European Sociological Review Advance Access published July 1, 2009

DOI:10.1093/esr/jcp034, available online at www.esr.oxfordjournals.org

Stratification and Mortality—A Comparison of Education, Class, Status, and Income

Jenny Torssander and Robert Erikson

In many analyses of social inequality in health, different dimensions of social stratification have been used more or less interchangeably as measures of the individual's general social standing. This procedure, however, has been questioned in previous studies, most of them comparing education, class, and/or income. In this article, the importance of education and income as well as two aspects of occupation—class and status—is examined. The results are based on register data and refer to all Swedish employees in the age range 35–59 years. There are clear gradients in total death risk for all socioeconomic factors except income from work among women. The size of the independent effects of education, class, status, and income differ between men and women. For both sexes, there are clear net associations between education and mortality. Class and income show independent effects on mortality only for men and status shows an independent effect only for women. While different stratification dimensions—education, social class, income, status—all can be used to show a 'social gradient' with mortality, each of them seems to have a specific effect in addition to the general effect related to the stratification of society for either men or women.

Introduction

A relationship between socioeconomic position and morbidity/mortality is more than well documented, but few have examined the simultaneous association between various socioeconomic indicators and health. Prior studies comparing dimensions of social stratification have shown that different measures are not fully exchangeable (Stronks *et al.*, 1997; Duncan *et al.*, 2002; Geyer *et al.*, 2006; Martikainen, Blomgren and Valkonen, 2007). This earlier research has mainly focused on the relative significance of education, occupational class, and/or income for health/mortality. Only a few studies have considered the impact of status on health, and then mainly in comparison with class (Chandola, 1998; Bartley *et al.*, 1999; Prandy, 1999a; Sacker *et al.*, 2000).

In this article, we explore the mortality relationship for four socioeconomic indicators: education, occupational class, occupational status, and income. Of course, education, class, status, and income to some extent reflect overlapping resources in terms of general social standing. But even though the socioeconomic indicators are interrelated and have common influences on an individual's longevity, there could also be some unique mechanism(s) that link each dimension to health. For example, knowledge of health-improving behaviour may be more easily accessible to those with a higher education, but there are also several indirect pathways between education and good health, e.g. through better jobs and higher incomes (Mirowsky, Ross and Reynolds, 2000; Lahelma *et al.*, 2004; Galobardes *et al.*, 2006; Martikainen, Blomgren and Valkonen, 2007). Thus, some of the socioeconomic effects on health and longevity are shared with

other socioeconomic dimensions, and some of them are more specific. Previously suggested indicator-specific health mechanisms are knowledge for education, working circumstances for class, and material conditions for income (Lynch and Kaplan, 2000; Erikson, 2001; Lahelma *et al.*, 2004).

It is perhaps less clear how the relationship between status and health should be interpreted. Status, often in combination with 'social' or 'socioeconomic', is frequently used as a general concept signifying an individual's social standing in society, not representing a certain dimension. However, what we here call status is more specific; it is a measure based on the occupational structure of marriage or cohabiting in the Swedish census of 1990, constructed in a similar way as the CAMSIS scale (Prandy and Lambert, 2003), called the Cambridge Scale, if the basis is a structure of friendship (Prandy, 1999b).

This scale is described as a measure of *general* advantage or disadvantage, reflecting combined material and social inequality (Prandy, 1998; Prandy and Lambert, 2003): The scale 'integrates the economic and the social, class and status, rather than trying to distinguish them' (Prandy, 1998, 345). Recently, a similar occupationally based stratification dimension has been described as a 'status order' different from the class structure (Chan and Goldthorpe, 2004; Chan and Goldthorpe, 2007a); status reflects social equality, inferiority, or superiority, while class is grounded in employment relations. Status, in this sense, cannot be seen as a mere combination of education and income (Chan and Goldthorpe, 2007a). Thus, 'socio-economic status', as used in many American studies as a measure based on education and income (Duncan, 1961), should not be assumed to be identical with status as used here.

The construction of the status scale is based on the assumption that people associate with and marry their social equals. A dimension reflecting the social closeness of occupational incumbents therefore provides a measure of social status. The notion that the status measure is derived from social interaction between equals might suggest that status mirrors similarities in lifestyles to a greater extent than, for instance, class or education. Thus, the four aspects of the individual's socioeconomic position of interest here could be supposed to differ in their relation to health and longevity. In sum, the main aim of this article is to examine independent effects of each indicator (education, class, status, and income) on mortality. This will indicate how interchangeable the socioeconomic factors are as well as the importance of specific mechanisms.

