Accumulated occupational class and self-rated health

Can information on previous experience of
class further our understanding of the social
gradient in health?

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Abstract

Previous research has shown a social gradient in health that suggests that better health is found for people in more advantaged positions in society. This research has mainly been focused on the relationship between social position in childhood and health or current position and health. However, little is known about the impact of positions held in between these two time-points. In this paper a potentially lasting health effect of occupational class positions is explored. The study starts with a description of the work-life biographies for people in different current class positions. Then goes on to investigate if the effect of current class is modified when including previous positions during adulthood, as well as how much extra information is gained by utilizing information on individual work histories. An association between accumulated experience of manual working class and self-rated health is found. Also, when controlling for accumulated class experience, the social gradient for current class is no longer significant. Furthermore, even for non-manual employees the odds of reporting less than good self-rated health is increasing with each added year of previous manual experience. This suggests that the social gradient in health is more complex than just a matter of current social position influencing current health, and that the effects would potentially be modified if the full complexity of life-time social positions were taken into account.

Keywords

Occupational class, accumulation of risk, social gradient, health, level of living survey (LNU)

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Introduction

Why do some people enjoy better health than others? One intuitive answer could be that some people have a less disease-prone biological constitution and thus are not afflicted in the same way as others. But health is not only a matter of biology, there are also other differences like for instance behavioral differences. Some people might be thrill-seeking and expose themselves to accident risks and some people disregard knowledge of the health risks involved in behaviors such as smoking, heavy alcohol consumption or poor dietary choices. Then there is the element of chance; some people might just happen to be unlucky. But health is not only a matter of individual differences; previous research has shown systematic differences between groups in society. Health can be affected by who you are in relation to other people around you, and people's social position influences health. Regardless of how social position is measured (e.g. by class or other measures of socioeconomic status) there seems to exist what has been deemed a social gradient in health, that works to the benefit of people with greater income, higher education, or that hold occupations that are typically characterized by a service contract in the Goldthorpean sense. This circumstance has prompted a vast amount of research; a simple search on Google Scholar with the phrase “social gradient + health” produces over 4500 results (www.scholar.google.se, 20110112). The social gradient has also been shown numerous times, both in poorer and better-off countries and has prompted the emergence of the terms “social determinants of health” and “fundamental causes of disease” (for overviews see e.g. Marmot, 2005; Kawachi *et al.*, 2002; Fritzell & Lundberg, 2007a).

Previous research on the social determinants of health has mainly been focused on the relationship between position during childhood and health or current position and health, while little is known about the impact of class positions held in between childhood and current class. The lack of studies should most likely be seen in the light of that data including full work-life biographies are scarce. However, with the economic activity histories in the Swedish level of living survey (LNU) this endeavor is made possible. In

this paper I will investigate whether there is a lasting health effect of different class positions during adulthood; it is plausible that it is the time spent in classes associated with bad health that is important for health outcomes rather than the socioeconomic position held at any particular stage in life (cf. Fritzell, 2007). At the same time it could be that taking the full working life into account may not change the picture drastically, since mobility in between class positions seem to be limited. The utility of trying to overcome the complexities of measuring class in a life cycle perspective will also be discussed.

Research aim

Using the occupational biographies in LNU the over- arching aim is to shed light on the possible impact of class positions held throughout the life cycle. A standard procedure of studying the association between current class and health will be compared with a model that includes time spent in manual classes – the classes mostly associated with bad health. The empirical analyses will start out with a thorough description of the variation in class experience among people within the different current classes; the more variation the more potentially fruitful it is to take the full working life into account. Thus, the research questions:

1. How much variation is there in work life biographies between those in different current classes?
2. Is the effect of current class position on health modified by previous positions during adulthood?
3. How much extra information can we gain by utilizing information on individual work histories?

Theory and previous research

Class and health

There is a large amount of research showing a health gradient for different class positions,¹ and when it comes to health outcomes there is a hierarchical ordering of occupational classes. The risk for less than good health is greater for working class than for service class and the greatest risks are normally reported for the unskilled part of the working class (Bartley, 2004). This social gradient has been the basis for the emergence of terms such as “social determinants” (e.g. Marmot, 2005) or “fundamental causes” of disease (e.g. Link and Phelan, 1995). As can immediately be heard by the choice of terminology this is a perspective of setting social position in the forefront when explaining differences in health or disease. Both these terms refer to that differences in class, or socioeconomic position, should be viewed as a constant underlying cause of differences in disease. Class is seen as related to different mechanisms like for instance material resources, behavior or choice that acts as intermediate mechanisms between class and health. While the intermediate mechanisms can change, social conditions remain a fundamental cause that affects these different mechanisms that are linked to health or disease. For example; when knowledge of health risks advance, socially affected behavior is also modified. One classic example is the cultural shift in the view of obesity; from a high-status marker that shows the monetary ability to eat properly (i.e. enough) to a low-status marker that shows the monetary *inability* to eat properly (i.e. healthily). Another example is the shift in attitudes and trends in smoking; from a “chic” habit of the well-to-do to a “dirty” habit of the working class. However, the shift in views were most probably not only motivated by the increasing knowledge of health implications², but even other motives for these changed attitudes have been more to the advantage of some groups than others, from a point of view of health.³ Health hazards in the working environment also change over time, but the occupations that are exposed to

¹ And likewise for other measures of socioeconomic position

² It is also important to note that this does not imply that the working class necessarily have a *lacking* knowledge of the health risks (see Bartley, 2004)

³ It would perhaps be fruitful to lean on the thinking of Bourdieu and his theories of how trends and tastes are produced and reproduced (1984) for a further discussion on this topic. That discussion will, however, not be conducted within the realms of this paper.

such hazards are still more commonly working class positions than service class positions (Lundberg, 1990). A model can thus be envisaged that traces a path from social structure to health outcomes, where the individual actions or behaviors are intermediate factors that enter at the very last step in the pathway (Graham, 2007). This means that e.g. behaviors that have effect on health are influenced by structural conditions and both structure and agency are so entered into these models, but they act on different levels in the causal chain. The expected mechanism is that an individual's position in society has effects on actions and scope of actions in such a way that it influences the possibility for good health.

Mechanisms

Below, some of the mechanisms most commonly used to explain social differences are described. Many of these are intertwined in each other and are thus hard to completely disentangle. It has also been suggested that a critical part of deprivation is that it is often multidimensional and that it is the sum of social disadvantage that should be discussed, rather than individual mechanisms (Korpi, Nelson & Stenberg, 2007).

Income is one factor that is often used when explaining social differences in health; smaller incomes give lesser opportunity for commodities and habits that can influence health. Differences in housing standards for example are contingent on income differences, both in regards to quality of the housing itself as well as to neighborhood standards such as degrees of vandalism and violence. Smaller incomes also give less opportunity to pursue a healthy life-style with for example good dietary habits or memberships in sport clubs or gyms. It can also be of importance for whether you seek appropriate medical advice or not. However, these factors might seem less relevant in a welfare state like Sweden where individuals with low incomes often get social assistance or other types of social subsidies. On the other hand even smaller costs may affect decisions in an already strained individual economy, and therefore should perhaps not be completely disregarded even in the context of the Swedish welfare state. For occupational classes, wages are typically smaller within the working class compared to the service class. Income differences should, however, not only be seen as something that affects individuals at the lower end of the income distribution (Fritzell & Lundberg, 2007c; Åberg-Yngwe, Fritzell, Lundberg *et al.*, 2003). There are empirical results

showing an income gradient in health also between individuals with higher incomes (Marmot, Davey Smith, Stansfeld *et al.*, 1991).

Working conditions is another mechanism often linked to health. These differ between occupations but are more homogenous within occupational classes. Working class occupations typically have harsher physical conditions such as heavy lifting, monotonous movements or positions, contact with harmful substances or pollutions etc., which can have negative effects on health, especially with long exposure (Lundberg, 1990). Working class occupations also have less favorable contractual conditions when it comes to control, demand and autonomy which have been shown to have effects on stress levels (Karasek & Theorell, 1990). The sum of experienced **stress** is often referred to as *allostatic load* and this can contribute to a lessened ability to cope with stressful situations and induce health problems. When we are exposed to stress there is a physiological "fight-or-flight" response that is activated in potentially threatening situations and that, among other things, releases short bursts of adrenaline. This is a normal and healthy response when there is a posing threat that we, for example, need to run away from. However, in modern day life a physical response (like running or shouting) is often not appropriate and must therefore be subdued and the release of adrenaline is not utilized. Frequent occurrence of such bursts can lead to storage of adrenaline in the body which can cause health problems such as high blood pressure, weight gain and risk for cardiovascular diseases (Bartley, 2004; McEwen, 1998). According to Baum, Garofalo and Yali (1999) everyday stressful events, like for instance occupational stress, neighborhood disputes, daily commuting, noise, or discrimination all contribute to this allostatic load and these types of events have also been shown to be more prevalent in less advantaged positions.

