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Mortality following conjugal bereavement: new data from Belgium

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Abstract.

This study uses a follow-up design in which the mortality rates of 53,903 and 138,778 Belgian widowers and widows and an equal number of matched controls not experiencing bereavement are compared. Excess mortality among the widowed is assessed, as is the extent to which this excess varies across sex and age-groups and with the duration of bereavement. To challenge the hypothesis that higher educational attainment buffers the harmful effects of spousal loss the relative risks are also calculated for subpopulations with different educational backgrounds.

Overall excess mortality among the bereaved in the three years following spousal loss stands at 10 percent, ranging from a high of 22 percent in the first six months down to a low of 6 percent in the second year. Differentiated by sex and age, the results are largely consistent with empirical findings elsewhere. Excess mortality among the bereaved is systematically greater for widowers than for widows and for the young than for the old widowed. Looking at the effects of education, the results do not support the hypothesis that the more educated suffer less excess mortality. On the contrary, in the period immediately following spousal loss, higher education seems to be associated with slightly greater excess mortality.

Keywords: differential mortality, bereavement, educational attainment

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1. Introduction.

Previous studies in a number of countries have found empirical evidence that persons experiencing the loss of their spouse are at a greater risk of dying than married people (Schaefer, Quesenberry & Wi, 1995). The extent to which this holds for Belgium has never been examined. This study uses a follow-up design in which the mortality rates of 53,903 and 138,778 Belgian widowers and widows respectively and an equal number of matched controls not experiencing bereavement are compared. Since the extent of excess mortality among the widowed seems to vary considerably both across sex- and age-groups and with the duration of bereavement (Mendes de Leon, Kasl & Jacobs, 1993), the effects of sex, age and time since spousal loss are explicitly assessed. Moreover, because only a few studies have assessed the role of social class (Martikainen & Valkonen, 1998) the relative risks are also calculated for subpopulations with different educational backgrounds. By doing so an attempt is made is to challenge the hypothesis that higher educational attainment buffers the harmful effects of spousal loss.

2. Theoretical considerations.

Both causal and artefactual explanations have been advanced to account for excess mortality following bereavement. We discuss first the causal theories and then turn to the possible role of artefacts such as selection.

2.1 'Time since bereavement'- related differentials.

The empirical evidence for excess mortality among the bereaved during the first six months following spousal loss is very consistent (Jagger & Sutton, 1991). It is broadly agreed that the excess is largely to be explained in terms of stress caused by grief and shock (Martikainen & Valkonen, 1996b). Stress is believed to cause the excess mortality through its role in the aetiology of numerous somatic as well as psychosomatic diseases (Bowling, 1987) and through its triggering effects on health-hazardous behaviours such as self-neglect, substance abuse and violence (Mellström et al., 1982).

The empirical evidence of excess mortality at longer durations after bereavement is less conclusive. Some authors do not find any excess mortality at all after the first few

months (Rees & Lutkins, 1967; Parkes, Benjamin & Fitzgerald, 1969; Nieme, 1979) while others do, even up to several years after the loss of the spouse (Mellström et al., 1982; Helsing & Szklo, 1981). Studies reporting an excess at longer durations have, however, shown that the excess declines over time from a peak in the first half year (Martikainen & Valkonen, 1996a).

Where excess mortality persists at longer durations, the explanations advanced are usually based on role theory. In a role-theoretic perspective spousal loss is not just a single stressful event but involves a transition to a new role. Successful adaptation to the new role may take time or may never be fully completed, while attempts to add new roles to existing ones may lead to overload. Given the existence of role patterning by gender, we discuss this further in the context of gender-related differentials in excess mortality.

2.2 Gender-related differentials.

Despite greater female vulnerability to the consequences of quite a number of stressful life-events (Kessler & McLeod, 1984), there is firm evidence that the mortality excess following bereavement is higher among widowers than widows (Stroebe & Stroebe, 1983). Widowers seem to be more prone to isolation from social support resources than widows and to have a harder time adjusting to the bereaved role (Bowling, 1987). Several reasons for this have been advanced.

It is widely agreed that close interpersonal relationships alleviate the harmful outcomes of stressful life events mainly through the social support they imply (Thoits, 1984). Men are more likely than women to rely on their spouses to maintain ties with kin and close friends and to invest more themselves in social ties with professional acquaintances; the latter fulfill a lesser supportive role following bereavement (Bowling, 1987; Stroebe & Stroebe, 1983).

