working life.* New York: Basic Books.

Kawachi I, Adler NE & Dow WH. 2010. Money, schooling, and health: Mechanisms and causal evidence. *Annals of the New York Academy of Sciences*, 1186: 56-68.

Kendig H, Dykstra PA, van Gaalen RI & Melkas T. 2007. Health of aging parents and childless individuals. *Journal of Family Issues*, 28: 1457-1486.

Khang YH, Lynch JW, Yang S, Harper S, Yun SC, Jung-Choi K & Kim HR. 2009. The contribution of material, psychosocial, and behavioral factors in explaining educational and occupational mortality inequalities in a nationally representative sample of South Koreans: relative and absolute perspectives. *Social Science & Medicine*, 68: 858-866.

Kjellsson S. 2013. Accumulated occupational class and self-rated health. Can information on previous experience of class further our understanding of the social gradient in health? *Social Science & Medicine*, 81: 26-33.

Koskinen S, Joutsenniemi K, Martelin T & Martikainen P. 2007. Mortality differences according to living arrangements. *International Journal of Epidemiology*, 36: 1255-1264.

Kravdal Ø. 2008. A broader perspective on education and mortality: Are we influenced by other people's education? *Social Science & Medicine*, 66: 620-636.

Krueger PM & Chang VW. 2008. Being poor and coping with stress: Health behaviors and the risk of death. *American Journal of Public Health*, 98: 889-896.

Lager ACJ, Modin B, De Stavola B & Vågerö D. 2012. Social origin, schooling and individual change in intelligence during childhood influence long-term mortality: a 68-year follow-up study. *International Journal of Epidemiology*, 41: 398-404.

Lager ACJ & Torssander J. 2012. Causal effect of education on mortality in a quasi-experiment on 1.2 million Swedes. *Proceedings of the National Academy of Sciences*, 109: 8461-8466.

Lawlor DA, Frankel S, Shaw M, Ebrahim S, Smith GD. 2003. Smoking and ill health: Does lay epidemiology explain the failure of smoking cessation programs among deprived populations? *American Journal of Public Health*, 93: 266–270.

Lawlor DA & Mishra GD. 2009. "Why family matters: An introduction." Pp 1-9 in Lawlor and Mishra (eds.) *Family Matters* Oxford: University Press.

Lillard LA & Panis CW. 1996. Marital status and mortality: The role of health. *Demography*, 33: 313-327.

Lindahl M. 2005. Estimating the Effect of Income on Health and Mortality Using Lottery Prizes as an Exogenous Source of Variation in Income. *Journal of Human Resources*, 40: 144-168.

Link BG & Phelan JC. 1995. Social conditions as fundamental causes of disease. *Journal of Health and Social Behavior*, 35 (Extra Issue): 80-94.

Link BG, Phelan JC, Miech R & Westin EL. 2008. The resources that matter: fundamental social causes of health disparities and the challenge of intelligence. *Journal of Health and Social Behavior*, 49: 72-91.

Liu SY, Buka SL, Kubzansky LD, Kawachi I, Gilman SE & Loucks EB. 2013. Sheepskin effects of education in the 10-year Framingham risk of coronary heart disease. *Social Science & Medicine*, 80: 31-36.

Lundberg O. 1990. *Den ojämlika hälsan: Om klass- och könsskillnader i sjuklighet*. Avhandling nr 11, Institutet för social forskning, Stockholm.

Lundberg O. 1991. Causal explanations for class inequality in health—an empirical analysis. *Social Science & Medicine*, 32: 385-393.

Lundberg O, Åberg Yngwe M, Kölegård Stjärne M, Björk L and Fritzell J. 2008a. *NEWS The Nordic Experience: Welfare States and Public Health*. Stockholm: CHESS/US-AB.

Lundberg O, Yngwe MÅ, Stjärne MK, Elstad JI, Ferrarini T, Kangas O et al. 2008b. The role of welfare state principles and generosity in social policy programmes for public health: An international comparative study. *The Lancet*, 372: 1633-1640.

Lynch J, Krause N, Kaplan GA, Tuomilehto J & Salonen, JT. 1997. Workplace conditions, socioeconomic status, and the risk of mortality and acute myocardial infarction: the Kuopio Ischemic Heart Disease Risk Factor Study. *American Journal of Public Health*, 87: 617-622.