Related Studies

Some studies have compared status and class in relation to health or mortality (Chandola, 1998; Bartley *et al.*, 1999; Prandy, 1999a; Sacker *et al.*, 2000). In all of them, the Cambridge Scale accounts for more of the variation in health than the EGP class schema or similar classifications do. Unfortunately, some of these studies make the comparison misleading by using the individual's own class position, but a household measure of status (Bartley *et al.*, 1999; Sacker *et al.*, 2000). This is problematic, as household position results in larger health/mortality differences than do individual measures, especially for women (Erikson, 2006).

Studying one aspect of lifestyle—cultural consumption—Chan and Goldthorpe (2007b, c) conclude that it is more determined by the status than by the class position of the individual. Thus, if status reflects common lifestyles to a greater extent than education or class does, a particular effect of status on health could be expected. Another support for the status–lifestyle link is that CHD-related health behaviour seems to be determined by status to a greater extent than by class (Chandola, 1998).

A recent study based on Swedish and German data shows that the three other indicators—education, class, and income—all have independent associations with all-cause mortality (Geyer *et al.*, 2006). Other studies comparing different measures of socioeconomic position have claimed that economic resources are more strongly related to mortality risk than is education or occupation (Sundquist and Johansson, 1997; Duncan *et al.*, 2002). For example, household income and wealth have strong associations with mortality even when other socioeconomic indicators are controlled for (Ecob and Davey Smith, 1999; Duncan *et al.*, 2002). This suggests that income has an independent effect on health, which is not confounded by education or occupation. However, one possible explanation for the more pronounced income–health association is selection (Stronks *et al.*, 1997). A relatively large part of the relationship between material resources and health has been shown to be related to labour market status, i.e. non-healthy groups are excluded from paid employment (commonly called the 'healthy worker effect'). Moreover, because annual income is a volatile measure, only weakly related to permanent income, information from only 1 year may not be enough (Friedman, 1957; Krieger, Williams and Moss, 1997). Household income is often used, which becomes problematic if the household resources are not equally divided *within* the family (Young, 1952; Lundberg, Pollak and Wales, 1997).

When comparing social class and education, Davey Smith and colleagues (1998) find that, for working men, social class is a better discriminator of socioeconomic mortality differences than is education. If so, education has limited direct influences on health, and the education–health association is primarily a result of the well-educated having better material resources than do those who have only completed compulsory school. Conversely, others conclude that education is a stronger predictor than occupational class when the two variables are included simultaneously in the analyses (Winkleby *et al.*, 1992; Marmot *et al.*, 1997).

In sum, previous studies on relative contributions of socioeconomic indicators to health inequality have presented rather disparate results. One starting point for the present study is that different indicators of socioeconomic position are not completely interchangeable, even though they measure the same latent dimension to some extent. However, they do not usually correlate strongly enough to support the use of one of them and not the other(s), except when there is a particular interest in a certain socioeconomic dimension. Furthermore, a specific socioeconomic measure may have varying impact on health for different groups in society. For example, earnings vary within the same educational level, and this is particularly clear across social groups, e.g. ethnic, age, and sex groups (Braveman *et al.*, 2005). In addition, health selection is of varying importance regarding education, occupation, and income. Compared to occupation and especially income, education is not affected by sickness late in life. However, while illness may lead to loss of income, it is more probable that it will lead to the person leaving the labour market than to a change of occupation and that, thus, the problem of health selection is most sensitive when used to estimate the effects of income. We therefore use an income measure that is an average from a number of years before the start of the study period. In a paper related to the present one, we complete the picture of the importance of the individual's own position by analysing the impact of the partner's socioeconomic standing (Torssander and Erikson, 2009).

Data and Methods

The data emanate from registers covering the entire Swedish population, where the different records have been matched using unique personal numbers. The following registers are used: (1) the Cause of Death Register 1991–2003, with information on underlying causes and timing of death; (2) the Census of 1990, for information on individuals' occupations; (3) LISA 1990, a database for labour market studies containing information on, e.g. education and income; (4) the Income and Assessment Register 1981–1989, with income information for several years; and (5) the Migration Register, in order to identify those who have emigrated from Sweden and, consequently, should be censored in the analyses.

The final dataset consists of all employed men and women, with information on education (1990) and income (1981–1989), who at the time of the census in 1990 were between 35 and 59 years of age. One reason for the rather narrow age span is that we want to take account of incomes for several years before 1990, and therefore excluded individuals too young to have reliable incomes in 1981. The total number of individuals with information on all socioeconomic variables is more than 2.1 million (Table 1).