Furthermore, social comparison which puts us in a lower hierarchical position than our peers can induce feelings of frustration which acts as stressors and thus heightens sensitivity for bad health (Åberg-Yngwe *et al.*, 2003). This **relative deprivation** has been put forward to explain that the social gradient can be found even among groups with higher levels of income or that are in occupations with less burdensome working conditions, as well as in countries with comparatively compressed income distributions (Fritzell & Lundberg 2007c; Bartley 2004). Åberg-Yngwe *et al.* (2003) has also found that the way in which income affects health is different at different parts of the income

distribution. For the upper part it is via these feelings of relative deprivation caused by social comparison but for the lower part it is the absolute deprivation, i.e. the lack of economic resources, which primarily affects health.

As discussed above, the *risk-behaviors* of unhealthy diets and of no exercise is more common for the working class. For occupations involving heavy manual labor the lack of exercise is perhaps not an immediate problem, since these jobs themselves involves physical activity. But in the long run these jobs can be very strenuous and induce work related strain and injuries, for which exercise would be a preventative measure. That strenuous work has effect on pain in the back and neck as well as on the locomotor organs has previously been shown on Swedish data (Lundberg, 1990). Smoking and excessive drinking is also more prominent among working class individuals (ibid.) and has for instance been linked to excess risks of cardiovascular disease (Lynch, Kaplan, Cohen *et al.*, 1996). Behavior could also have a potential lingering effect; “old habits die hard” (compare with Bourdieu’s theory of *habitus*). For an individual with a certain behavior that is influenced by class position, there would perhaps be an initial period where he/she might still live in accordance with the old habits, even if the class position has changed. Following that train of thought, it is also possible that the longer time an individual has practiced a behavior, the longer it takes to change it; the behavior becomes more or less crystallized over time. An individual that has been in a working class position for a long time might be more reluctant to embrace the healthier life-styles of the service class, even if he/she changes class position. This is one reason to hypothesize that class can have an accumulative effect on health, via a lingering of different healthy or unhealthy life-styles that works above and beyond social mobility.

Reversed causality is another issue in regards to effects of social positions on health. The “healthy worker” effect suggests that people in employment are a positively selected group, i.e. individuals in work are generally in better health than individuals that are not in work (Dahl, 1993). According to Dahl, however, this would lead to an underestimation of the social gradient, since it is more common for the working class to leave the workforce due to health problems (ibid.) Furthermore, there could be a case of health selection into different class positions, where individuals with health problems are less frequently recruited into advantaged positions. It has been shown that different dimensions of socioeconomic status (such as occupation, education or income) have both

direct and indirect effects on health *and* that health generates selection into social positions (Halleröd & Gustafsson, 2010). It has, however, also been shown that the health selection is mainly a movement *out* of the workforce, rather than into less advantaged occupational positions (Lundberg, 1990). Or as Bartley (2004) puts it; it seems unreasonable to think that already unhealthy individuals would be to any large extent selected into for instance physically demanding occupations.

Accumulation of risk

The question which class position has the stronger association with health, childhood class or current class, can find different answers in the literature. Some studies of cardiovascular mortality for instance, shows that low childhood socioeconomic status has a predictive ability on health that works over and above the achieved position during adulthood (e.g. Poulton *et al.*, 2002). Other studies, on Swedish data, have shown that childhood position has little effect beyond later achieved position on presently experienced health (Fritzell, 2007). The reasoning for this, according to Fritzell, is that the effect of childhood position on adult health mainly works through social reproduction, i.e. children often end up in similar class positions as their parents, but it is rather the adult position that influences adult health.

A person's health might, however, not only be influenced by childhood conditions and present conditions. It could also be influenced by what happened between these points in time. In the life-course approach to health this is called cumulative exposure or accumulation of risk (Kuh *et al.*, 2003). Here one focuses on the conditions during the whole life span, where people who are exposed to continuous harsh conditions are thought to become increasingly prone to disease. This view developed in the late 1990's as a reaction to a polarization of research that either emphasized seemingly irreversible effects of prenatal conditions or exclusively looked at health effects of adult lifestyles (*ibid.*). Given that social conditions can be seen as fundamental causes of disease, accumulated exposure to for instance working class occupations could be seen as an accumulated risk of lesser health.

Fritzell (2007) has shown that, in Sweden, there can be an association found between the share of an individual's life spent in non-manual classes and self-rated health (SRH) as

well as certain physical ailments (i.e. musculoskeletal pain). The found association is such that the bigger share of life in non-manual positions, the better health (Fritzell, 2007, p. 82f). Ljung and Hallqvist (2006) have also found an effect of accumulated social position on health, on Swedish data. According to their research the proportion of life spent in manual work is related to the risk for myocardial infarction.

Associations between accumulated class experience and health has also been found in international research (e.g. Heslop, Smith, Macleod *et al.*, 2001; Singh-Manoux, Ferrie, Chandola *et al.*, 2004; Naess, Claussen, Thelle, *et al.*, 2004). A gradational association between accumulated position and health has been shown (Sing-Manoux *et al.*, 2004) and it has also been found that a cumulative measure of “lifetime socioeconomic experience” is a better predictor of mortality than socioeconomic measures from a single point in time (although in the cited study it has only been tested for women) (Heslop *et al.*, 2001). Different causes of death, however, are affected differently by the accumulated experience. But on all-cause mortality accumulated social conditions show an increased risk compared to measurements at single points in time (Naess *et al.*, 2004). It seems feasible to argue that health effects of social position can accumulate over the life course. However, to my knowledge, the international research has mainly tested associations between social position and mortality. There has been very little international research on the effect of accumulated class on morbidity and on non-fatal conditions.

Own achieved class position

As has already been stated by Fritzell (2007), to study effects of total class experience is quite uncommon, most probably not for lack of interest but for scarcity of usable data. Fritzell’s cited study is one of the few trying to do this, and he is using the same data as is used in this study. However, in Fritzell’s study the accumulation is measured over the full course of life. My intention is to measure accumulated class experience as it is achieved in adulthood. Obviously, at onset of working life, individuals cannot be considered *tabula rasa*. Experiences that we carry with us from childhood play a part in our way of life and in the choices we make as adults. However, if Fritzell is right and, at least in Sweden, the main effect of class on health is through adult rather than childhood class; my point of departure would be to examine if accumulation of this adult class has

any effect on health. Do experiences of occupational class accumulate or do they become redundant the day we change class positions?

Data and Method

For this study I am using the economic activity history section in the Level of living survey (LNU) from the years 1991 and 2000. Below I will present LNU and its economic activity history section, the sample used in this study, attrition rates, as well as the methods used.

The Level of Living Survey

LNU is a longitudinal survey that has been conducted five times since 1968,⁴ and is now currently finishing the data collection for its sixth wave. In fact, LNU is one of longest running such surveys in the world (sofi.su.se). The approach in LNU is multidimensional and sets out to capture the respondents' living conditions in several areas. The original respondents were a random sample consisting of 1/1000 of the people in Sweden in the ages 15-75. As the panel has aged, new respondents have been added to keep the survey representative of the population and in 1991 the lower limit for inclusion was changed so that the survey now contains individuals between 18-75 years of age.

The Economic Activities History Section of LNU

The economic activities history section was introduced in the 1991 wave of LNU and was included also in the 2000 wave. The section is a set of questions to give a detailed account of each individual's economic activities on a month-to-month basis. The module starts with the question "*Have you ever had a job that lasted at least six months?*" All respondents that answer affirmatively are then asked a series of questions about their jobs and other economic activities from that first job on, counting every activity that lasted **at least one month** and ending up at the recent activity.⁵ The activities that are registered

⁴ Subsequent waves were conducted in 1974, 1981, 1991 and 2000.

⁵ Only activities in Sweden are registered.

are not only about gainful employment (e.g. employee, self-employed, farmer) but also other activities are registered such as: unemployment, studies, military service, parental leave, housework, or pensioner.⁶ The design of the module is such that the start-date is only asked for the first job. For all subsequent periods only the end-date is registered, and is thus taken as start-date of the following period. This design is geared at leaving no time unaccounted for, i.e. no blank periods should occur in the economic activity history.

Since LNU is a panel-survey the respondents who answered the economic activity history in 1991 did not have to go back to their first job when they answered the survey again in 2000. These respondents were instead asked the question: "*What was your main activity in January 1990?*" This can lead to some ambiguity in the data; it is possible that the last activity that was registered in 1991 is not the same as the first period being registered in 2000 and due to recall errors it is also possible that information regarding the period(s) after January 1990 from the 1991-survey does not match the information that the same respondent gave for the same period(s) in the survey of 2000. There has been a lot of work done to remove inconsistencies in the data⁷, resulting in the combined economic activity history section of the Level of living surveys of 1991 and 2000 (WH9120). In the final dataset the number of mismatched episodes has been substantially reduced and it has been tested both for remaining inconsistencies and for reliability of coding.

WH9120 is a separate dataset from the full interviews of LNU1991 and LNU2000. Some individual data, such as sex and date of birth, has been kept in this dataset, while other individual level information (like education or health) can be accessed by merging this dataset with the datasets from the full surveys.⁸

⁶ For a complete list of economic activities, see appendix 2.

⁷ By researchers at The Swedish Institute for Social Research (SOFI).

⁸ Merging information between datasets is facilitated by unique personal serial numbers that are given to each respondent in LNU. An individual keeps the same serial number in all waves of LNU where he/she is a respondent.

