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MARITAL PARTNER AND MORTALITY: THE EFFECTS OF THE SOCIAL POSITIONS OF BOTH SPOUSES

by

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Title: Marital partner and mortality: The effects of the social positions of both spouses

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Abstract

Background Individual education, social class, social status and income are all associated with mortality, and this is likewise the case for the position of the marital partner. We investigate the combined effect on mortality of own and partner's positions regarding these four factors.

Methods Prospective follow-up of information in the 1990 Census of the Swedish population aged 30-59 (N=1 502 148). Data on all-cause mortality and deaths from cancer and circulatory disease for the period 1991-2003 were collected from the Cause of Death Register. Relative mortality risks were estimated by Cox regression.

Results All-cause mortality of both men and women differs by women's education and status and by men's social class and income. Men's education has an effect on their own mortality but not on their partner's, when other factors are included in the models. Women's education and men's social class are particularly important for women's deaths from circulatory diseases

Conclusions The partner's social position has a clear effect on individual mortality, and women's education seems to be particularly important. The results appear above all to support hypotheses about the importance of lifestyle and economic resources for socio-economic differences in mortality.

Introduction

Death rates differ between individuals by their position on the stratification ladder. This has been established using several different measures of 'socio-economic status' – for example, education, social class, social status and income. These measures all capture the effect of a central dimension of social stratification, but mortality, in addition, varies with each of them also when the others are controlled for (1-8). It is furthermore well known that mortality varies with marital status as well as with the social position of the spouse (9-14). In this article we study the association between mortality and several measures of the social position of the individual and of the spouse. The aim is to reveal the possible influences on mortality of both partner's positions with regard to several socio-economic dimensions.

Partner influence – previous research

A number of studies demonstrate that one partner's level of education has an influence on the mortality of the other partner.(15-21) Thus, the educational attainment of both spouses is important for the individual's health and/or death risk. For cardiovascular mortality, Jaffe and colleagues (15,16) conclude that the wife's education is even more important for predicting a man's mortality risk than his own educational level. Results from other studies show that mortality differences across educational groups are (for both men and women) more or less the same regardless of whether own or partner's educational level is the basis for the classification.(17,19,22) Focusing only on the influence of the wife's education on the husband's mortality risk, Suarez et al. (21) find that men whose wives are more highly educated than themselves have a higher death risk than others, but this has been refuted by other research. (20)

Less interest has been devoted to the impact of partner's occupational class or income on the individual's mortality risk. Both class and income have, however, been related to health on a

household level.(23,24) The few exceptions which look at specific partner influence along these dimensions show that own and partner occupational class discriminates about the same in mortality risk for both men and women active in the labour market,(17) while spousal income has a negative effect on mortality risk, i.e. positive on longevity for women but not for men.(22)

It is plausible that close social relations can affect health behaviour, and that the family environment in particular is a place for shared lifestyles influenced by both spouses. Family members may well influence different spheres of family life, reflecting gender roles in the home. For example, there is a greater tendency for women to influence the health behaviours of their husbands – in such matters as alcohol consumption or smoking – than for husbands to influence their wives. (25)

Thus, previous studies indicate the importance of the socioeconomic position of close family members for mortality risk. However, these previous studies have mainly focused on the role of the partner's educational level. Here, we focus on the education and income of both partners as well as on two occupational measures – class and status. This will give a broader understanding of the interplay between these dimensions of social stratification. The large number of cases, i.e. the total working Swedish population, uniquely enables us to consider all these factors simultaneously.

Data and method

The data set is a compilation of Swedish population registers, where the different records have been matched by unique personal numbers. Information on marriage or cohabitation is derived from the Census of 1990, as well as own and partner class, status and income. Five *classes* of employment are distinguished on a basis resembling the EGP class schema.(26) The *status* scale is the first dimension from a correspondence analysis of the occupations of

married or cohabiting men and women in Sweden. The scale is thus based on the similarity of occupations within partnerships. We interpret it as a status measure since people are likely to associate with and marry their status equals.(27,28) *Income* refers to yearly income from work in 1990 and includes wage-related benefits such as parental allowance and sickness benefits. Highest attained *educational level* was collected from the Educational Register the same year. All deaths between 1991 and 2003 were followed up in the Cause of Death Register; and the Emigration Register for the same period was used to identify those who left Sweden before 2004, since these individuals will be censored in the analyses.