Some of the socioeconomic variables are continuous in nature and some are categorical. To make them comparable, we have distinguished five educational groups and five occupational classes, and the continuous measures income and status are divided into quintiles.

Socioeconomic Variables

Education is measured as highest educational level in 1990. Five levels are distinguished: (1) compulsory/elementary school; (2) upper secondary school, 2 years or shorter; (3) upper secondary school, 3 years or more; (4) college/university, less than 3 years; and (5) college/university, 3 years or more (including postgraduate studies).

The *class* division is based on the official Swedish occupational classification, which is very similar to the EGP class schema (Erikson and Goldthorpe, 1992). Five classes of employed persons are distinguished: (1) unskilled manuals (EGP VII) and routine nonmanuals (EGP IIIb); (2) skilled manuals (EGP VI); (3) intermediate occupations (EGP IIIa); (4) lower managerials and professionals (EGP II); and (5) higher managerials and professionals (EGP I). Routine nonmanual occupations are included in the first group, because their working conditions are similar to those of unskilled manual workers in terms of skill demands and monitoring possibilities. Farmers and other self-employed are excluded due to the problem of comparing incomes of employed and self-employed persons.

The *status* scale is the first dimension score from a correspondence analysis conducted by Paul Lambert

Table 1 Socioeconomic position

	Women		Men	
	%	*N*	%	*N*
Educational level				
Compulsory school	29.8	315,358	33.6	353,325
Upper secondary school $\leq$2 years	35.6	376,792	25.0	262,649
Upper secondary school $>2 \leq 3$ years	7.0	73,859	16.0	168,511
College/university <3 years	14.1	149,302	10.3	108,248
College/university $\geq$3 years	13.6	144,160	15.1	158,249
Total	100	1,059,471	100	1,050,982
Occupational class (EGP group)				
Unskilled manual (VII) & Routine non-manual (IIIb)	44.0	466,592	26.7	280,352
Skilled manual (VI)	10.1	106,785	23.2	243,681
Intermediate (IIIa)	13.9	147,462	8.8	92,373
Lower managerial/professional (II)	21.9	231,915	22.0	231,406
Higher managerial/professional (I)	10.1	106,717	19.3	203,170
Total	100	1,059,471	100	1,050,982
Status points	*Mean*	387.5	*Mean*	321.0
(Min 1, max 999)	*SD*	215.9	*SD*	261.5
Average income 1981–1989	*Mean*	666.2	*Mean*	1070.9
(In 100 SEK)	*SD*	273.7	*SD*	443.9
Total number of individuals		1,059,471		1,050,982
Number of deaths 1991–2003		39,682		63,389

Distribution of the population (35–59 years of age) by education, class, status, and income.

(University of Stirling). It is based on a cross-tabulation of the wife's and the husband's occupations (or the occupations of cohabiting partners) in a dataset of married/cohabiting Swedish men and women in 1990. Thus, the scale is based on the assumption that the frequencies in the table reflect the relative distances in status between occupations. The result is one major stratification dimension with an ordering of occupations based on marriage and cohabiting patterns. The range of the scale is set to 1 to 999. The scale is the same for women and men, but sex-specific quintile groups are used in the analyses.

Income is measured as the average individual income from work for the period 1981 to 1989 (recalculated according to CPI 1989). Wage-related benefits such as parents' allowance and sickness benefit are included. Because income is a volatile concept and long-term income affects health to a greater extent than does current income (Benzeval and Judge, 2001), a more stable income measure is desired, e.g. the individual's annual earnings taken as an average over several years. Annual income may be affected by health status—more so than is education or occupation. However, some of the impact of reversed causation on the income–mortality association could be avoided with this income measure. Income is divided into quintile groups based on the income distribution for the total sample (aged 35 to 59 years in 1990). The lowest quintile group includes the 20 per cent with the lowest income, etc. Because men on average earn more than women do, we have constructed sex-specific income quintiles to obtain equally large groups for both sexes. For a description of the socioeconomic variables, see Table 1.

In total, the dataset contains information on slightly more than 2.1 million men and women. All educational groups are well represented among both sexes. The majority have not attained a higher educational level than at most 2 years of upper secondary schooling. About 25 per cent among the men and slightly more among the women have a tertiary education (irrespective of length). The largest occupational group is unskilled manuals (including routine nonmanuals). Occupations that are classified as skilled manual are more frequent among men than among women. Conversely, women more often occupy intermediate occupations (and routine nonmanual occupations that are included in the first category). Higher managerial and professional occupations are more common among men than among women. Looking at Table 1, it is clear that while men on average have considerably higher incomes than women do, women

actually on average have slightly higher status than men do.