Sample

WH9120 contains a total of 6269 individuals; 3180 men and 3089 women. The sample for this study will consist of *individuals between 35-65 years of age* that were *actively working* as *employees* at the time of the interview. The higher cut-off point of 65 years of age is due to the normal retiring age in Sweden. I have chosen not to include old age pensioners in this study, even though it could be an interesting group in regards to examining potential lasting health effects of class accumulation.⁹ However, old age pensioners may have health issues that are different from the working population, which would have to be taken into consideration. It would also entail taking discrepancies from the normal retirement age into account. This is an issue that I will have to leave out in this master's thesis, maybe to revisit in the future. The lower end of the age criterion for inclusion is set to include individuals that have had time to accumulate some occupational class experience. How many years individuals of different ages has spent in the workforce, i.e. how many years they have accounted for in the economic activity history (and thus is their maximum possible length of work experience in this data) can be seen below (figure 1). People of 35 years of age have, on average, spent 15 years in the workforce¹⁰ and at the 10th percentile they have 11 years of maximum possible length of work experience. Previous research has also shown that most people reach their final occupational class somewhere between their thirties and forties (Härkönen & Bihagen, 2010). It therefore seems reasonable to assume that most of the class experience that differs from current class has already taken place around the age of 35.

⁹ There has been studies that showed that the association between work-based socioeconomic measures and mortality declines after retirement age (Marmot & Shipley, 1996), but the association between occupational class and morbidity might not be affected in the same way.

¹⁰ mean=15,7; median=16; std.dev=5,3

Figure 1. Mean number of years in the workforce, by age (age 18-65).

Looking at the connection with self rated health, we can also see that the propensity to report less than good health starts to rise around the age of 35 (figure 2). To examine differences in probability for less than good SRH seems most fitting on age groups that report this to a larger extent. Due to the age criteria 2839 cases were excluded.

Figure 2. Shares of individuals within different age-groups that report less than good SRH. Age-groups: 18-29, 30-39, 40-49, 50-59, 60-65 (mean age of each age group shown on x-axis).

A further 802 individuals between 35-65 years of age were not actively working at the time of the interview. People that were not working at the time of the interview are not assigned an occupational class in the WH9120-datafile but rather an *economic status* that

defines their current activity. As already mentioned above, these activities can be as diverse as unemployment, early retirement, studies, parental leave or longer stays abroad. Some of these activities can in themselves be connected to self-rated health, early retirement being the most obvious one. It would be possible to recode some of these individuals according to their occupation prior to their current one.¹¹ However, to avoid the potential bias for individuals that are not working due to a current health problem, I have chosen to exclude rather than to recode these individuals. Lastly, the final sample criterion of only including the employed part of the population is set partly due to small numbers of self employed individuals, but also because it is feasible to imagine different health implications of being employed and of being self employed. As well as a large degree of heterogeneity among the self employed. Within the defined age span 376 individuals were self employed at the time of the interview and were thus excluded. This leaves a sample of 2252 cases, consisting of 1123 men and 1129 women (49,8% and 50,1% respectively). These respondents can have been interviewed in 1991, in 2000 or in both waves.

Attrition

Due to the complexity of the data there has been, as previously mentioned, a lot of work done on trying to get as large parts of the data as possible in useable form. In that process, variables were constructed that flag for different inconsistencies or possible problems in the data. These variables have been very useful when trying to sort out item non-responses or mismatched responses that result in attrition of the sample. One such variable is a description of the original 1991-data; whether the respondent has a complete work-history and a description of reasons to why not, when not. In cases where it was impossible to account for all job shifts, for instance for respondents with many short employments, an occupational history was constructed instead. An occupational history gives details of dates when a person enters and exits an occupation, not a particular employment (as the economic activity history). For the purposes of this study that is unproblematic, since the issue of interest is the length of time in a particular type of employment and not of particular jobs as such. For some of the occupational histories,

¹¹ This is possible as long as the prior activity is work. And of course it is also possible to recode according to the period prior to that etc.

however, there is an extra episode registered in the beginning of the history. These cases have been excluded because of surplus but uncertain information. Other cases that have been detected for exclusion by using this variable are cases where the respondent has entered the biography without fulfilling the criteria as well as proxy or telephone interviews where economic activity histories are not supposed to have been asked. Total attrition from this variable is 30 cases. Three cases have negative time registered in at least one period in the WH9120 and cannot be used and one case in the study sample is lacking the start date or end date in a period, meaning that length of time cannot be calculated. There are also three cases of overlapping periods which makes for uncertain calculations of time. The largest attrition is due to inconsistencies between the two surveys for the same respondent. As mentioned earlier, there is an overlapping period between the two surveys for respondents that were in both waves. In the variable *Resemblance* the degree of match in this period is rated. Resemblance is rated on three conditions: economic state (employed, self-employed, unemployed, student etc), occupation and industry. Cases where the information between 1991 and 2000 is different for all three conditions are rated “inconsistent”. The study sample contains 220 inconsistent cases and these have been excluded from the study. This leaves 1995 usable cases in the sample, 985 men and 1010 women.

Variables

Below all variables included in the analyses will be presented, starting with the dependent variable. Descriptive statistics of all variables can be found in appendix 1, except for the variable of current class position for which the distribution in the sample will be presented in the results section (table 1).

Dependent variable

Health is the outcome variable of interest in this study. The health measure used is the subjective measure of self reported health (SRH) in the LNU surveys of 1991 or 2000, derived from the question “*How would you rate your general health?*” with the answers good (1), bad (2) and somewhere in between (3).¹² The question is dichotomized into a

¹² The variable is merged onto WH9120 from LNU2000 and LNU1991. SRH from 1991 is used for individuals that only were respondents in 1991, for everyone else SRH from 2000 is used.

dummy variable for **less than good SRH**, with the value 0 given to “good” and all else is given the value 1. Hence the measure is of bad health, or rather the exception from good health. To measure the exception from good health is partly about the data; in the study sample 79.7 % report good SRH.¹³

That most people report good health also makes the exceptions an issue of interest; if there are systematic social differences in the propensity to report other than good health. And if the risk of experiencing something other than good SRH is different according to class, or more notably according to the accumulated class experience. Measuring and analyzing bad rather than good health is also the tradition within most research on social differences in health. Furthermore it is the common practice within the tradition of Swedish welfare research, an area of research in which the Level of living survey historically has played a major role (Fritzell & Lundberg, 2007b). It therefore seems fitting to analyze bad rather than good health on this material. Questions can be raised about the validity of self ratings in health; whether it rather measures other things like for instance socially acceptable answers or personality-driven differences in how to perceive ones state of health. However, when measures of self ratings have been tested and evaluated they have been shown to be quite accurate estimations of not only the subjective well-being but also of a more objective state of general health. Measures of self-rated health have a good predictive ability for mortality (e.g. Burström & Fredlund, 2001; Idler & Benyamini, 1997; Miilunpalo, Vuori, Oja *et al.*, 1997), which could be viewed as the ultimate consequence of bad health. It has also been tested as a quite stable measure for individuals’ health at different time-points. In addition, it has shown a high correlation with health care utilization (Miilunpalo *et al.*, 1997). Other self reported health measures have also been tested. Self ratings of long-standing illness has been scrutinized under the assumption that working class individuals are more prone than service class individuals to over report such illness, with results that refute the assumption (Elstad, 1996).

¹³ In the total population of LNU2000 73,4 % report good SRH.

Independent variables

Class and accumulated class. The class schema used is the Swedish socioeconomic Index (SEI). This is a classification made by Statistics Sweden (SCB 1982:4) that is essentially similar to the widely used EGP-schema. It is based on occupation and firstly makes a division between employed and entrepreneurs/employers. The employed are then categorized according to manual and non-manual employment and thereafter by the qualifications typically needed for different occupations. Entrepreneurs and employers are categorized according to number of employees (for a full list of SEI-classes, see appendix 3). The detailed schema will at most times in this paper be collapsed into broader categories such as unskilled (SEI10) and skilled (SEI20) manual employees and different levels of non-manual employees, or even in broader terms into working class (SEI 10, 20), service class (SEI 30, 40, 50) and self-employed (SEI 60, 70, 80). Any type of self employment, i.e. self employed, self employed professionals, entrepreneurs and farmers, will be treated as one class-category in this paper. Self employed professionals (SEI60) are sometimes grouped together with higher level non-manual employees (SEI50), but for this paper I have found it more fitting to group any experience in SEI 60 with experience of self employment. Partly due to that the propensity of SEI 60 for less than good SRH is vastly different compared to higher level non-manuals (not shown) and partly to keep employment and self employment separate.

In the economic activity history SEI is assigned to each period in the data. The last period in the history is used as measure of **current class**. Current class is used as dummy-variables of each collapsed class-category, with higher level non-manual employees (SEI50) as reference category. Since WH9120 includes individuals that has been interviewed either in 1991, in 2000 or at both times; “current” class refers to occupational class position at the time of the (latest) interview. Due to the sample selection SEI 60-80 will only appear as accumulated experience, and not as current class position.