The final dataset consists of all employed and married or cohabiting men and women, who at the time of the census in 1990 were between 30 and 59 years of age. Individuals outside the labour market and self-employed persons were excluded – the self-employed because of the incomparability of their incomes with those of employed persons. Otherwise the amount of missing data is small; among married/cohabiting individuals in the chosen age span only 0.3% lack information on highest attained educational level and 3.9% have zero incomes. The total number of individuals for whom there is information about all socioeconomic variables (both own and partner's position) is about 1.5 million and the total number of deaths is more than 52,000.

Four indicators – education, class, status and income – are considered separately. To improve comparability we distinguish five educational groups and five occupational classes, and the continuous measures income and status are divided into quintiles. The distributions of the socioeconomic variables are summarized in Table 1.

Table 1 about here

Cox regression, with age in months as the dependent variable and death as the event, is used to estimate death risks for the different groups. Censoring occurs at emigration or at the end of the follow-up period in December 2003.

Results

Social differences in mortality rates are clearly lower among married persons active in the labour market than in the total population – the death risk is about twice as large for those with only compulsory education compared to those with longer tertiary education if we consider the total population. The corresponding risk difference for employed married or cohabiting individuals is about 50 % (results are available on request), while the risk differences among those who either are married or employed fall in between these values. In spite of the lower mortality differences in the study group, there are considerable social gradients, as is evident from Tables 2 and 3.

Tables 2 and 3 about here

The tables are organised according to the assumption that there is a causal order between the social dimensions. Thus, we assume that education precedes occupation and that income in turn depends on occupation. Education alone shows a clear mortality gradient for both sexes (Model I). Status has, unlike class, a strong relationship with mortality among women, while the opposite is true for men (Model II). Given these results we only include class for men and status for women in the 3rd model. The effects of education and status remain substantial among women, while the effect of income from work is quite small. When income is included in the model, the importance of education remains for men, while the effect of social class is reduced. The variation in mortality risk between income groups is, on the other hand, large, with those in the lowest fifth of the distribution having a death risk that is more than 50 % higher than that for those in the highest fifth, even when education and social class have been taken into account.

Influence of partner's position

In order to estimate the effects of the social positions of the partners, their characteristics from Model III – women's education, status and income, and men's education, class and income – were included in the analyses simultaneously with the corresponding individual characteristics. Men's education turns out to have no significant effect on women's mortality, given the other own and partner characteristics, and women's income from work has either a weak or no effect men's and women's mortality (results are available on request). These factors are therefore excluded from Models IV and V. In Model IV, the effect of men's own education is rather weak, as is also the case for men's social class, while there are considerable mortality differences between (own) income quintiles. Interestingly enough, in model IV mortality differences by men's class seem to be greater for women than for men. However, women's education demonstrates a considerable effect on mortality for both themselves and their partners; this is, to a somewhat lesser extent, also the case for women's status.

There may be confounders, e.g. intelligence, behind the association between education and mortality, while we would assume that health selection stands for a very small part of this association since educational level is attained rather early in the life course. On the other hand, bad health may affect an individual's occupation and income. However, where occupation is concerned, we would conjecture that bad health is more likely to lead to an exit from the labour market than to low class and status. It seems improbable that a man in a managerial position would become a manual worker because of bad health. Thus, given that only those active in the labour market are included in the analyses, occupational health selection should have no or only a very small direct effect on the results, although we will underestimate health differences between the social classes if manual workers more often than non-manual leave employment due to health problems. We can, on the other hand, expect poor health to have a considerable effect on income, since it may lead to a reduction in working time. The very high death risk among men in the lowest income quintile presumably depends on health selection to a large extent. We may therefore obtain a more correct picture of possible causal effects by excluding income, as we do in

Model V. In this model, the effects of women's education and status remain about the same as in Model IV, while the effect of men's class increases considerably, particularly for men's mortality.

There is no measure corresponding to variance accounted for (R^2) in OLS, but a simple indication of the combined effect on mortality of all the factors in the different models can be obtained by comparing the two groups of extreme categories, that is, estimating the hazard ratio given by comparing those who occupy extreme positions on all factors, i.e. the exponent of the sum of the parameters for these positions in the models ("HR extreme group", see the last rows of the Tables 2 and 3). In Model IV, the death risk is more than doubled among the least advantaged group for women (compared to the reference group of the most advantaged) and the total effect is even greater for men.