Statistical Analyses

Cox regressions (Cox, 1972) are used to calculate hazard ratios. The Cox regression, like other survival models, allows for taking into account time (here: age) until an event (here: death) occurs. The hazard ratio can be interpreted as the risk of dying (during a short period of time) compared to the corresponding risk for the reference group, controlling for age and other covariates. The analyses are conducted for men and women separately. Individuals who are alive at the end of the study period, i.e. December 2003, will be censored at this time, and those who have emigrated before the end of 2003 will be censored at the time of emigration.

Results

Spearman's rank order correlations between education, class, status, and income are shown in Table 2. Not surprisingly, all socioeconomic indicators correlate positively, although the correlations are of different strength. The highest correlated forms of stratification are those based on occupation, i.e. class and status (0.80 for both men and women). For education and class/status, correlations are about 0.6. Thus, education, class, and status show rather high correlations with each other, but not too high not to be included simultaneously in the coming analyses, owing to the large number of cases. The correlations of income and education, class, and status, respectively, are lower (between 0.31 and 0.41 for women and 0.38 and 0.54 for men). Income is measured here at an earlier point in time than occupation is, which could result in lower correlations for income compared to the other factors, but the correlations between income from 1990 and the other socioeconomic dimensions are about the same or slightly higher.

Even given the large number of cases in the database, the number of observations in particular combinations of the four socioeconomic variables are quite small. This is particularly the case for combinations of class and status. That is, there are no or very few cases of low status among professionals and neither of high status among unskilled workers. However, if we exclude either class or status and look at the combination of the remaining three variables, the cell numbers do not appear as exceedingly small. Thus, among men the smallest cell frequency in a table of education by class by income is 194, and 170 in the table of education by status by income. For women the lowest frequencies are 91 and 137, respectively. Thus, we believe that the problem of multicollinearity does not make our subsequent results unreliable (cf. Table 4).

Table 2 Spearman correlation coefficients

	Education	Class	Status	Income
Women				
Education	1.00			
Class	0.66	1.00		
Status	0.64	0.80	1.00	
Income	0.31	0.41	0.35	1.00
Men				
Education	1.00			
Class	0.61	1.00		
Status	0.61	0.80	1.00	
Income	0.38	0.54	0.47	1.00

This data is for all combinations of education, occupational class, occupational status, and income.

In the next step, the relations between these socioeconomic indicators and mortality are explored. To start with, each variable is analysed one by one (Table 3). Generally, there are clear gradients for all socioeconomic variables. The differences between the highest and lowest groups are smaller, and the gradients are flatter among women than among men for every indicator. This has also been consistently shown in earlier studies (Koskinen and Martelin, 1994; Martikainen, 1995; Erikson, 2006). The highest relative risk is found for men in the lowest income quintile group (2.29 compared to the highest quintile). There seems to be a nonlinear relationship between income and mortality among men, given the comparatively high death rate in the lowest income group. Apart from men with the lowest incomes, the gradient for income seems slightly flatter than the gradients for the other factors. It is probable that reversed causality is the explanation for the exceptionally high risk of dying among men with low incomes, even though this problem ought to be reduced for more stable income measures. For example, income from 1990 yields larger risk differences than does the average during the 1980s used here.

On the contrary, for women there are relatively small differences in death risk by income. Moreover, there is no clear decrease in death risk for every income group. However, all other income groups show higher death risks than does the highest income group. Another deviation from a decrease in death risks for

Table 3 Relative death risks

	Men	Women
Education	RR	RR
Compulsory school	**1.76**	**1.48**
Upper secondary school ≤2 years	**1.67**	**1.34**
Upper secondary school >2 ≤ 3 years	**1.26**	**1.23**
College/university <3 years	**1.14**	1.04
College/university ≥3 years	1	1
Class		
Unskilled manual (VII) & Routine non-manual (IIIb)	**1.87**	**1.36**
Skilled manual (VI)	**1.61**	**1.18**
Intermediate (IIIa)	**1.37**	**1.18**
Lower managerial/professional (II)	**1.17**	0.98
Higher managerial/professional (I)	1	1
Status		
1 Lowest quintile group	**1.80**	**1.49**
2	**1.69**	**1.27**
3	**1.36**	**1.23**
4	**1.19**	**1.05**
5 Highest quintile group	1	1
Income from work, average 1981–1989		
1 Lowest quintile group	**2.29**	**1.14**
2	**1.55**	**1.07**
3	**1.38**	**1.12**
4	**1.18**	**1.14**
5 Highest quintile group	1	1

Results from bivariate *Cox regressions. All individuals 35–59 years (1990). Bold face denotes significance at 5% level.*

higher groups is found among women in lower managerial/professional occupations (RR = 0.98, not significant).