Accumulated class experience is constructed as a simple addition of all periods, in months, that a respondent has reported to have been in an occupation that is classified with that SEI-code. All variables of accumulated class have then been converted to years to facilitate for more intuitive interpretations. The variables used for accumulated class

are **years in work** and **years in manual employment**. Years in work is the grand total of all periods spent in gainful employment, i.e. a summation of all SEI-classed experiences. Years in manual employment is the sum of periods spent in either unskilled or skilled manual employment (i.e. SEI 10 and SEI 20). I also use square terms for the two accumulation variables, i.e. **years in work²** and **years in manual employment²** to account for any curvilinearity at more lengthy experiences. In the descriptive statistics I also present average shares of the total working life spent in different positions for individuals in different current classes. **Total working life** then refers to the respondent's age minus age at the time of his or her first job that lasted at least 6 months.

Control variables

Age. Age is calculated from the respondent's birth year, in relation to in which wave of the survey the respondent was interviewed.

Age². Age squared, included to account for potential curvilinearity due to for instance further acceleration of health deterioration at higher ages.

Sex. Sex is used as control in all models (Women=1).

Education. Education is taken from LNU1991 or LNU2000, depending on the time of interview, and measures number of years of schooling. A control for education is used since education has a consistent correlation with health and mortality and is cited as the most influential socioeconomic factor in regards to health differentials (Elo, 2009; Torssander & Erikson, 2009).

Survey year. Survey year is a dummy variable for whether or not the respondent participated in LNU2000 (LNU2000=1).

Method

The variation in accumulated class experiences will be analyzed by exploring the reported experience of other classes, within each of the groups of current classes. The extent, to which accumulated class experiences are associated with self-rated health, will firstly be presented as descriptive statistics. To further explore the potential associations I will use step-wise linear probability models (LPM). LPM is basically an ordinary least squares (OLS) regression model but with a binary outcome variable instead of a continuous one. Logistic regressions, or logit models, are more often used when dealing with probabilities of binary outcomes. Logit models take on a curvilinear form that

complies better with probability functions, and outcomes are often presented as log odds ratios - interpreted as percentage point's change in the odds for the binary outcome (Edling & Hedström, 2003; Long, 1997). I will, further on in the analysis, also use a logit model to explore the odds to experience less than good SRH, depending on previous class experience. However, before turning to logit models I will examine in which way the different variables and combinations of variables can be used to best capture any potential association between class experience and SRH and for this I will use LPM. Normally it is not advised to use OLS for binary outcomes since it involves problems with heteroscedasticity, unrealistic coefficients and misspecified functional form. But to explore the different models I will use step-wise modeling, which would be less suitable with a logit model. In logit models unobserved heterogeneity means that differences in coefficients or odds ratios between models or even between groups within the same model cannot readily be taken as substantive differences in the effect of the independent variable upon the dependent variable. This makes it problematic to compare between models and between groups using logit models (Mood, 2010). Step-wise modeling involves a comparison of models. I am also hoping to address the question of whether we gain more understanding of social differences in health when including measures of accumulated class, which also entails comparison between models. Thus, LPM seems to be more fitting for the step-wise part of the analyses. All models will be executed using the software package STATA11.

When comparing between models one can compare the R²-value to see which model explains the largest share of variation in the dependent variable. One drawback with R² in step-wise modeling is that adding variables to a model routinely leads to an increase in R². In models with quite low degrees of explained variance to begin with, it can be hard to discern if an increase of R² is due to the model getting a better fit or if it is just the effect of adding more variables. Instead the adjusted R² can be used. Adjusted R² takes the number of variables into account and is therefore a better measure when comparing between models with different numbers of independent variables (Edling & Hedström, 2003).

In the first model I will use current class as main independent variable to see if the social gradient in health is evident in the sample. The current classes will be entered as dummy-variables, with higher level non-manuals (SEI 50) as reference category. I will control for

age, sex, education and survey year. For age I will also include a square term, since there seem to be a somewhat curvilinear association (see figures 3-6), that could very well be due to age. These control variables will be used throughout the different models.

In model 2 and 3 I will test two variables that accounts for previous work experience. Firstly (model 2) the more inclusive measure of length of work experience, i.e. the total time that each respondent has been in gainful employment, and then in model 3, the length of time spent in manual work. According to the social gradient, manual employees, on average, should have higher prevalence of less than good SRH than the rest of the population. If these experiences have any lasting effect on health it would, according to the accumulation hypothesis, become more influential the longer exposure one has had. In model 4 I will adjust these two accumulation variables controlled for each other and finally, in model 5, I will use all hitherto listed variables. All models will be presented both for the total sample and for men and women separately.

Results

Below I will present the empirical results. Firstly I will present the distribution of current class and then examine the distribution of occupational class experiences for the different current classes. Then I will examine how health is distributed in the different classes, starting with current class position and then adding different class experiences.

Current class and class accumulation

The distribution of current SEI class for employed respondents 35-65 years of age can be seen below in table 1. Both the broader classes and a more fine-grained distribution with separate classes for qualification level as well as for occurrence of subordinates are specified in table 1. Collapsing the classes further, into working class and service class would give a working class (SEI10+SEI20) of around 42 percent. The classes are quite evenly distributed among men; around 22 percent of men are represented in each class category. With the exception of assistant non-manual employees (SEI30) that have a

slightly smaller representation of men. Among women the more frequent classes are unskilled manuals (SEI10), assistant non-manuals (SEI30) and intermediate non-manuals (SEI40). In positions with higher demands for qualifications, women are somewhat under represented. For the sample as a whole, the classes have fairly equal sizes. Unskilled manuals and intermediate non-manuals are the two slightly larger classes with around 24 percent each of the population, compared to 17 percent for the other three classes.

Table 1, Class distribution for employees between 35-65 years of age, for the total sample and for men and women separately. Both broader categories (in bold) and more detailed classes.

<i>SEI-class</i>	<i>ALL</i>		<i>MEN</i>		<i>WOMEN</i>	
	Freq.	%	Freq.	%	Freq.	%
10: Unskilled manual employees	488	24.46	220	22.34	268	26.53
11...in goods production	127	6.37	89	9.04	38	3.76
12...in service production	361	18.1	131	13.3	230	22.77
20: Skilled manual employees	356	17.84	217	22.03	139	13.76
21... in goods production	212	10.63	199	20.2	13	1.29
22... in service production	144	7.22	18	1.83	126	12.48
30: Assistant non-manual employees	348	17.44	113	11.47	235	23.27
33... lower level	118	5.91	35	3.55	83	8.22
35...with subordinates	45	2.26	25	2.54	20	1.98
36... higher level. w/o subordinates	185	9.27	53	5.38	132	13.07
40: Intermediate non-manual employees	474	23.76	209	21.22	265	26.24
45...with subordinates	51	2.56	30	3.05	20	1.98
46...without subordinates	423	21.2	179	18.17	132	13.07
50: Higher level non-manual employees	329	16.49	226	22.94	103	10.2
56...higher level non-manual employees	252	12.63	162	16.45	90	8.91
57...upper-level executives	77	3.86	64	6.5	13	1.29
Total	1,995	100	985	100	1,010	100

The average share of the total working life that is spent in different class positions, for individuals with different current class positions, is presented in table 2. For all classes, the largest share has been spent within the current class (as is illustrated by the diagonal). Manual workers, both skilled and unskilled, have spent around 70 percent of their working life in their current class. The second largest share of working experience is spent in the other manual class, with the result that both skilled and unskilled manual

workers have spent more than 75 percent of their working life in the manual working classes (77 and 86 percent respectively). Notable is also that for the remaining part of their time since entering the workforce, manual workers have spent almost all of it in other activities than work. Meaning that manual workers have, on average, spent more than 90 percent of their working life either in manual work or outside the workforce and less than 10 percent in any other class position. When separating men and women it is found that female manual workers have spent a smaller share of their working life in the working classes than men. The difference is the largest among men and women with skilled manual occupations, and women currently in skilled manual occupation have, on average, spent a larger proportion of their working life in unskilled manual labour than men currently in skilled manual occupations.

Table 2. Mean share of working life spent in each SEI-class, for each current SEI-class. Total sample and for men and women separately.