In general, wives still carry a larger burden of the domestic tasks than their husbands. From a role-theoretic point of view this makes the role of spouse more protective, and widowhood more hazardous, for men since widowers tend to be less well-equiped to care for themselves than widows (Bowling, 1987; Stroebe & Stroebe,1983).

For widows, persistent mortality excess can be explained in terms of the greater financial vulnerability of women in general and of widows in particular (Smith & Zick, 1996). Financial problems following bereavement may in themselves be major sources of additional stress for widows and they may also lead widows to limit their preventive-health-care seeking behaviour with deleterious long-term effects on their health.

2.3 Age-related differentials.

Most authors find both younger widowers and widows to be more affected by bereavement than older ones. In both cases this can readily be grasped in terms of the often more sudden and unacceptable nature of a young spouse's death leaving the bereaved spouse in a more profound state of shock (Martikainen & Valkonen, 1996b). For widows it can additionally be expected that older couples have had more chance to accumulate financial resources over a longer period of wedlock and thus to be better

financially protected than younger ones (Smith & Zick, 1996). Finally for both men and women, widowhood at a young age may lead to taking on additional roles (increased professional activities for widows, increased child-care responsibilities for widowers) and thus additional long-term stress.

2.4 Social status-related differentials.

Given the well-documented differential responsiveness to stressful life events between lower-status people and middle- and upper-status people (Kessler & McLeod, 1990) in general, an interaction between social class differentials, bereavement and mortality should not come as a surprise. The differential responsiveness to stress can be explained in terms of both individual and environmental differences (Kessler & Cleary, 1980). A number of personality traits, such as high self-esteem and, in particular, perceived personal control, are known to alleviate stress. It is well documented that these traits relate positively to social class (Kessler & Cleary, 1980). For the U.S. it has been shown that lower-status have also less access to informal social resources such as supportive social relationships and community ties (Kessler & Cleary, 1980), although this may not hold for the older generations in those parts of Europe that still have a relatively high level of residential stability and strong family ties. Finally it is generally agreed that lower-status individuals are also more likely to have a precarious financial situation.

It seems reasonable, therefore, to hypothesize that, faced with the loss of their spouse, highly-educated people may be exposed to slightly less stress and are likely to be better able to handle stress and to maintain their health level than less-educated people. This hypothesis has, however, been contested in a recent study for Finland by Martikainen and Valkonen (1998). Martikainen and Valkonen found that higher education and income did not noticeably reduce the relative mortality risks of either widows or widowers, although an effect did emerge when the results were assessed in terms of absolute rather than relative differences in mortality. The observation period they used (6 years) was not further divided, so no inferences could be drawn about the course of the effect over time. Moreover, they were not able to control for a number of the potential confounding effects discussed in the next section. Nevertheless, their results constitute a firm justification for challenging the hypothesis again with data from other countries.

2.5 Artefact explanations.

The observed excess mortality following bereavement is not necessarily due to the bereavement: in addition to the explanations discussed above a number of artefact explanations may account for at least a part of the excess (Martikainen & Valkonen, 1996b). It is clear that both homogamy and the life-long sharing of the same environment by a couple may be potential sources of upwards bias (Stroebe & Stroebe, 1983). Further, there are the possible confounding effects of fatal accidents in which both spouses die (which would also bias estimates upwards) and the remarrying of widows and widowers (which could bias them downwards) (Schaefer, Quesenberry & Wi, 1995). Martikainen and Valkonen (1996a) have examined several of the possible confounding influences in some detail for the Finnish data and come to the conclusion that these sources of bias are unlikely to be important enough to explain the observed

mortality excess completely. Nevertheless, it is clear that they might be important and that any serious attempt to measure effects needs to control for them as far as possible.