Death risk differences across income groups are larger for single women with full-time work compared to women in general. For example, women with the fifth lowest incomes have a relative death risk of 1.36 (not in the table, reference: highest quintile) and the increase is gradual for every income group. Single full-time working women's death risks are thus more similar to those reported for men, although the scope of the differences in death risk still varies considerably between the sexes.

In spite of the substantial variation in mortality between the socioeconomic groups, the differences between them are actually underestimated, due to the 'healthy worker effect', as it is particularly potent among those in lower positions. Thus, differences between educational groups among all persons, i.e. also including those outside the labour market, are clearly greater than those reported above. That is, the hazard ratios for all men and women with only compulsory education is 2.04 and 1.79, respectively, as compared to 1.76 and 1.48 for men and women in the labour market.

Separate analyses on class differences within some selected educational groups show that mortality differences are larger among individuals with a university education than among those with a compulsory education, at least for men. A similar result is found for status for different educational groups. These greater mortality differentials by class and status among those with tertiary education could possibly depend on loss being a greater cost than the corresponding gain being a win. That is, the burden of not finding a high-status job when one has a university education may have a greater negative effect than the positive effect of finding a salariat job when one has only a compulsory education (Keller and Zavalloni, 1964; Tversky and Kahneman, 1991).

The results from a regression with *only* class and status included show that both occupational aspects have a remaining effect on death risk when the other factor is included in the model (not in table). The relative risks for unskilled manuals and the lowest status quintile are 1.7 and 1.2, respectively, for men. The corresponding numbers for women are 1.1 and 1.4. Thus, the class influence is more prominent for men and the status influence for women. Nevertheless, both class and status have independent associations with death risk.

In Table 4 (Model I), all four indicators are included simultaneously in the Cox model. One prominent feature is that education seems to have significant independent relationships with death risk for both women and men, e.g. women with only compulsory school have a relative risk of 1.30, and the corresponding risk for men is 1.27.

The class effect more or less disappears for women, but not for men, in the multivariate analyses. On the contrary, a clear association between status and death risk appears only among women, where the hazard ratio for the group with the lowest status is 1.28. The corresponding ratio is 1.09 for the lowest status group compared to the highest among men, while there are no clear differences among the other groups.

In Model II (Table 4) only one occupational measure is included: class for men and status for women. The results are very similar to those reported in Model I. Thus, the rather high correlation between the occupational measures class and status does not blur the analyses to any appreciable extent.

The income–mortality association for men remains strong when education, class, and status are controlled

Table 4 Relative death risks

	Men		Women	
	Model I	Model II	Model I	Model II
Education				
Compulsory school	**1.27**	**1.28**	**1.30**	**1.33**
Upper secondary school ≤ 2 years	**1.28**	**1.29**	**1.24**	**1.25**
Upper secondary school $>2 \leq 3$ years	**1.13**	**1.14**	**1.17**	**1.18**
College/university <3 years	**1.06**	**1.06**	**1.06**	**1.05**
College/university ≥ 3 years	1	1	1	1
Class				
Unskilled manual (VII) & Routine non-manual (IIIb)	**1.18**	**1.22**	1.03	
Skilled manual (VI)	**1.09**	**1.14**	**0.90**	
Intermediate (IIIa)	**1.07**	**1.09**	1.01	
Lower managerial/professional (II)	1.01	**1.03**	**0.94**	
Higher managerial/professional (I)	1	1	1	
Status				
1 Lowest quintile group	**1.09**		**1.28**	**1.29**
2	1.03		**1.09**	**1.11**
3	1.03		**1.11**	**1.10**
4	1.04		1.02	0.99
5 Highest quintile group	1		1	1
Income from work, average 1981–1989				
1 Lowest quintile group	**1.81**	**1.81**	**0.91**	**0.92**
2	**1.23**	**1.23**	**0.89**	**0.89**
3	**1.14**	**1.14**	**0.95**	**0.95**
4	**1.07**	**1.06**	0.99	0.99
5 Highest quintile group	1	1	1	1

Results from multivariate *Cox regressions. Model I: education, class, status, and income. Model II: education, one occupational measure (class for men and status for women), and income. All individuals 35–59 years (1990). Bold face denotes significance at 5% level.*

for (relative death risk for second lowest quintile group = 1.23). For women, the association between income and mortality for some groups shows a reversed pattern, thus, income *per se* does not play an important role in women's survival.