<i>Current class*</i>	<i>Share of working life in different SEI-classes</i>						
	<i>10</i>	<i>20</i>	<i>30</i>	<i>40</i>	<i>50</i>	<i>60-80</i>	<i>Other activities</i>
10 All	0.70	0.07	0.04	0.02	0.00	0.03	0.13
Men	0.72	0.12	0.04	0.02	0.00	0.03	0.07
Women	0.69	0.04	0.05	0.01	0.00	0.02	0.19
20 All	0.20	0.66	0.02	0.01	0.00	0.02	0.09
Men	0.14	0.76	0.02	0.02	0.00	0.02	0.05
Women	0.29	0.48	0.03	0.01	0.00	0.02	0.17
30 All	0.13	0.06	0.60	0.06	0.02	0.02	0.11
Men	0.17	0.11	0.50	0.08	0.05	0.04	0.05
Women	0.11	0.03	0.64	0.05	0.01	0.02	0.15
40 All	0.10	0.08	0.13	0.51	0.05	0.02	0.13
Men	0.12	0.13	0.12	0.46	0.07	0.02	0.07
Women	0.08	0.04	0.14	0.54	0.03	0.01	0.17
50 All	0.05	0.03	0.10	0.17	0.54	0.02	0.08
Men	0.06	0.04	0.08	0.18	0.56	0.03	0.05
Women	0.03	0.01	0.14	0.17	0.48	0.01	0.15

*10=Unskilled manual employees, 20=Skilled manual employees, 30=Assistant non-manual employees, 40=Intermediate non-manual employees, 50=Higher level non-manual employees

Non-manual employees has spent roughly half their career in their current class. The main part of the remaining experience for people in assistant and intermediate level non-manual (SEI30 and SEI40) employment have been in the manual working class. People in the higher non-manual positions (SEI 50) have most of their remaining experience in

the non-manual intermediate and assistant levels. When separating between men and women, women in non-manual employment have larger shares of their working life within their current class at assistant and intermediate level. For higher level non-manual employees, men have longer experience within their current class. Apart from activities outside gainful employment, the manual working class is the second biggest share of the working life for most SEI-groups, or rather for all groups apart from higher level non-manual employees for whom intermediate level employment is the second largest share. In a perspective of intragenerational mobility, this is perhaps not very surprising, since it is more common to be upwardly mobile than downwardly. However, other activities than work accounts for a quite large share of time since the entry into the workforce. For most of the classes it is either the second largest part of the work experience, or not far from. Notable is also that women, regardless of current class position, have spent substantially larger shares of their working life outside gainful employment than men. Women in manual positions have an average of 17 percent or more outside of work, compared to men who have an average of 10 percentage points less time outside of work. This is most probably due to longer periods of parental leave as well as longer periods in homemaking.

Another way of looking at the distribution of occupational class experience is how common it is to have had any experience in a class, regardless of the length of that experience. This can be seen in table 3 and, as could be expected from table 2, in almost all classes more than half of the inhabitants have at some stage of their working life been in an occupation within the unskilled manual working class. The exception is for the higher level service class, where only about 30 percent of the inhabitants have ever been unskilled workers. More than half of the higher level service class has been in intermediate level service class, which also could be expected to be a vital part of the career trajectory for higher service class employees. In general, table 3 tells mostly the same story of intragenerational class mobility as table 2. If the most common career trajectories are through upward mobility this would be read as movement from left to right in table 3. It is therefore not surprising to find comparably large proportions in the cells just to the left of the cell for current class position. Turning to downward mobility, it can be observed in table 3 that movement from right to left is less common. Especially mobility from service class occupations to working class occupations is quite rare. Very few individuals that are currently in manual occupations have ever been in higher level

salariat; in fact not a large proportion of individuals in working class occupations have ever been in service class occupations at all. These results mirrors pretty well previous research on Swedish data (Tåhlin, 1993). Experience of activities outside work is common in all classes; more than 60 percent has ever been in other activities. For women these figures are especially high, more than 80 percent of women in all classes have some experience of other activities than work. As discussed earlier a large share of that time could be expected to be either child-rearing or homemaking and if those activities are excluded the proportion of women with experiences outside work are substantially lowered (se numbers in parenthesis in table 3).

Table 3. Share of individuals in each current class that has any experience within each class category. For total sample and for men and women separately.

Current Class*	Share of individuals that has ever been in occupational class:					
	10	20	30	40	50	Other activities**
10 All	1.00	0.34	0.21	0.07	0.02	0.77 (0.55)
Men	1.00	0.44	0.19	0.08	0.02	0.66 (0.65)
Women	1.00	0.26	0.23	0.05	0.02	0.86 (0.46)
20 All	0.71	1.00	0.14	0.08	0.01	0.72 (0.65)
Men	0.63	1.00	0.09	0.10	0.00	0.60 (0.58)
Women	0.83	0.99 ¹⁴	0.22	0.06	0.01	0.91 (0.76)
30 All	0.54	0.23	1.00	0.22	0.08	0.80 (0.52)
Men	0.59	0.41	1.00	0.28	0.15	0.62 (0.61)
Women	0.51	0.15	1.00	0.18	0.05	0.88 (0.48)
40 All	0.53	0.32	0.45	1.00	0.18	0.80 (0.61)
Men	0.58	0.46	0.43	1.00	0.22	0.67 (0.64)
Women	0.49	0.21	0.46	1.00	0.14	0.89 (0.58)
50 All	0.33	0.17	0.40	0.54	1.00	0.62 (0.51)
Men	0.37	0.20	0.35	0.54	1.00	0.50 (0.50)
Women	0.23	0.10	0.50	0.55	1.00	0.87 (0.55)

*10=Unskilled manual employees, 20=Skilled manual employees, 30=Assistant non-manual employees, 40=Intermediate non-manual employees, 50=Higher level non-manual employees

**Other activities excluding parental leave and house work are shown in parenthesis.

¹⁴ The total here ought to be 1,00. The sum of 0,99 is due to one observation without a start date, that should have been excluded but was missed in the selection process (woman with unknown lenght of time as a waitress, sei22).

In table 4 shares of time in activities outside gainful employment are presented.¹⁵ The unemployment shares are highest for men in occupations that do not require any previous education or training. In general, men have spent a larger proportion in unemployment than women. The shares of time spent in education (since first entry into the labor force)¹⁶ is largest in the non-manual classes and women in intermediate and high level non-manual employment have larger proportion of their time in education than comparable men. Women in skilled manual occupations also have longer education than any other group within the manual working class, on level with men in intermediate or high level service class occupations. This could be indication of that women in skilled manual occupations often start their time in the workforce before they get their educational qualifications, which would mean that comparably young women in skilled manual employment have both a long time in the workforce and that their education is reported within the WH9120. Or it could be a case of over-qualification for this group of women. As could be expected, according to table 4 the larger proportions outside gainful employment that are found for women are driven by high rates of house work and parental leaves. Men, in general, spend less time in these activities and the extent that they do is not large enough to be measurable with only two decimal points (as in table 4).

¹⁵ Only activities with shares >0.01 are presented in table 4, which is the reason for some smaller discrepancies between the row-totals in table 4 and the corresponding shares of time in "other activities" in table 2. The excluded activities are *labour market programme, pension, military service, other, abroad, and unknown*. Military service contributes to 1 percent of the time for all men except for higher level service class (share<0.005).

¹⁶ Time spent in education here refers to any periods of time the respondent has spent in education *after the first job of at least 6 months*. I.e. elementary school is not included and neither is any higher education that is undertaken *before* the first entry into the workforce.

Table 4. Mean share of working life in activities outside work. for each current class. Total sample and for men and women separately.

<i>Current class*</i>	<i>Share of working life in activities outside work</i>				
	<i>Un-employed</i>	<i>Studying</i>	<i>Parental leave</i>	<i>House work</i>	<i>Total</i>
10 All	0.02	0.02	0.02	0.06	0.12
Men	0.03	0.02	0.00	0.00	0.05
Women	0.01	0.02	0.04	0.11	0.18
20 All	0.01	0.02	0.02	0.02	0.08
Men	0.01	0.02	0.00	0.00	0.03
Women	0.01	0.04	0.06	0.05	0.16
30 All	0.01	0.02	0.03	0.04	0.10
Men	0.01	0.02	0.00	0.00	0.04
Women	0.01	0.02	0.05	0.06	0.14
40 All	0.01	0.05	0.04	0.02	0.11
Men	0.01	0.04	0.00	0.00	0.06
Women	0.01	0.06	0.06	0.03	0.16
50 All	0.01	0.05	0.02	0.01	0.08
Men	0.01	0.04	0.00	0.00	0.05
Women	0.00	0.07	0.06	0.02	0.15

* 10=Unskilled man. empl., 20=Skilled man. empl., 30=Assistant non-man. empl., 40=Intermediate non-man. empl., 50=Higher level non-man. empl.

Accumulated class and health

Descriptive statistics

Looking at the frequencies of answers on the self-rated health question, the pattern of a social gradient in health can be seen (table 5). There is a division between intermediate and higher level non-manual employees and everyone else in regards to SRH. Individuals in intermediate and higher level non-manual employment, on average, have higher rates of good SRH than the population average. Some exceptions from a strict gradient can however be noticed in table 5. The best SRH is reported by intermediate rather than higher level non-manual employees. However, when breaking down the class categories further, the smallest incidence of good SRH is, as expected, found among unskilled manual workers in goods production. The reports of bad SRH is in most respects a mirroring image of good SRH reports; intermediate and higher level non-manual employees report bad SRH to a lesser extent than everyone else. The absolute largest

share of bad SRH is found for unskilled manual employees in goods production, and the second largest by assistant level non-manuals. Also here exceptions from the expected gradient can be noted; unskilled manuals in service production (SEI 12) and assistant level non-manuals with subordinates (SEI 35) have levels of bad SRH reports that are as low as for intermediate and higher level non-manuals.