3. Data and design.

We have opted here to carry out the analysis along the same general lines as Martikainen and Valkonen in their study of the role of education in the excess mortality of the widowed in Finland (1998). They compared the incidence/exposure mortality rate for the widowed and non-widowed in each of a limited number of subpopulations defined by age, sex and education. We do the same to permit comparisons. Given however, (a) the very marked regional differences in mortality in Belgium (Mérenne, et al., nd.), (b) the large differences in socio-economic situations (for example, large differences in houshold structures, income and unemployment) (Mérenne, et al., nd.), (c) the potentially confounding effects of homogamy and the similar living conditions of married couples, we decided that extensive further controls were needed. We chose to work with a follow-up design with matching rather than to rely on statistical controls, since the former makes more intensive controls possible.

A linkage of the Belgian 1991 census data to all deaths occurring in the succeeding five years (March 1991- March 1996)[1] resulted in the identification of 54,927 men and 141,120 women aged between 30 and 84 and still married at the time of the census, who were widowed in the five year follow-up period. These persons were enrolled in the bereaved population in this study with the date of the death of the spouse, determined in weeks after census, as the time of entry. To reduce the confounding effects of fatal accidents in which both spouses died, persons who died in the same week as their partner were excluded from the analysis.

Each member of the bereaved population was then matched with a non-bereaved person in order to reduce the potential confounding effects of homogamy and similar environment. The control group individuals were matched not only on sex and age (in single years), but also on province of residence (10 provinces plus Brussels), educational level (highest diploma: 12 categories), workforce status (5 categories: employed, unemployed, homemaker, retired, handicapped), number of children (defined as parity of the wife) and number of persons in the household[2]. Potential matches were identified for 53,903 or 98,1% of the widowers and for 138,778 (98,3%) of the widows. Where more than one potential match was identified, a single control person was selected at random. The time of entry in the study of each control was set the same as that of the widower or widow he or she was matched to.

Both populations were followed on a weekly basis from the time of entry in the study up to March 1 1996. Because persons dying in the same week as their spouse were excluded from the bereaved population, this resulted in a potential observation period per matched pair ranging from one week to 260 weeks. To limit the potential bias due to remarriage of some widows and widowers we present results here only for the first 3 years following spousal loss. The three years are further divided into four successive intervals; two intervals of 6 months and two of a year. These periods are treated as independent units of analysis: once one member of a matched pair dies, the survivor is excluded from the analysis for subsequent intervals. In other words, each interval starts

with matched groups. Incidence-exposure mortality rates for the bereaved and control groups were calculated for each interval separately.

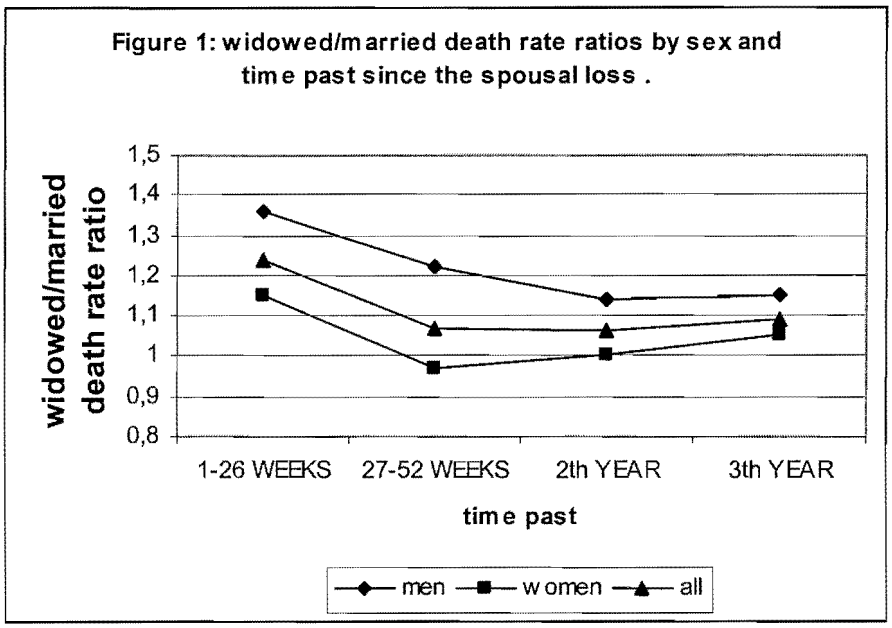
The core of the analysis consists of the calculation of widowed/married death-rate ratios, although rate differences are also considered. Following Martikainen and Valkonen (1998), the ratios are calculated separately for two age categories and two categories of educational attainment. The breakpoints of the age categories were chosen with the Belgian legal age at retirement as reference (65 for men and 60 for women). For men the age categories are thus 30-64 and 65-84 at entry into the study, for women they are 30-59 and 60-84. The categories of educational attainment are referred to hereafter as 'basic' and 'higher'. The category 'basic' comprises persons with no diploma or only a primary school diploma, the category 'higher' those who have completed at least lower secondary schooling[3]. The number of cases in each of the combined sex-, age- and educational groups is given in table 1.