However, the relative difference in death risk between income groups is, as mentioned, more salient among single women who work full-time than other women. This is also the case in the multivariate analyses where the risk of dying is 13 per cent higher for single, full-time working women in the lowest income quintile compared to the highest (not in the table). Hence, income from own work is more important for longevity for single women than for married women.

It is important to note that, here, income refers to earnings from work, which to some degree could be considered a measure of the status related to the job. This interpretation would make understandable the finding that income, but not status, is important among men, when both variables are included in the model, while the opposite is true for women. The difference between the sexes in this respect could be due to income being a more important status marker for men than for women.

Discussion

In this article, we simultaneously introduce four stratification variables—education, social class, income from work, and status based on marriage patterns—in the analysis of mortality. The aim is to explore their total and independent relationship with mortality in order to evaluate how interchangeable they are in health inequality research. The data refer to the whole Swedish population aged 35 to 59, active in the labour market in 1990. The relative risks of dying in the years 1991–2003 within separate stratification groups were analysed using Cox regression.

Each of the four stratification variables, when introduced as the only factor in the model, generally

shows a clear association with the risk of death for both women and men. This result can be seen as an example of Paul Lazarsfeld's suggested 'interchangeability of indices' (Lazarsfeld, 1939; 1958), according to which any reasonable indicator of a latent dimension will do the job of measuring the dimension in question. On the other hand, if the indicators have a meaning in themselves and not just in mapping the latent factor, then content will be lost and associations blurred if the various indicators are assumed to provide the same information.

However, the four stratification variables are not full substitutes for each other. Each one of them, while they do indicate the effect on mortality of the general stratification order in society, is in fact related to separate mechanisms by which socioeconomic differences influence mortality. When education, class, income and status are all included in a multivariate regression model, we find that while education shows a strong effect for both women and men, the effects of class and income only remain among men, while the effect of status only remains among women.

Although education is an important determinant of social class, status, and income, meaning that much of the effect of education is channelled through these other factors, it has a substantial direct effect on mortality. One possible interpretation is that more education provides women and men with better instruments for understanding health risks, and perhaps for evaluating the plethora of advice on health matters and/or for getting more benefits from health services. Fuchs suggested that 'individuals with low rates of time discount would invest in many years of schooling and would also invest in health-enhancing activities' (1982, 4), an idea further discussed by Lleras-Muney (2005) in relation to mortality. However, Fuchs only found weak effects.

Social class has a clear independent effect on mortality among men. It is far from evident what the mechanisms are that account for this effect, but the generally more advantageous working conditions of the higher classes represent a plausible candidate. That no independent effect of social class appears among women may be related to the observation that the individual occupation of married or cohabiting women is a weak indicator of their social class position (Erikson, 1984; Erikson, 2006). Another explanation is the larger proportion of women who are working part-time and thus are less exposed to (adverse or favourable) working conditions. The importance of social class among women may appear to be different when the situation of the family is taken into account.

Income from work has a clear and strong independent effect on mortality among men, while it has no or even a reversed effect among women. Two hypotheses can be raised in relation to this result. Income from work is a better indicator of the material conditions of men than of those of women, as men's incomes account for a greater part of the consumption power of the household. This possibility is further supported by the observation that income from work is a more important factor for single women than for those living together with a partner. The effect of income may be different for both men and women if disposable income, i.e. consumption power, or household income is introduced in the models rather than income from work. This later factor, on the other hand, may be more important for self-esteem and self-respect among men than among women, assuming that work stands for a greater part of the life world of men.

Social status, on the other hand, appears to have a strong independent effect among women, but hardly any effect among men. One possible hypothesis concerning why this should be the case is related to the second hypothesis for income stated above. If self-respect and self-esteem among women are related to their general social standing in society, which we assume that status as measured here indicates, while income from work is more important in this respect for men, then we should expect to find results such as the present ones. Furthermore, the social status of women may be more related to their lifestyle than is the case for men. Women's lifestyle may also be more important for that of the family, which could be part of the observation that the individual social status of men hardly has any independent effect on their mortality.