If the effect of class on self-rated health can be lasting, experiences in the manual classes (SEI-classes 10 and 20) as well as for assistant level non-manuals (SEI-class 30) could potentially be contributing to an accumulated risk; and experiences of intermediate and higher level service class (SEI-classes 40 and 50) are potential modifiers. It is uncertain, however, if the assistant non-manual employees of higher level (SEI 36) should be included in the potential risk-classes or as a modifier, since the propensity for good SRH are just above the average level but with reports of bad SRH that are higher than average.

Table 5. Distribution of self-rated health in different SEI-classes, percent (frequencies)

<i>Current SEI-class</i>	<i>Self-rated health % (n)</i>			
	<i>Good</i>	<i>Bad</i>	<i>In Between</i>	<i>n</i>
10: Unskilled man. employees	74 .18 (362)	3 .89 (19)	21 .93 (107)	100 (488)
11...in goods prod.	63 .78 (81)	7 .09 (9)	29 .13 (37)	100 (127)
12...in service prod.	77 .84 (281)	2 .77 (10)	19 .39 (70)	100 (361)
20: Skilled man. employees	77 .53 (276)	3 .65 (13)	18 .82 (67)	100 (356)
21...in goods prod.	77 .36 (164)	3 .77 (8)	18 .87 (40)	100 (212)
22...in service prod.	77 .78 (112)	3 .47 (5)	18 .75 (27)	100 (144)
30: Assistant non-man. empl.	78 .16 (272)	4 .02 (14)	17 .82 (62)	100 (348)
33...lower level	75 .42 (89)	4 .24 (5)	20 .34 (24)	100 (118)
35...with subord.	75 .56 (34)	2 .22 (1)	22 .22 (10)	100 (45)
36...higher level. w/o subordinates	80 .54 (149)	4 .32 (8)	15 .14 (28)	100 (185)
40: Intermediate non-man. empl.	85 .44 (405)	2 .11 (10)	12 .45 (59)	100 (474)
45...with subord.	86 .27 (44)	0 .00 (0)	13 .73 (7)	100 (51)
46...w/o subord.	85 .34 (361)	2 .36 (10)	12 .29 (52)	100 (423)
50: Higher level non-man. empl.	83 .59 (275)	2 .43 (8)	13 .98 (46)	100 (329)
56...h. lev.non-man.	82 .94 (209)	2 .38 (6)	14 .68 (37)	100 (252)
57...upper-level exec.	85 .71 (66)	2 .60 (2)	11 .69 (9)	100 (77)
Total	79 .70 (1590)	3 .21 (64)	17 .09 (341)	100 (1995)

Figure 3-6 illustrates the relationship between accumulated class experiences and self-rated health, with experiences divided into 5-year categories.¹⁷ The relationship is shown for total experience of work (i.e. other activities than work are not included); of manual work; of manual work and assistant level non-manual work combined; and of intermediate and high level non-manual work. Work in general (figure 3) is related to a lower risk of bad health; the prevalence of other than good SRH for individuals with less than five years of work experience is more than 35 percent, which then goes down to just under 20 percent for longer times of working experience. This could be due to a “healthy worker” effect, i.e. if health problems lead to a larger propensity to go in and out of employment. There is a slight upturn in the end of the graph, at work experiences of 25 years or more, which most probably should be attributed to age.

Figure 3. Share of individuals reporting less than good SRH for each 5 years of working experience.

Experience of intermediate and high level non-manual employment (figure 4) is also connected to lower risk for bad SRH. About 24 percent of individuals with less than five years experience in these classes reports other than good SRH. This is reduced with longer experience and goes down under 15 percent. Like for general work experience

¹⁷ In figure 4-6 “0 years” includes all individuals that has never been in this category - i.e. to be included in the category “less than 5 years” one month of experience would suffice. In figure 3, however, 0 years of experience is not included; to be included in the WH9120 a minimum of six months work experience is required.

there is an upturn at the end of the graph, and as for general work experience this should probably be interpreted as mostly an effect of ageing.

Figure 4. Share of individuals reporting less than good SRH for each five years experience in intermediate and high level non-manual employment.

For working class experience on the other hand (figure 5), the trend is the opposite. The prevalence of less than good SRH for individuals with no experience in this class is less than 15 percent. With increasing experience this rises and after five years of experience about 25 percent reports other than good SRH. There is, however, also a period of lesser risk at experiences between 15 and 25 years.

Figure 5. Share of individuals reporting less than good SRH for each five years of experience in manual employment (SEI-class 10+20)

When adding the assistant level non-manuals to the working class (figure 6), the pattern is similar, but somewhat muted. The start-off point is the same, of individuals with no experience of any of these classes less than 15 percent report other than good health. The rise after that is somewhat modified, but the trend is of increasing prevalence of less than good SRH with increasing experience.

Figure 6. Share of individuals reporting less than good SRH for each five years experience in manual and assistant non-manual employment (SEI-class 10+20+30)

In all four figures, the shares of individuals with other than good SRH increases at experiences of 25 years or more, and as previously mentioned this should probably be seen as an effect primarily of ageing.¹⁸ However, it is notable that the increase at long experiences are from very different previous levels; of individuals with more than 25 years of experience within intermediate or high non-manual employment still only about 15 percent have less than good SRH. The corresponding figure for experience of manual employment, as well as for the combination with assistant non-manuals, is almost 25 percent.

¹⁸ The correlation between age and less than good self-rated health is 0,14. Hence as expected there is a correlation between age and health but it is not very strong, at least not on this study population, and it leaves a lot of room to explain differences in self-rated health with other correlations than age.

Linear probability models and logistic regression

The step-wise LPM models are presented below, in tables 6-8. In Model 1 (table 6) the expected social gradient can be observed. For women the gradient can be observed but the differences from the reference category (SEI 50) are not statistically significant. For the total population and well as for men associations with higher proportions of bad SRH for manual employees (SEI 10 and 20) are statistically significant. However, intermediate non-manual employees show a negative association. This is not really in line with a strict social gradient, but remembering table 5 where this group had the smallest incidence of bad health reports, this is perhaps not surprising. As can be expected, there is a curvilinear age-effect where the initial association between age and less than good self-rated health is negative but with decreasing strength at higher ages. Judging from model 1, the social gradient as represented by current class position seems more fitting to use for men since there are very few significant results for women. To investigate the association between occupational experiences and SRH the two accumulation variables are tested, first separately and then jointly. Starting with model 2 (table 6), that shows the crude association for the length of total work experience, there is a negative association between total work experience and propensity for other than good SRH. This is significant both for the total sample and for the gender separate analysis. All variables in model two, apart from the controls for sex and survey year, are measures of time and have the same direction of association (square terms of course going in the other direction), but the coefficient for age does not reach significance. Model 2 does not capture more variety in health than model 1; degree of explained variance (both expressed by R2 and adjusted R2) is only slightly increased. However it does so a bit more efficiently, using fewer variables.

Table 6. Propensity for less than good SRH. LPM, models 1 and 2

	Model 1			Model 2		
	<u>All</u> Coef.	<u>Men</u> Coef.	<u>Wom</u> Coef.	<u>All</u> Coef.	<u>Men</u> Coef.	<u>Wom</u> Coef.
Current sei10	0.107 **	0.132 **	0.092 n/s			
Current sei20	0.079 *	0.083 †	0.077 n/s			
Current sei30	0.056 n/s	0.065 n/s	0.051 n/s			
Current sei40	-0.008 n/s	-0.026 n/s	0.014 n/s			
Current sei50	Ref	Ref	Ref			
Years in work				-0.015 ***	-0.014 *	-0.014 *
Years in work^2				0.000 *	0.000 n/s	0.000 *
Years in manual empl.						
Years in manual empl^2						
Age	-0.045 **	-0.054 **	-0.035 n/s	-0.024 n/s	-0.030 n/s	-0.019 n/s
Age^2	0.001 ***	0.001 **	0.000 †	0.000 *	0.000 *	0.000 n/s
Sex (Women=1)	0.007 n/s			0.000 n/s		
Education (years)	0.001 n/s	0.005 n/s	-0.003 n/s	-0.008 **	-0.010 *	-0.010 *
Survey (2000=1)	0.014 n/s	-0.017 n/s	0.045 †	-0.006 n/s	-0.052 †	0.037 n/s
Cons.	0.983	1.116	0.843	0.831	0.945	0.776
R2	0.041	0.064	0.026	0.040	0.066	0.027
Adj. R2	0.036	0.057	0.018	0.037	0.060	0.021
n	1,994	984	1,010	1,994	984	1,010

*** p<0.001 **p<0.01 *p<0.05 † p<0.1 n/s p>0.1

In model 3 (table 7) the other accumulation variable (amount of time spent in manual positions) is tested and has the opposite association with health, compared to total time in work. Longer time in manual labor is associated with a larger propensity to experience less than good SRH. In this model, the coefficient for age has doubled and is again significant but length of education no longer has any significant association with SRH. For men, the amount of time in manual labor explains a larger part of the variation in SRH than the total work experience and this is also true when looking at the full study population. On the contrary, for women the total work experience explains a larger part of this variation; R2 is higher for women in model 2 than in model 3. This could be due to that women have a smaller representation in the manual working class (SEI-class 10+20) than men, and that a larger proportion of female employees with limited skill requirement are lower level assistant non-manuals (SEI 33), which is an experience not

included here. When exploring the combined association with SRH for length of work experience and time in the manual classes (model 4, table 7) both measures of accumulated experience are significant, for men as well as for women. The coefficients for number of years in work are of equal sizes for men and women but the coefficient for each added year in manual work is slightly bigger for women than for men. This perhaps indicates that there is a larger variation in health between women than between men. The two measures for accumulation together explain 6,7 percent (adjusted R2)¹⁹ of the variation in SRH among men, an increased explained variance of one percentage point compared to model 1.²⁰ The increase in adjusted R2 is equally large both for the total population and for women as it is for men, but the degree of explained variance is lower, suggesting that the model has a better fit for men than for women.