Mackenbach JP, Stirbu I, Roskam AJR, Schaap MM, Menvielle G, Leinsalu M & Kunst AE. 2008. Socioeconomic inequalities in health in 22 European countries. *New England Journal of Medicine*, 358: 2468-2481.

Mackenbach JP. 2010. New trends in health inequalities research: Now it's personal. *The Lancet*, 376: 854-855.

Mackenbach JP. 2012. The persistence of health inequalities in modern welfare states: The explanation of a paradox. *Social Science & Medicine*, 75: 761-769.

Macintyre S. 1992. The effects of family position and status on health. *Social Science & Medicine*, 35: 453-464.

Macintyre S, Maciver S & Sooman A. 1993. Area, class and health: Should we be focusing on places or people? *Journal of Social Policy*, 22: 213-234.

Macintyre S. 1997. The Black Report and beyond: What are the issues? *Social Science & Medicine* 44: 723-745.

Mazumder B. 2012. The effects of education on health and mortality. *Nordic Economic Policy Review*, 2012: 261-301.

McLeod JD & Kessler RC. 1990. Socioeconomic status differences in vulnerability to undesirable life events. *Journal of Health and Social Behavior*, 31: 162-172.

Manzoli L, Villari P, Pirone G & Boccia A. 2011. Marital status and mortality in the elderly: a systematic review and meta-analysis. *Social Science & Medicine*, 64: 77-94.

Marmot M & Shipley MJ. 1996. Do socioeconomic differences in mortality persist after retirement? 25 year follow up of civil servants from the first Whitehall study. *BMJ: British Medical Journal*, 313: 1177.

Marmot M. 2004. *The Status Syndrome: How Social Standing Affects Our Health and Longevity.* New York: Owl Books.

Martikainen P & Valkonen T. 1996. Mortality after death of spouse in relation to duration of bereavement in Finland. *Journal of Epidemiology and Community Health*, 50: 264-268.

Matthews KA, Gallo LC & Taylor SE. 2010. Are psychosocial factors mediators of socioeconomic status and health connections? *Annals of the New York Academy of Sciences*, 1186: 146-173.

Mead M. 1970. *Culture and Commitment.* Gardin City: Doubleday.

Meer J, Miller DL & Rosen HS. 2003. Exploring the health–wealth nexus. *Journal of health economics*, 22: 713-730.

Meghir C, Palme M & Simeonova E. 2012. *Education, health and mortality: Evidence from a social experiment.* Working paper No. 17932, National Bureau of Economic Research.

Meyler D, Stimpson JP & Peek MK. 2007. Health concordance within couples: a systematic review. *Social Science & Medicine*, 64: 2297-2310.

Monden CW, van Lenthe F, De Graaf ND & Kraaykamp G. 2003. Partner's and own education: does who you live with matter for self-assessed health, smoking and excessive alcohol consumption?. *Social Science & Medicine*, 57: 1901-1912.

Montez JK & Zajacova A. 2013. Explaining the Widening Education Gap in Mortality among US White Women. *Journal of Health and Social Behavior*, 54: 165-181.

Nilsen SM, Bjørngaard JH, Ernstsen L, Krokstad S & Westin S. 2012. Education-based health inequalities in 18,000 Norwegian couples: The Nord-Trøndelag health study. *BMC Public Health*, 12: 998.

Östberg V. 1996. *Social structure and children's life chances: an analysis of child mortality in Sweden.* Swedish institute for social research: Dissertation series nr 26.

Pampel FC, Krueger PM & Denney JT. 2010. Socioeconomic disparities in health behaviors. *Annual Review of Sociology*, 36: 349-370.

Pappas G, Queen S, Hadden W & Fisher G. 1993. The increasing disparity in mortality between socioeconomic groups in the United States, 1960 and 1986. *New England Journal of Medicine*, 329: 103-109.

Parker MG & Thorslund M. 2007. Health trends in the elderly population: Getting better and getting worse. *The Gerontologist*, 47: 150-158.

Phelan JC, Link BG & Tehranifar P. 2010. Social Conditions as Fundamental Causes of Health Inequalities: Theory, Evidence, and Policy Implications. *Journal of Health and Social Behavior*, 51(1 suppl): 28-40.

Prandy K. 1990. The revised Cambridge scale of occupations. *Sociology*, 24: 629-655.

Prandy K. 1999. Class, stratification and inequalities in health: A comparison of the Registrar-General's Social Classes and the Cambridge Scale. *Sociology of Health & Illness*, 21: 466-484.