Finally, in addition to the reference rate (rate for the control group), the rate ratios and their confidence intervals for each partial table, a test statistic for heterogeneity testing against equality of the rate ratios is assessed. STATA's EPITAB procedure was used for all calculations (StataCorp, 1997) .

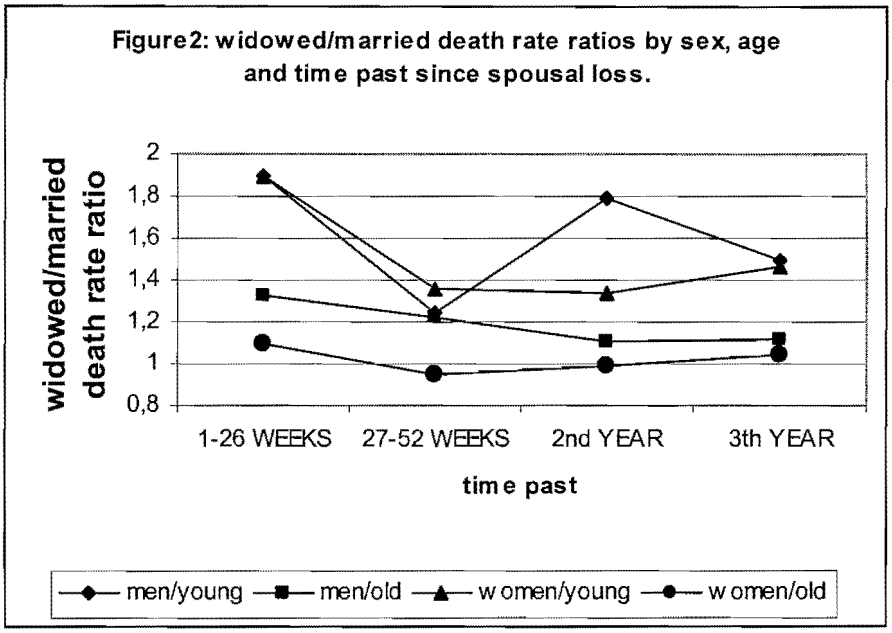
4. Results.

Since this is the first time data on mortality following spousal loss have been analysed for Belgium, we summarize overall levels before turning to the effect of education. Overall excess mortality among the bereaved stands at 10 percent, ranging from a high of 22 percent in the first six months down to a low of 6 percent in the second year after the loss of the spouse (figure 1 and table 2).

Differentiated by sex, the results are largely consistent with the theoretical considerations presented above and with empirical findings elsewhere. Excess mortality among the bereaved is systematically greater for widowers than for widows. The difference between the sexes is significant (p-value of the test for heterogeneity <0,05)



at all durations of bereavement except the last. For widowers, excess mortality declines at longer durations but is significant for all intervals considered; for widows though, excess mortality is observed only in the first six months.
In figure 2 and tables 3 and 4, age is included as well as sex. Comparison of figure 2 with figure 1 shows that excess mortality among the widowed observed for women in general (figure 1) stems almost entirely from the younger women; for older women excess mortality among the widowed is very small (figure 2).