To test the assumption of proportional hazards in Cox regression, we estimated Model V for two age groups (30-44; 45-59). Among women the parameters overall are of similar magnitude, while those for men generally are slightly higher for the younger group, except regarding partner's status. However, the parameter structures are similar in the two cases, which provides confidence to the combined results (results are available on request).

Mortality differences between social classes vary considerably across causes of death (29), which is why we report differences in two major cause groups – cancer and circulatory diseases – in Table 4. The socioeconomic factors included are those in Models V in Tables 2 and 3.

Table 4 about here

Inequality is greater for circulatory diseases than for cancers for all the included social factors. For both cause groups women's education has an independent effect on mortality for both men and women. The effect of women's status (net of the other factors) seems to be weak for cancer mortality but stronger for circulatory diseases. Men's social class has a substantial effect for both causes and for men as well as women, but particularly so for women's mortality from circulatory diseases. Men's education only seems to be important for men's cardiovascular mortality. There

are substantial differences in mortality between the least and the most advantaged groups, and this is especially the case for women's circulatory mortality (HR_{ext} =3.78).

Discussion

In the present article it is shown that the socioeconomic position of the partner – measured as education, class, status or income – is an important determinant for the individual's own mortality risk. It has earlier been established that individual factors indicating different dimensions of social stratification cannot be used interchangeably, even if they are all related to the basic stratification of society.(5) The factors come in a fairly clear chronological order – education, occupation (class and status), income – an order which can also to some extent be supposed to indicate causal influences, even if confounders such as childhood socioeconomic conditions or cognitive ability may precede all of them. Education is of great importance through both a direct influence on mortality and an indirect one via occupation and income. Education may also have an indirect effect through its possible importance for choice of partner. In a similar way, class seems to have both a direct effect on mortality and an indirect one via income.

The importance of women's education for both women's and men's mortality is one of the most important findings of the present analyses. Women traditionally take more responsibility for the home than men do, and as a consequence, women's education might be more important for the family lifestyle – e.g. in terms of food habits – than men's education. If highly educated women more easily understand advice about health and are better at making sense of the plethora of advice about healthy lifestyles, then women's education could have a substantial influence on the health and mortality of the partner. Women with higher education may also (be able to) receive better medical treatment (30), which may also be true for men – and for partners of highly educated women. We would assume that the effect of women's status, in a similar way, is transmitted via its relation to the lifestyle of the family, since the status scale is a better reflection of lifestyles than, for example, class (derived from similarities in employment relations).(28) That the effect of men's social class is severely reduced, when income is present in the models,

suggests that much of the effect of social class on mortality is indirect via income. Mortality differences by men's incomes are great for both men and women, presumably since men stand for the major part of the family income and thus the material standard of the family.

However, before we can draw any conclusions about the possible causal effects of the various stratification factors on mortality, we have to consider various potential selection effects. The most obvious selection factor is that good health may lead to a more advantaged position in the social structure. This may to some extent be the case for education and occupation, but more importantly for income. However, the results presented here prompt the question of whether health selection is important for the social position of the partner. To some extent this may be the case. Thus, educated women may prefer not to live with men who drink and smoke excessively or who drive carelessly, and men with such inclinations may avoid highly educated women. Such a selection could be part of the explanation for the effect of women's education on men's mortality, although we believe that it can only account for a lesser part of it.

Health selection may also have an effect on occupation, although in this case bad health may rather lead to an exit from the labour market than to low class and status. One causal effect of men's social class on their own mortality risk could, for example, be that occupational hazards account for some of the increased risk. However, these individual hazards among men could hardly increase the death risk of their female partners.

It is fairly obvious that many factors that lead to low income may also lead to bad health. This may particularly be the case for men with the very lowest incomes. The increased death risk for women living with men in this category may indicate the effects of having a low consumption power. However, if unhealthy behaviours are an important explanation of the high death risks among men with low incomes, it seems probable that their wives also live relatively unhealthily. Nevertheless, the substantial effect on both men and women of men's social class, when income is not included in the model, indicates the importance of consumption standards for mortality.