Prandy K & Lambert P. 2003. Marriage, social distance and the social space: An alternative derivation and validation of the Cambridge Scale. *Sociology*, 37: 397-411.

Roelfs DJ, Shor E, Davidson KW & Schwartz JE. 2011. Losing life and livelihood: A systematic review and meta-analysis of unemployment and all-cause mortality. *Social Science & Medicine*, 72: 840-854.

Ruhm CJ. 2000. Are recessions good for your health? *The Quarterly Journal of Economics*, 115: 617-650.

Sacker A, Bartley M, Firth D & Fitzpatrick R. 2001. Dimensions of social inequality in the health of women in England: Occupational, material and behavioural pathways. *Social Science & Medicine*, 52: 763-781.

Schieman S, Whitestone YK & Van Gundy K. 2006. The nature of work and the stress of higher status. *Journal of Health and Social Behavior*, 47: 242-257.

Schrijvers CT, van de Mheen HD, Stronks K & Mackenbach JP. 1998. Socioeconomic inequalities in health in the working population: The contribution of working conditions. *International Journal of Epidemiology*, 27: 1011-1018.

Schrijvers CT, Stronks K, van de Mheen HD & Mackenbach JP. 1999. Explaining educational differences in mortality: The role of behavioral and material factors. *American Journal of Public Health*, 89: 535-540.

Semyonov M, Lewin-Epstein N & Maskileyson D. 2013. Where wealth matters more for health: The wealth–health gradient in 16 countries. *Social Science & Medicine*, 81: 10-17.

Sherman GD, Lee JJ, Cuddy AJ, Renshon J, Oveis C, Gross JJ & Lerner JS. 2012. Leadership is associated with lower levels of stress. *Proceedings of the National Academy of Sciences*, 109: 17903-17907.

Shkolnikov VM, Andreev EM, Jdanov DA, Jasilionis D, Kravdal Ø, Vågerö D & Valkonen T. 2012. Increasing absolute mortality disparities by education in Finland, Norway and Sweden, 1971–2000. *Journal of Epidemiology and Community Health*, 66: 372-378.

Smith KR & Zick CD. 1994. Linked lives, dependent demise? Survival analysis of husbands and wives. *Demography*, 31: 81-93.

Siegrist J. 1996. Adverse health effects of high-effort/low-reward conditions. *Journal of Occupational Health Psychology,* 1: 27–41.

Singh-Manoux A. 2005. Commentary: Modelling multiple pathways to explain social inequalities in health and mortality. *International Journal of Epidemiology*, 34: 638-639.

Skalická V, van Lenthe F, Bambra C, Krokstad S & Mackenbach J. 2009. Material, psychosocial, behavioural and biomedical factors in the explanation of relative socio-economic inequalities in mortality: Evidence from the HUNT study. *International Journal of Epidemiology,* 38: 1272-1284.

Smith JP. 1999. Healthy bodies and thick wallets: The dual relation between health and economic status. *The Journal of Economic Perspectives*, 13: 145-166.

Smith JP. 2009. The impact of childhood health on adult labor market outcomes. *The Review of Economics and Statistics*, 91: 478-489.

Statistics Sweden [Statistiska centralbyrån]. 1982. *Socioekonomisk indelning (SEI)*. Meddelanden i samordningsfrågor (MIS) 1982:4.

Statistics Sweden [Statistiska centralbyrån]. 2005. *En longitudinell databas kring utbildning, inkomst och sysselsättning (LOUISE) 1990-2002*. Serien bakgrundsfakta 2005:1.

Statistics Sweden [Statistiska centralbyrån]. 2010. *Livslängden i Sverige 2001-2010. Livslängdstabeller för riket och länen*. Demografiska rapporter 2011:2.

Stewart A, Prandy K & Blackburn RM. 1980. *Social stratification and occupations*. London: Macmillan.

Strand BH, Grøholt EK, Steingrímsdóttir ÓA, Blakely T, Graff-Iversen S & Næss Ø. 2010. Educational inequalities in mortality over four decades in Norway: Prospective study of middle aged men and women followed for cause specific mortality, 1960-2000. *BMJ: British Medical Journal*, 340: c654.

Stringhini S, Sabia S, Shipley M, Brunner E, Nabi H, Kivimaki M & Singh-Manoux A. 2010. Association of socioeconomic position with health behaviors and mortality. *JAMA: the Journal of the American Medical Association*, 303: 1159-1166.