Table 7. Propensity to report less than good SRH. LPM, models 3 and 4.

	Model 3			Model 4		
	<u>All</u> Coef.	<u>Men</u> Coef.	<u>Wom</u> Coef.	<u>All</u> Coef.	<u>Men</u> Coef.	<u>Wom</u> Coef.
Years in work				-0.018 ***	-0.018 **	-0.018 **
Years in work²				0.000 **	0.000 n/s	0.000 **
Years in manual empl.	0.007 **	0.006 †	0.010 **	0.009 ***	0.007 *	0.013 **
Years in manual empl²	0.000 *	0.000 n/s	0.000 *	0.000 **	0.000 n/s	0.000 **
Age	-0.048 **	-0.057 **	-0.036 †	-0.021 n/s	-0.027 n/s	-0.016 n/s
Age²	0.001 ***	0.001 **	0.000 †	0.000 *	0.000 *	0.000 n/s
Sex (Women=1)	0.018 n/s			0.012 n/s		
Education (years)	-0.001 n/s	0.002 n/s	-0.004 n/s	-0.001 n/s	-0.002 n/s	-0.003 n/s
Survey (2000=1)	0.007 n/s	-0.021 n/s	0.034 n/s	-0.006 n/s	-0.053 †	0.033 n/s
Cons.	1.074	1.237	0.881	0.644	0.744	0.589
R2	0.037	0.051	0.031	0.048	0.075	0.038
Adj. R2	0.033	0.045	0.025	0.044	0.067	0.031
n	1,994	984	1,010	1,994	984	1,010

*** p<0.001 **p<0.01 *p<0.05 † p<0.1 n/s p>0.1

¹⁹ Model 4 contains the same number of variables as model 1 but to make equal comparison between all models, adjusted R2-values are quoted and not crude R2-values.

²⁰ An interaction term between number of years in work and number of years in manual employment has been tested but does not reach significance. Model 4 has also been tested when excluding the variables *age* and *age2* which results in slightly higher coefficients for the accumulation variables but a lower R2 as well as adjusted R2, rendering that model inferior to the one including the age variables.

To investigate whether the social gradient for current class is modified by taking previous work experience into account we control all variables for each other in the final model (model 5, table 8) and find that there are no significant results for current class position when controlling for previous experience in manual occupations and for total time in gainful employment. The coefficients for number of years in work as well for number of years in manual employment are essentially the same as in the previous model (model 4). Proportion of explained variance is also comparable to model 4.

Table 8. Propensity to report less than good SRH. LPM, model 5.

	Model 5					
	<u>All</u>		<u>Men</u>		<u>Women</u>	
	Coef.		Coef.		Coef.	
Current sei10	0.036	n/s	0.060	n/s	-0.018	n/s
Current sei20	0.015	n/s	0.023	n/s	-0.035	n/s
Current sei30	0.046	n/s	0.054	n/s	0.027	n/s
Current sei40	-0.021	n/s	-0.036	n/s	-0.007	n/s
Current sei50	Ref		Ref		Ref	
Years in work	-0.018	***	-0.016	**	-0.019	**
Years in work^2	0.000	**	0.000	n/s	0.000	**
Years in manual employment	0.008	**	0.006	n/s	0.014	**
Years in manual employment^2	0.000	*	0.000	n/s	0.000	**
Age	-0.021	n/s	-0.028	n/s	-0.016	n/s
Age^2	0.000	*	0.000	*	0.000	n/s
Sex (Women=1)	0.008	n/s				
Education (years)	0.001	n/s	0.000	n/s	-0.001	n/s
Survey (2000=1)	-0.003	n/s	-0.047	†	0.034	n/s
Cons.	0.612		0.723		0.586	
R2	0.051		0.081		0.040	
Adj. R2	0.045		0.069		0.028	
n	1,995		984		1,010	

*** p<0.001 **p<0.01 *p<0.05 † p<0.1 n/s p>0.1

In this step-wise modeling it can be found that combining both current class position and previous experiences (model 5) accounts for higher amounts of variance in self-rated health among currently employed individuals, than when using only current class positions (model 1). It has also been shown that when both current class and previous experience is considered, the social gradient as measured by current class is rendered non-significant. This would suggest that the effect of current class on SRH to a large extent works through the experiences gained during the course of the working-life.

After this step-wise modeling we turn to logistic regression that is more compliant with the functional form of probabilities and odds. The first model used as a logit is model 5. Since logistic regression is highly sensitive to unobserved heterogeneity it seems more suitable to use the more inclusive model 5 (table 9) than the restricted model 4, even though they in the LPM give equal results. Here it is found that when controlling for current class position, each added year of work experience reduces the odds of less than good SRH with about 10 percent. However, each added year of experience in manual occupations is associated with an increase in the same odds. In the total model there are no significant results for sex, i.e. the odds for less than self-rated health are not different for men and women in this model. Separate logits for men and women show the same directionality in changes of odds even though the only variable giving statistically significant changes in odds for men is length of time spent in work.

Table 9. Change in odds of reporting less than good SRH, for total sample and for men and women separately.

	<i>Less than good SRH</i>		
	<i>All or</i>	<i>Men or</i>	<i>Women or</i>
Current sei10	1.264 n/s	1.504 n/s	0.945 n/s
Current sei20	1.125 n/s	1.206 n/s	0.849 n/s
Current sei30	1.353 n/s	1.399 n/s	1.226 n/s
Current sei40	0.852 n/s	0.720 n/s	0.973 n/s
Current sei50	<i>Ref</i>	<i>Ref</i>	<i>Ref</i>
Age	0.936 n/s	0.919 n/s	0.941 n/s
Age^2	1.001 n/s	1.002 n/s	1.001 n/s
Years in work	0.898 ***	0.909 *	0.891 **
Years in work^2	1.002 **	1.001 n/s	1.002 **
Years in manual employment	1.054 **	1.042 n/s	1.093 **
Years in manual employment^2	0.999 *	0.999 n/s	0.998 **
Sex (Women=1)	1.060 n/s		
Education (years)	1.013 n/s	1.011 n/s	0.993 n/s
Survey (2000=1)	1.028 n/s	0.803 n/s	1.279 n/s
n	1,994	984	1,010

*** p<0.001 **p<0.01 *p<0.05 † p<0.1 n/s p>0.1

Hitherto has been shown on the one hand a negative association between currently being in a high or intermediate service class positions and reports of less than good SRH, and on the other hand a positive association between number of years in a working class position and less than good SRH. If the health effects of manual experience is accumulative and lasting one would expect that this association can be found even among individuals that are no longer in these positions of risk. Below, in table 10, is a logistic regression for the change in odds of reporting less than good health depending on amount of time spent in manual work, for individuals currently in high or intermediate service class positions. The odds of service class employees to report less than good health increase by 11 percent per each year of previous experience in the manual working class, and the effect on the odds wanes off at longer experiences.

Table 10. Odds of reporting less than good SRH, for individuals in SEI-class 40 or 50. Both total and for men and women separately.

	<i>Less than good SRH</i>		
	<i>All</i>	<i>Men</i>	<i>Women</i>
	<i>or</i>	<i>or</i>	<i>or</i>
Years in work	0.926 n/s	0.923 n/s	0.933 n/s
Years in work^2	1.001 n/s	1.001 n/s	1.001 n/s
Years in manual employment	1.110 *	1.045 n/s	1.198 **
Years in manual employment^2	0.997 †	0.999 n/s	0.993 *
Age	0.788 n/s	0.678 n/s	0.893 n/s
Age^2	1.003 †	1.005 †	1.002 n/s
Sex (Women=1)	1.242 n/s		
Education (years)	1.021 n/s	1.048 n/s	0.979 n/s
Survey (2000=1)	1.166 n/s	0.770 n/s	2.097 †
N	803	435	368

*** p<0.001 **p<0.01 *p<0.05 † p<0.1 n/s p>0.1

Discussion

Results and implications

In the introduction, three research questions were stated. How much variation is there in the work life biographies between different current classes? Is the effect of current class position modified by previous positions during adulthood? And how much extra information can we gain by utilizing information on individual work histories?

In the descriptive analyses of the work life biographies it was found that for employed individuals between 35-65 years of age, the main part of the accumulated class experience is within the current class. The remaining part of the experience is to a large extent spent in nearby class positions, if a hierarchical order of classes is envisaged. Intragenerational mobility is primarily an upward movement, there is only small incidences of downward mobility, and it is especially rare with downwards movement

from the positions of intermediate and higher level service class. This is in line with previous research on intragenerational mobility patterns in Sweden (Tåhlin, 1993). Time spent outside work, since entry into the workforce, is predominantly time spent by women in the home, either with children or as homemakers. Time in education is the other more prominent activity outside gainful employment and is mostly time spent by the service class. Unemployment is not largely represented in the working life of this population; however, unskilled male workers have been unemployed to a larger extent than the rest of the population.