Many of the mechanisms suggested as explanations for the connection between the individual position in the stratification structure and mortality – e.g. life course strain (31), status (32) and intelligence(33) – cannot easily be related to the position of the partner. For example, the IQ hypothesis seems to receive support from the important role of education, but this hypothesis is difficult to reconcile with the weak effect of men's education, when their partner's education has been controlled for. The background of e.g. large mortality risk differences between social classes and income groups could of course be based on cumulative effects of experiences over the life-course, already starting before birth, but how should the effects of the partner's education and occupation be interpreted from a life course perspective? It is furthermore difficult to estimate from our results the importance of Marmot's status syndrome (32), since status, in his interpretation, is related to almost any hierarchical relation in the social structure. Can we assume that this is also applicable to the partner's positions? It seems to us that lifstyle and material conditions are the factors most easily reconciled with the results presented here, as partners can be assumed to share lifestyle and women may to a greater extent than men determine the lifestyle of the family, while men stand for most of its economic resources.

It is clear that none of the hypotheses about why there are social differences in mortality between people in different social positions can be ruled out by our results. It is also clear that while all of them may stand for some part of the association, our results suggest that none of them can be assumed to account for a large part of it. However, *specific* partner characteristics like women's education and men's social class are clearly influential beyond own position and other partner characteristics. These more specific mechanisms linking a partner's socioeconomic position to an individual's own longevity need to be more carefully studied.

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Table 1: Distribution of socioeconomic variables year 1990 for married or cohabiting individuals in the ages 30-59 and number of deaths 1991-2003.

	Women		**Men**	
Own	N	N of deaths	N	N of deaths
Education				
Compulsory school	196 025	6952	228 410	13892
Upper sec ≤ 2 y	281 481	6936	190 845	8042
Upper sec ≤ 3 y	56 433	1099	123 498	5188
Tertiary < 3 y	115 971	2070	85 762	2756
Tertiary ≥ 3 y	101 164	1843	122 559	3707
*Class**				
Unskilled man & Routine non-man	320 104	9783	173 440	9687
Skilled manual	83 667	1809	170 403	7998
Intermediate occ	101 957	2455	69 563	3185
Lower man/prof	172 464	3358	178 247	7127
Higher man/prof	72 882	1495	159 421	5588
Status (min 1 max 999)				
Lowest quintile	130444	4368	158246	8438
	145133	4186	145436	7316
	171550	4167	166577	7489
	155977	3193	140783	5658
Highest quintile	147970	2986	140032	4684
Income				
Lowest quintile	150683	4061	150369	9210
	149805	3549	150618	7100
	150883	3771	149762	6181
	149533	3954	150230	5893
Highest quintile	150170	3565	150095	5201
Total N	751 074	18900	751 074	33585

* These classes correspond to the following EGP classes (26) (1) Unskilled manuals – EGP VII, Routine non-manuals – EGP IIIb; (2) Skilled manuals – EGP VI; (3) Intermediate occupations – EGP IIIa: (4) Lower managerial/professional occupations – EGP II; and (5) Higher managerial and professional occupations – EGP I.

Table 2: Relative death risks for different socioeconomic groups. Men 30-59 years.

	Model I	Model II	Model III	Model IV	Model V
Own					
Education					
Compulsory school	**1.57**	**1.29**	**1.24**	**1.10**	**1.15**
Upper sec ≤ 2 y	**1.50**	**1.27**	**1.24**	**1.13**	**1.16**
Upper sec ≤ 3 y	**1.23**	**1.13**	**1.13**	1.04	**1.05**
Tertiary < 3 y	**1.14**	**1.08**	**1.08**	1.01	1.02
Tertiary ≥ 3 y	1(ref)	1(ref)	1(ref)	1(ref)	1(ref)
Class					
Unskilled man & Routine non-man		**1.32**	**1.11**	**1.06**	**1.28**
Skilled manual		**1.17**	1.05	1.01	**1.15**
Intermediate occ		**1.12**	1.04	1.02	**1.12**
Lower man/prof		**1.06**	1.01	0.99	**1.05**
Higher man/prof		1(ref)	1(ref)	1(ref)	1(ref)
Status					
1 Lowest quintile group		1.07			
2		1.02			
3		1.03			
4		1.04			
5 Highest quintile group		1(ref)			
Income					
1 Lowest quintile group			**1.56**	**1.54**	
2			**1.25**	**1.23**	
3			**1.16**	**1.14**	
4			**1.11**	**1.10**	
5 Highest quintile group			1(ref)	1(ref)	
Partner					
Education					
Compulsory school				**1.25**	**1.23**
Upper sec ≤ 2 y				**1.20**	**1.18**
Upper sec ≤ 3 y				**1.12**	**1.10**
Tertiary < 3 y				**1.13**	**1.12**
Tertiary ≥ 3 y				1(ref)	1(ref)
Status					
1 Lowest quintile group				**1.13**	**1.16**
2				1.04	1.04
3				1.03	**1.05**
4				0.98	0.98
5 Highest quintile group				1(ref)	1(ref)
HR extreme group	**1.57**	**1.83**	**2.16**	**2.56**	**2.12**