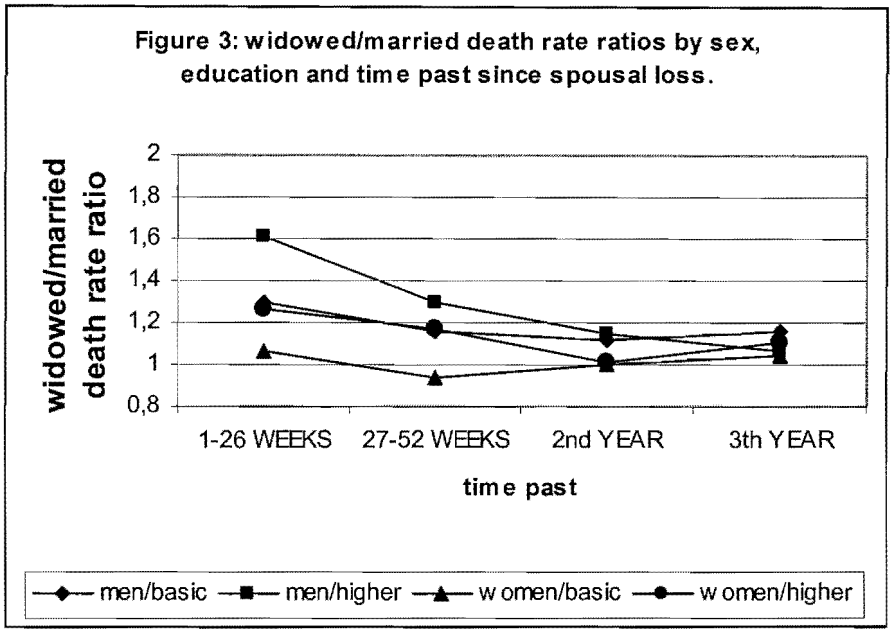
For both sexes, the mortality excess is larger for younger than for older people[4], as expected. Excess mortality is particularly marked at very short durations post-bereavement among younger people, regardless of sex. Interestingly, although older widowers fair worse than older widows relative to their non-widowed counterparts in the first year post bereavement, this is not the case for younger widowers and widows: the young widows fair as badly as the young widowers in the first year.

The greatest excess mortality is concentrated in those groups where bereavement is relatively unusual (among old widowers and among both widows and widowers at young ages), which may constitute particularly stressed groups. That this concentration is not solely an artefact due to our focus on relative risks (rate ratios) rather than on absolute differentials (rate differences) is suggested by the markedly higher levels at short rather than long durations post bereavement for both young widows and young widowers.

Table 5 summarizes the results by education. Higher education is associated with excess mortality in general over the three year period, and especially in the first year. In the second and third year, there is no significant difference in mortality between widowed and non-widowed.

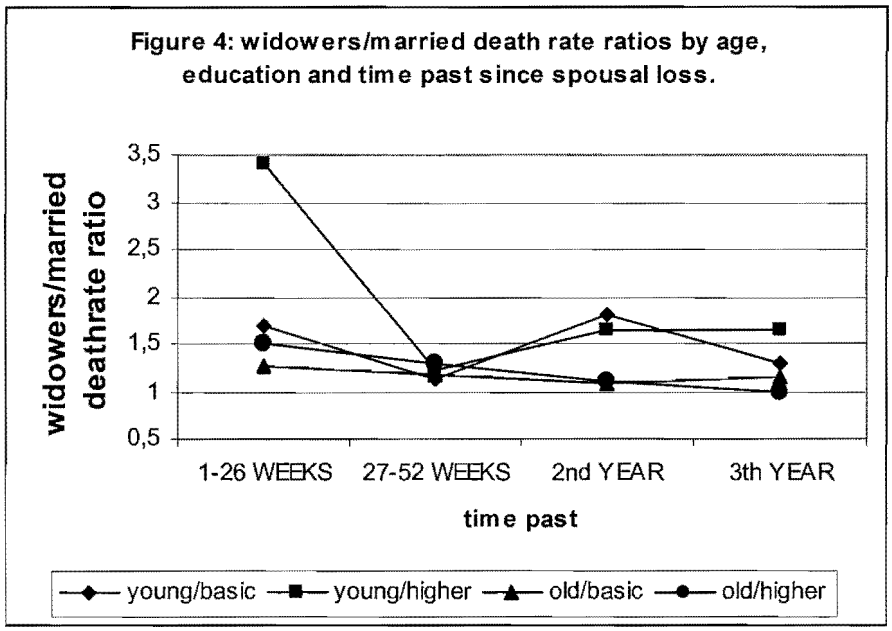
Figure 3 and tables 6 and 7 include both education and sex and are comparable to the age and sex analysis presented in figure 2 and tables 3 and 4. Again we see that the excess mortality among widows in general observed in Figure 1 results almost entirely