Like in numerous previous studies I find that current class position is associated with SRH; different current class positions have different average levels of self-rated health. This association is in line with the commonly found social gradient in health. However, the results from the linear probability models, suggests that there is also an association between accumulated experience of manual working class positions and SRH. The total number of years in work is negatively associated with propensity for less than good SRH, i.e. longer time in work, regardless of what kind of work, is associated with a lesser risk of experiencing other than good health. Length of time spent in work is of course also connected to time spent in other activities, like for instance unemployment. Unemployment has a robustly shown association with negative health outcomes (for an overview, see Bartley, 1994), so the lesser risk for a negative health outcome associated with work experience could possibly be viewed in the light of other experiences that are avoided when one has gainful employment. But, as mentioned above, unemployment is not a very prevalent experience in the population in this study. The negative association between total time in employment and less than good SRH can also be due to reversed causality. As previously discussed, it is feasible to believe that individuals with lesser health are more prone to go in and out of employment. Sick-leaves are, however, not explicitly measured in the data. It seems feasible to assume that any period of illness that lasted over a month is included in either the economic status category of “other activities”, or as “pension”, if the individual had a longterm health-problem that resulted in early retirement. Neither of these categories amount to large proportions of the past experiences for any of the class-groups in this study. This is most probably due to that only individuals that are currently working are included in the study which, according to Dahl (1993), would run the risk of underestimating the association for the non-manual groups in this study.

The second variable for accumulated class in this study, number of years in manual employment, is set to measure experiences that can be considered risk-factors for health. The number of years spent in manual employment shows a significant association with higher risks for less than good SRH, indicating that there is a cumulative effect of experience of at least manual working class. In the mutually adjusted model (model 5) the previously shown social gradient as measured by current class is no longer statistically significant, but the measures of accumulation still retain significant associations. The degree of explained variance is also greater than for the regular social gradient model (model 1), even after adjusting for the number of extra variables added. In fact, the association between accumulated experiences and SRH alone accounts for as much of the variation as when current class is also included. This is suggesting that the health effect of current class position works to a large extent through previous class experience. This would be along the same lines of reasoning as Fritzell (2007) attributing the effect of childhood class position to social reproduction of class positions. Since a large share of the population has had most of their work experience within their current class, perhaps current class represents a proxy measure of previous experience. In a logit model I also use the high and intermediate level service class to see if the effect of previous experience in manual labor is still present even after one leaves the working class. The odds of reporting less than good SRH is increasing with each added year of manual experience, even for this group of non-manual employees. This suggests that the social gradient in health is more complex than just a matter of current social position influencing current health. Hence it is plausible to answer the second stated research question affirmatively; health-effects of current class would potentially be modified if the full complexity of life-time social positions were taken into account.

The question still remains though, what do we gain from a rather laborious exercise to collect data and construct variables of accumulated occupational class positions? That seems to me as a matter of perspective. Or as Tåhlin (1993) put it:

It is reasonable to expect that the impact of class position on activities and attitudes of different kinds to a large extent stems from accumulated class experiences rather than simply from the position that the individual currently occupies. The importance of past experiences can further be assumed to vary with respect to what it is one is attempting to explain.

Current class position from cross-sectional data can be assumed to misrepresent the health association for individuals that recently changed class position or that are in a very temporary position. But judging from the descriptive statistics in this study, this can be expected to apply to only a small part of a cross-section, since class positions seem to be quite stable across time for individuals. If one is interested in predictive abilities of class on health, current class position ought to be as sufficient a measure as the total class experience. If, however, one is interested in explaining how social differences in health come about, accumulated class experience might contribute to tell a fuller story.

Limitations and further research

In the economic activity history of LNU, one of the limitations when assessing accumulated experience is the fact that the biography does not take into account experiences before an initial job lasting at least 6 months. This has the effect that “time in the workforce” (i.e. amount of total possible time in work) is different, even for individuals of the same age, depending on age at first job. Trying to account for, and adjust for, different time variables has therefore been a challenging task and would need to be further addressed before making any causal claims.

That individuals enter the biography at different ages also means that there is a possible underestimation of the length of accumulated experiences. To make an illustrative example: a 50-year old individual that started to work at 18 and then went on to 3 years of higher education at the age of 21 will in the economic activity history have a registered 3 year period of education and a total time in the workforce of 32 years. Another 50 year old individual that started 3 years of education at the age of 18 and then started working at 21 will have no experience of studies registered and a total time in the workforce of 29 years. This will primarily affect this study if a large proportion of individuals, that entered the biography after their higher education is completed, also had several shorter periods (i.e. less than 6 months) of working experience before or during their student years. These experiences could feasibly be expected to be in occupations with no (or low) skill requirements, which could potentially lead to an underestimation of the association between time in manual employment and SRH. Self-rated health is also only measured at one time-point in this study, at the time of the interview. Thus it is not possible to ascertain when a health problem emerged or the temporal ordering between

occupational class position and health. Information on health status at several time-points, ideally on a yearly or even monthly basis, would be useful to further investigate the relationship between the work-life and health.

In general, the relationship between current class, accumulated class and other experiences are complex and would need to be further explored. For future research it would for example be of interest to see how the result for this population differs from populations that include individuals currently in other activities than work, since this study consists only of currently employed individuals. As mentioned earlier it would also be of interest to examine whether similar results can be found for retirees. Looking ahead, to a new wave of LNU currently being finalized, the economic activity history will be expanded both to include a larger population as well as longer biographies for the panel which would facilitate further exploration in the future. It would also be of interest to find other suitable data, for instance within the rich supply of Swedish registry data, where it would be possible to trace individual careers. In total population data it could also perhaps be possible to include self employed individuals in the analysis. Self employed is a group that is often hard to include in analysis on survey data, due to small numbers, thus we know even less about the health for this group.

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Table of variables

Mean, median and standard deviations for dependent, independent and control variables. Total sample population, and men and women separate.²¹

	<i>Bad SRH</i>			<i>Number of years in workforce</i>			<i>Number of years in work</i>			<i>Number of years in manual employment</i>			<i>Age</i>			<i>Number of years in education</i>			<i>Respondent in LNU2000</i>		
	All	Men	Wom	All	Men	Wom	All	Men	Wom	All	Men	Wom	All	Men	Wom	All	Men	Wom	All	Men	Wom
Mean	0,20	0,20	0,20	29,04	29,08	29,01	25,86	27,55	24,22	12,62	14,60	10,69	46,46	46,66	46,27	11,99	12,07	11,92	0,61	0,60	0,61
Median	0	0	0	29,17	29,33	28,50	25,83	27,83	24,00	8,58	12,08	5,67	46,00	46,00	46,00	12,00	12,00	12,00	1	1	1
Std.dev	0,40	0,40	0,40	9,96	10,32	9,60	9,94	10,43	9,16	12,94	13,70	11,83	7,39	7,63	7,14	3,43	3,59	3,26	0,49	0,49	0,49
n	1995	985	1010	1995	985	1010	1995	985	1010	1995	985	1010	1995	985	1010	1995	984	1010	1995	985	1010

²¹ For distribution of current class, see table 1.

Economic activities

<hr/> Work <hr/>	
1	Employed
2	Self-employed
3	Farmer
<hr/> Other economic activities <hr/>	
4	Unemployed
5	Labor market programme ²²
6	Studying
7	Military service
8	Parental leave
9	Housework
10	Pensioner
11	Other
12	Abroad ²³
13	Unknown, missing
<hr/>	

²² Only valid answer in LNU2000

²³ Not a valid answer in either LNU1991 or LNU2000, constructed from the response to the follow up question of what "other" activity the respondent had been engaged in.

Statistics Sweden's Socioeconomic Classification (SEI)

10	Unskilled manual workers
11	Unskilled manual employees, goods production
12	Unskilled manual employees, service production
20	Skilled manual employees
21	Skilled manual employees, goods production
22	Skilled manual employees, service production
30	Assistant non-manual employees
33	Assistant non-manual employees, lower level
35	Foremen, supervisors of manual employees
36	Assistant non-manual employees, higher level
40	Intermediate level non-manual employees
45	Supervisors of assistant non-manual employees
46	Intermediate level non-manual employees
50	Professionals and higher level non-manual employees
56	Professionals and higher level non-manual employees
57	Professionals and higher level non-manual employees, executive positions and/or with subordinates
60	Self-employed professionals and academics
70	Self-employed and entrepreneurs
71	Self-employed, no employees
72	Self-employed, 1-9 employees (small scale entrepreneurs)
73	Self-employed, 10-19 employees (intermediate scale entrepreneurs)
74	Self-employed, ≥ 20 employees (large scale entrepreneurs)
80	Farmers
86	Farmers, ≤ 20 hectares arable land
87	Farmers, 21-100 hectares arable land
89	Farmers, size of farm unknown