Note: Bold face figures indicate a 5 percent level significant difference from the reference category.

Table 3: Relative death risks for different socioeconomic groups. Women 30-59 years.

	Model I	Model II	Model III	Model IV	Model V
Own					
Education					
Compulsory school	**1.53**	**1.34**	**1.32**	**1.26**	**1.26**
Upper sec ≤ 2 y	**1.38**	**1.28**	**1.25**	**1.21**	**1.21**
Upper sec ≤ 3 y	**1.22**	**1.17**	**1.14**	**1.13**	**1.12**
Tertiary < 3 y	**1.09**	**1.10**	1.07	1.05	1.05
Tertiary ≥ 3 y	1(ref)	1(ref)	1(ref)	1(ref)	1(ref)
Class					
Unskilled man & Routine non-man		0.99			
Skilled manual		**0.85**			
Intermediate occ		0.94			
Lower man/prof		**0.93**			
Higher man/prof		1(ref)			
Status					
1 Lowest quintile group		**1.26**	**1.25**	**1.18**	**1.19**
2		**1.09**	**1.09**	**1.07**	**1.07**
3		**1.12**	**1.09**	1.04	1.05
4		1.03	1.01	1.00	1.00
5 Highest quintile group		1(ref)	1(ref)	1(ref)	1(ref)
Income					
1 Lowest quintile group			**1.07**		
2			0.99		
3			1.03		
4			1.04		
5 Highest quintile group			1(ref)		
Partner					
Class					
Unskilled man & Routine non-man				**1.16**	**1.25**
Skilled manual				**1.10**	**1.17**
Intermediate occ				1.04	**1.08**
Lower man/prof				**1.05**	**1.08**
Higher man/prof				1(ref)	1(ref)
Income					
1 Lowest quintile group				**1.15**	
2				**1.12**	
3				**1.07**	
4				1.05	
5 Highest quintile group				1(ref)	
HR extreme group	**1.53**	**1.66**	**1.76**	**1.98**	**1.88**

Note: Bold face figures indicate a 5 percent level significant difference from the reference category.

Table 4: Relative death risks in cancer and circulatory diseases for different socioeconomic groups. Men and women 30-59 years.

	Men		***Women***	
	Cancer	Circulatory	Cancer	Circulatory
Women's education				
Compulsory school	**1.16**	**1.33**	**1.16**	**1.79**
Upper sec ≤ 2 y	**1.14**	**1.26**	**1.13**	**1.62**
Upper sec ≤ 3 y	1.10	**1.18**	1.04	**1.48**
Tertiary < 3 y	**1.11**	**1.15**	1.03	1.20
Tertiary ≥ 3 y				
Women's status				
1 Lowest quintile group	1.06	**1.28**	**1.09**	**1.37**
2	1.04	1.08	1.05	1.15
3	0.99	**1.12**	1.01	**1.21**
4	0.96	1.00	1.03	0.95
5 Highest quintile group				
Men's class				
Unskilled man & Routine non-man	**1.22**	**1.31**	**1.18**	**1.54**
Skilled manual	**1.18**	**1.08**	**1.12**	**1.49**
Intermediate occ	**1.12**	**1.14**	1.05	**1.22**
Lower man/prof	**1.07**	**1.07**	1.07	**1.19**
Higher man/prof				
Men's education				
Compulsory school	**1.08**	**1.28**		
Upper sec ≤ 2 y	1.07	**1.24**		
Upper sec ≤ 3 y	1.05	1.07		
Tertiary < 3 y	0.99	1.08		
Tertiary ≥ 3 y				
HR extreme group	**1.61**	**2.86**	**1.49**	**3.78**

Note: Bold face figures indicate a 5 percent level significant difference from the reference category.