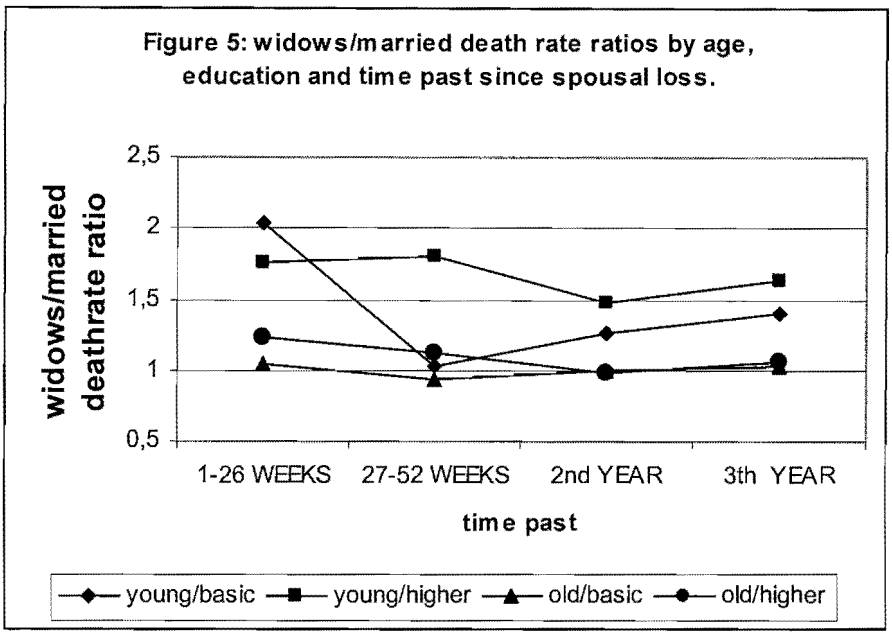
from one subgroup, here the women with more than basic education: the relative risks for women with only a primary school diploma are all very close to unity (figure 3).



For both sexes there is a marked difference in relative risks in the first year following bereavement, with the greatest relative risks among the more highly educated. The more educated may have lower mortality in general, but their higher educational level does not appear to provide an additional bonus in the face of bereavement.

Figures 4 and 5 and tables 8 and 9 take account of all the variables simultaneously: age, sex and educational level. Because of the small number of deaths in some subgroups, the confidence intervals for the estimates are sometimes wider and the levels of significance lower than before.





We still find, however, a significant difference in the excess mortality between the two education groups over the three year period in general, and more particularly in the first year. Our conclusion that although more education may be associated with lower mortality in general it does not provide additional protection in the face of spousal loss remains untouched.

The absence of a buffering effect of education in our analysis cannot be accounted for by our focus on relative rather than absolute differences in mortality rates. Rate differences do not show a buffering effect either: for women the absolute differences between bereaved and non-bereaved differ little between more and less educated women, while for men even the absolute differences are slightly greater for the more highly educated in the first year after bereavement.

5. Discussion.

Our results are generally similar to those elsewhere. Both widowers and widows in Belgium are significantly more at risk of dying than their married equivalents and strong support is given to the existence of age, sex and duration interactions.

Our results also support Martikainen and Valkonen's finding for Finland that a higher educational level does not significantly buffer the effects of spousal loss. On the contrary, during the first year of widowhood there are indications that the opposite may hold. Not only are the relative risks greater at a higher level of educational attainment, but for men the absolute difference in mortality rates is also greater.

That education does not buffer the effects of bereavement and may even be associated with greater excess mortality, particularly in the first year following bereavement, appears at first sight difficult to explain. One possible explanation can be derived from the fact that excess mortality is generally higher in the first year in those subgroups where bereavement is rare than in those subgroups where bereavement is more common.

It is higher for widowers than for widows, for the young than for the old, for the more educated than for the less educated. This is particularly striking for the relative differences in mortality rates, but it holds even in some cases, albeit to a lesser degree, for the absolute differences too.

We speculate that the unexpectedness of bereavement, may increase the stress in some cases and that a shortage of bereaved peers to provide informed and convincing support and role models may be an additional factor (Bowling, 1987).

6. Conclusions.

Excess mortality among the widowed is generally as high or even higher among the more educated than among the less educated. Education may indeed lower mortality risks in general but it does not appear to provide an additional bonus following loss of a spouse. On the contrary in the first year after bereavement it is more often associated with greater rather than with less excess mortality.