Sverke M, Hellgren J & Naswall K. 2002. No security: A meta-analysis and review of job insecurity and its consequences. *Journal of Occupational Health Psychology*, 7: 242-264.

Sweeting H & West P. 1995. Family life and health in adolescence: A role for culture in the health inequalities debate. *Social Science & Medicine*, 40: 163-175.

Tamakoshi A, Tamakoshi K, Lin Y, Mikami H, Inaba Y, Yagyu K & Kikuchi S. 2010. Number of children and all-cause mortality risk: Results from the Japan Collaborative Cohort Study. *The European Journal of Public Health,* 21: 732–737.

Tarkiainen L, Martikainen P, Laaksonen M & Valkonen T. 2012. Trends in life expectancy by income from 1988 to 2007: Decomposition by age and cause of death. *Journal of epidemiology and community health*, 66: 573-578.

Taylor SE, Repetti RL & Seeman.T .1997. Health psychology: what is an unhealthy environment and how does it get under the skin? *Annual review of psychology,* 48: 411-447.

The National board of health and welfare [Socialstyrelsen]. 2009. *Folkhälsorapport 2009*. www.socialstyrelsen.se/Lists/Artikelkatalog/Attachments/8495/2009-126-71_200912671.pdf

The National board of health and welfare [Socialstyrelsen] and Swedish National Institute of Public Health [Statens folkhälsoinstitut]. 2013. *Folkhälsan i Sverige*. www.socialstyrelsen.se/Lists/Artikelkatalog/Attachments/19032/2013-3-26.pdf

Toivanen S. 2011. Income differences in stroke mortality: A 12-year follow-up study of the Swedish working population. *Scandinavian Journal of Public Health*, 39: 797-804.

Treiman DJ. 1977. *Occupational prestige in comparative perspective*. New York: Academic Press.

Tåhlin M. 2007. Class clues. *European Sociological Review*, 23: 557-572.

Umberson D. 1987. Family status and health behaviors: Social control as a dimension of social integration. *Journal of Health and Social Behavior*, 28: 306-319.

Umberson D. 1992. Gender, marital status and the social control of health behavior. *Social Science & Medicine*, 34: 907-917.

van Lenthe FJ, Schrijvers CT, Droomers M, Joung IM, Louwman MJ & Mackenbach JP. 2004. Investigating explanations of socio-economic inequalities in health The Dutch GLOBE study. *The European Journal of Public Health*, 14: 63-70.

van Oort FV, van Lenthe FJ & Mackenbach JP. 2005. Material, psychosocial, and behavioural factors in the explanation of educational inequalities in mortality in the Netherlands. *Journal of Epidemiology and Community Health*, 59: 214-220.

Vågerö D & Illsley R. 1995. Explaining Health Inequalities: Beyond Black and Barker. *European Sociological Review*, 11: 219-241.

Vågerö D & Erikson R. 1997. Socioeconomic inequalities in morbidity and mortality in western Europe. Letter to Lancet. *Lancet,* 350:516-517.

Vågerö D & Lahelma E. 1998 "Women, work, and mortality: An analysis of female labor participation." Pp. 73-85 in Orth-Gomér, Chesney & Wenger (eds) *Women, Stress, and Heart Disease.* Hillsdale, NJ: Earlbaum.

Vågerö D. 2000. Health inequalities in women and men: Studies of specific causes of death should use household criteria. *British Medical Journal*, 320: 1286.

Weitoft RG, Burström B & Rosén M. 2004. Premature mortality among lone fathers and childless men. *Social Science & Medicine*, 59: 1449-1459.

Wilkinson RG. 1996. *Unhealthy Societies: The Afflictions of Inequality.* London: Routledge.

Willner S. 2005. "Hälso- och samhällsutvecklingen i Sverige 1750-2000" pp. 35-79 in Sundin, Hogstedt, Lindberg and Moberg (eds). *Svenska folkets hälsa i ett historiskt perspektiv* Statens folkhälsoinstitut, R 2005:8.

Wyke S & Ford G. 1992. Competing explanations for associations between marital status and health. *Social Science & Medicine*, 34: 523-532.

Zimmer Z, Hermalin AI & Lin HS. 2002. Whose education counts? The added impact of adult-child education on physical functioning of older Taiwanese. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 57: 23-32.

Zimmer Z, Martin LG, Ofstedal MB & Chuang YL. 2007. Education of adult children and mortality of their elderly parents in Taiwan. *Demography*, 44: 289-305.