In essence, the results of the present analyses suggest that while mortality has a gradient on any of the variables class, education, income and status, on the one hand, great caution should be exercised when considering various possible indicators of 'socioeconomic status' in the analysis of mortality, on the other. Education, social class, income, and status all seem to have slightly different effects on and associations with mortality and should thus be separately identified rather than merely used as indicators of the stratification of societies.

Funding

Grant no. 2006-0680 from The Swedish Council for Working Life and Social Research to Robert Erikson

and grant no. 2007-3351 from the Swedish Research Council to Michael Tåhlin for Jenny Torssander.

Acknowledgements

We are most grateful to Paul Lambert for constructing the status scale used in the present article. We also thank Erik Bihagen for his good advice on an earlier version and an anonymous reviewer for helpful suggestions.

References

Bartley, M., Sacker, A., Firth, D. *et al.* (1999). Social position, social roles and women's health in England: changing relationships 1984–1993. *Social Science and Medicine*, **48**, 99–115.

Benzeval, M. and Judge, K. (2001). Income and health: the time dimension. *Social Science and Medicine*, **52**, 1371–1390.

Braveman, P. A., Cubbin, C., Egerter, S. *et al.* (2005). Socioeconomic status in health research: one size does not fit all. *JAMA*, **294**, 2879–2888.

Chan, T. W. and Goldthorpe, J. H. (2004). Is there a status order in contemporary British society? Evidence from the occupational structure of friendship. *European Sociological Review*, **20**, 383–401.

Chan, T. W. and Goldthorpe, J. H. (2007a). Class and status: the conceptual distinction and its empirical relevance. *American Sociological Review*, **72**, 512–532.

Chan, T. W. and Goldthorpe, J. H. (2007b). Social status and newspaper readership. *American Journal of Sociology*, **112**, 1095–1134.

Chan, T. W. and Goldthorpe, J. H. (2007c). Social stratification and cultural consumption: music in England. *European Sociological Review*, **23**, 1–19.

Chandola, T. (1998). Social inequality in coronary heart disease: a comparison of occupational classifications. *Social Science and Medicine*, **47**, 525–533.

Cox, D. R. (1972). Regression models and life-tables. *Journal of the Royal Statistical Society. Series B (Methodological)*, 34, 187–220.

Davey Smith, G., Hart, C., Hole, D. *et al.* (1998). Education and occupational social class: which is the more important indicator of mortality risk? *Journal of Epidemiology and Community Health*, **52**, 153–160.

Duncan, G. J., Daly, M. C., Mc Donough, P. *et al.* (2002). Optimal indicators of socioeconomic status for health research. *American Journal of Public Health*, **92**, 1151–1157.

Duncan, O. D. (1961). A socio-economic index for all occupations. In Reiss, A. J. and Duncan, O. D. (Eds.), *Occupations and Social Status*. New York: The Free Press of Glencoe.

Ecob, R. and Davey Smith, G. (1999). Income and health: what is the nature of the relationship? *Social Science and Medicine*, **48**, 693–705.

Erikson, R. (1984). Social class of men, women and families. *Sociology*, **18**, 500–514.

Erikson, R. (2001). Why do graduates live longer? Education, occupation, family and mortality during the 1990s. In Jonsson, J. O. and Mills, C. (Eds.), *Cradle to Grave: Life-course Change in Modern Sweden*. Durham: Sociology press, pp. 211–227.

Erikson, R. (2006). Social class assignment and mortality in Sweden. *Social Science and Medicine*, **62**, 2151–2160.

Erikson, R. and Goldthorpe, J. H. (1992). *The Constant Flux. A Study of Class Mobility in Industrial Societies*. Oxford: Clarendon Press.

Friedman, M. (1957). *A theory of the Consumption Function*. Princeton, NJ: Princeton U.P.

Fuchs, V. R. (1982). Time Preference and Health: An Exploratory Study. NBER Working Paper No. 539.

Galobardes, B., Shaw, M., Lawlor, D. A. *et al.* (2006). Indicators of socioeconomic position (part 1). *Journal of Epidemiology and Community Health*, **60**, 7–12.

Geyer, S., Hemström, Ö., Peter, R. *et al.* (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.

Keller, S. and Zavalloni, M. (1964). Ambition and social class: a respecification. *Social Forces*, **43**, 58–70.

Koskinen, S. and Martelin, T. (1994). Why are socio-economic mortality differences smaller among women than among men? *Social Science and Medicine*, **38**, 385–396.