We suggest that this may be related to the fact that excess mortality following bereavement in general is higher in subgroups where bereavement is rare. The more educated with their lower levels of bereavement constitute in this sense a 'marginal' social group, and greater excess mortality for them is then perhaps not so surprising.

Tables.

Table 1: Number of widowers and widows by age and educational attainment.

Sex	Age	educational attainment			
		missing	basic	higher	total
widowers	< 65 yrs.	1152	8032	7312	16496
	≥ 65 yrs.	2902	25167	9338	37407
	total	4054	33199	16650	53903
widows	< 60 yrs.	2399	15058	12065	29522
	≥ 60 yrs.	9633	77243	22380	109256
	total	12032	92301	34445	138778

Table 2 : Widowed/married death rate ratios by sex and time since bereavement.

time	sex	N widowed (total person-weeks at risk)	Control population death rate/1000 person-weeks	RR	95% C.I.	heterogeneity
1-26 weeks	widowers	53903 (1302870)	1,0154	1,36	1,27-1,46	
	widows	138778 (3391539)	0,5176	1,11	1,04-1,18	
						p = 0,00
	all	192681 (4694409)	0,6562	1,22	1,16-1,28	
27-52 weeks	widowers	45281 (1097263)	1,0008	1,22	1,13-1,32	
	widows	120856 (2957188)	0,5117	0,97	0,9-1,04	
						p = 0,00
	all	166137 (4054451)	0,6444	1,07	1,02-1,13	
2nd year	widowers	37839 (1671784)	1,044	1,14	1,07-1,22	
	widows	104399 (4703391)	0,4933	1	0,94-1,06	
						p = 0,00
	all	142238 (6375175)	0,6381	1,06	1,02-1,11	
3th year	widowers	25133 (1061016)	1,011	1,15	1,06-1,25	
	widows	74496 (3182304)	0,4796	1,05	0,98-1,13	
						p = 0,11
	all	99629 (4243320)	0,6128	1,09	1,04-1,15	
full 3 years	widowers	53903 (5355035)	1,0643	1,2	1,16-1,25	
	widows	138778 (14561088)	0,5132	1,03	1,00-1,07	
						p = 0,00
	all	192681 (19916123)	0,6629	1,1	1,08-1,13	

Table 3 : Widowers/married death rate ratios by age and time since bereavement

time	age	N widowed (total person-weeks at risk)	Control population death rate/1000 person-weeks	RR	95% C.I	heterogeneity
1-26 weeks	< 65 yrs.	16496 (407355)	0,1886	1,9	1,43-2,54	
	≥ 65 yrs.	37407 (895515)	1,3898	1,33	1,24-1,43	
						p = 0,01
27-52 weeks	< 65 yrs.	14749 (361875)	0,221	1,24	0,91-1,68	
	≥ 65 yrs.	30532 (735388)	1,3832	1,22	1,12-1,33	
						p = 0,92
2nd year	< 65 yrs.	12922 (585848)	0,1889	1,79	1,41-2,28	
	≥ 65 yrs.	24917 (1085936)	1,5053	1,1	1,03-1,18	
						p = 0,00
3th year	< 65 yrs.	9469 (410564)	0,2161	1,5	1,14-1,98	
	≥ 65 yrs.	15664 (650452)	1,5119	1,12	1,03-1,22	
						p = 0,04
full 3 years	< 65 yrs.	16496 (1782528)	0,2038	1,61	1,41-1,84	
	≥ 65 yrs.	37407 (3572507)	1,4894	1,18	1,14-1,22	
						p = 0,00