Krieger, N., Williams, D. R. and Moss, N. E. (1997). Measuring social class in US public health research: concepts, methodologies, and guidelines. *Annual Review of Public Health*, **18**, 341–378.

Lahelma, E., Martikainen, P., Laaksonen, M. *et al.* (2004). Pathways between socioeconomic determinants of health. *Journal of Epidemiology and Community Health*, **58**, 327–332.

Lazarsfeld, P. (1939). Interchangeability of indices in the measurement of economic influences. *Journal of Applied Psychology*, **23**, 33–45.

Lazarsfeld, P. (1958). Evidence and inference in social research. *Daedalus*, **87**, 99–130.

Lleras-Muney, A. (2005). The relationship between education and adult mortality in the United States. *The Review of Economic Studies*, **72**, 189–221.

Lundberg, S. J., Pollak, R. A. and Wales, T. J. (1997). Do husbands and wives pool their resources? Evidence from the United Kingdom child benefit. *The Journal of Human Resources*, **32**, 463–480.

Lynch, J. and Kaplan, G. (2000). Socioeconomic position. In Berkman, L. F. and Kawachi, I. (Eds.), *Social Epidemiology*. Oxford: University Press, pp. 13–35.

Marmot, M., Ryff, C. D., Bumpass, L. L. *et al.* (1997). Social inequalities in health: next questions and converging evidence. *Social Science and Medicine*, **44**, 901–910.

Martikainen, P. (1995). Socioeconomic mortality differentials in men and women according to own and spouse's characteristics in Finland. *Sociology of Health and Illness*, **17**, 353–375.

Martikainen, P., Blomgren, J. and Valkonen, T. (2007). Change in the total and independent effects of education and occupational social class on mortality: analyses of all Finnish men and women in the period 1971–2000. *Journal of Epidemiology and Community Health*, **61**, 499–505.

Mirowsky, J., Ross, C. E. and Reynolds, J. (2000). Links between social status and health status. In Bird, C. E., Conrad, P. and Fremont, A. M. (Eds.), *Handbook of Medical Sociology*. Upper Saddle River, NJ: Prentice-Hall, pp. 47–67.

Prandy, K. (1998). Class and continuity in social reproduction: an empirical investigation. *The Sociological Review*, **46**, 340–364.

Prandy, K. (1999a). Class, stratification and inequalities in health: a comparison of the Registrar-General's Social Classes and the Cambridge scale. *Sociology of Health and Illness*, **21**, 466–484.

Prandy, K. (1999b). The social interaction approach to the measurement and analysis of social stratification. *International Journal of Sociology and Social Policy*, **19**, 204–236.

Prandy, K. and Lambert, P. (2003). Marriage, social distance and the social space: an alternative derivation and validation of the Cambridge scale. *Sociology*, **37**, 397–411.

Sacker, A., Firth, D., Fitzpatrick, R. *et al.* (2000). Comparing health inequality in men and women: prospective study of mortality 1986-96. *BMJ*, **320**, 1303–1307.

Stronks, K., van de Mheen, H., van den Boos, J. *et al.* (1997). The interrelationship between income, health and employment status. *International Journal of Epidemiology*, **26**, 592–600.

Sundquist, J. and Johansson, S. (1997). Indicators of socio-economic position and their relation to mortality in Sweden. *Social Science and Medicine*, **45**, 1757–1766.

Torssander, J. and Erikson, R. (2009). Marital partner and mortality. The effects of the social positions of both spouses. *Working paper series, Swedish Institute for Social Research, No. 5*.

Tversky, A. and Kahneman, D. (1991). Loss aversion in riskless choice: a reference-dependent model. *Quarterly Journal of Economics*, **106**, 1039–1061.

Winkleby, M. A., Jatulis, D. E., Frank, E. *et al.* (1992). Socioeconomic status and health: how education, income, and occupation contribute to risk factors for cardiovascular disease. *American Journal of Public Health*, **82**, 816–820.

Young, M. (1952). Distribution of income within the family. *The British Journal of Sociology*, **3**, 305–321.

Authors' Addresses

Jenny Torssander (to whom correspondence should be addressed), Swedish Institute for Social Research, Stockholm University, SE-106 91 Stockholm, Sweden. Email: jenny.torssander@sofi.su.se

Robert Erikson, Swedish Institute for Social Research, Stockholm University, SE-106 91 Stockholm, Sweden. Email: robert.erikson@sofi.su.se

Manuscript received: September 2008