Table 4 : Widows/married death rate ratios by age and time since bereavement

time	age	N widowed (total person-weeks at risk)	Control population death rate/1000 person-weeks	RR	95% C.I	heterogeneity
1-26 weeks	< 60 yrs.	29522 (730692)	0,0561	1,90	1,29-2,85	
	≥ 60 yrs.	109256 (2660847)	0,6443	1,09	1,02-1,16	
						p = 0,00
27-52 weeks	< 60 yrs.	26637 (655899)	0,0762	1,36	0,93-2,00	
	≥ 60 yrs.	94219 (2301289)	0,6359	0,95	0,88-1,03	
						p = 0,06
2nd year	< 60 yrs.	23627 (1083340)	0,0765	1,34	1,00-1,8	
	≥ 60 yrs.	80772 (3620051)	0,6182	0,99	0,93-1,05	
						p = 0,04
3th year	< 60 yrs.	17824 (778702)	0,0757	1,46	1,04-2,07	
	≥ 60 yrs.	56672 (2403602)	0,6105	1,04	0,97-1,12	
						p = 0,05
full 3 years	< 60 yrs.	29522 (3259739)	0,0716	1,47	1,24-1,75	
	≥ 60 yrs.	109256 (11301349)	0,6409	1,01	0,99-1,05	
						p = 0,00

Table 5 : Widowed/married death rate ratios by education and time since bereavement.

time	education	N widowed (total person-weeks at risk)	Control population Death rate/1000 person-weeks	RR	95% C.I.	heterogeneity
1-26 weeks	basic	125500 (3055440)	0,7687	1,16	1,09-1,22	
	higher	51095 (1246803)	0,3825	1,44	1,28-1,62	
						p = 0,00
	all	176595 (4302243)	0,6567	1,2	1,15-1,27	
27-52 weeks	basic	107825 (2632471)	0,7507	1,03	0,97-1,1	
	higher	44427 (1082999)	0,3837	1,23	1,08-1,41	
						p = 0,01
	all	152252 (3715470)	0,6444	1,07	1,02-1,13	
2nd year	basic	92146 (4134541)	0,7334	1,05	1,00-1,10	
	higher	38217 (1705436)	0,4275	1,09	0,99-1,20	
						p = 0,54
	all	130363 (5839977)	0,6381	1,06	1,02-1,11	
3th year	basic	64315 (2735007)	0,7015	1,09	1,02-1,16	
	higher	26869 (1146187)	0,4069	1,08	0,95-1,23	
						p = 0,89
	all	91184 (3881194)	0,6128	1,09	1,04-1,15	
full 3 years	basic	125500 (12974139)	0,766	1,08	1,05-1,11	
	higher	51095 (5268013)	0,4168	1,19	1,12-1,26	
						p = 0,01
	all	176595 (18242152)	0,6629	1,1	1,08-1,13	

Table 6 : Widowers/married death rate ratios by education and time since bereavement.

time	education	N widowers (total person-weeks at risk)	Control population Death rate/1000 person-weeks	RR	95% C.I.	heterogeneity
1-26 weeks	basic	33199 (801215)	1,2087	1,29	1,18-1,40	
	higher	16650 (403764)	0,6205	1,61	1,37-1,89	
						p = 0,01
	all	49849 (1204979)	1,0114	1,36	1,26-1,46	
27-52 weeks	basic	27675 (669829)	1,2017	1,16	1,06-1,28	
	higher	14211(344781)	0,6513	1,29	1,08-1,54	
						p = 0,32
	all	41886 (1014610)	1,0147	1,19	1,09-1,29	
2nd year	basic	22955 (1014156)	1,2343	1,12	1,04-1,21	
	higher	12014 (530371)	0,7242	1,15	1,00-1,33	
						p = 0,70
	all	34969 (1544527)	1,0592	1,13	1,05-1,20	
3th year	basic	15054 (632233)	1,1711	1,16	1,05-1,28	
	higher	8144 (345967)	0,7269	1,06	0,89-1,27	
						p = 0,37
	all	23198 (978200)	1,0143	1,14	1,04-1,24	
full 3 years	basic	33199 (3279699)	1,2602	1,16	1,12-1,21	
	higher	16650 (1669523)	0,7034	1,26	1,17-1,37	
						p = 0,06
	all	49849 (4949222)	1,0722	1,19	1,14-1,23	

Table 7 : Widows/married death rate ratios by education and time since bereavement.

time	education	N widows (total person-weeks at risk)	Control population Death rate/1000 person-weeks	RR	95% C.I.	heterogeneity
1-26 weeks	basic	92301 (2254225)	0,6117	1,06	0,99-1,15	
	higher	34445 (843039)	0,2679	1,26	1,05-1,50	
						p = 0,08
	all	126746 (3097264)	0,5181	1,09	1,02-1,17	
27-52 weeks	basic	80150 (1962642)	0,5963	0,94	0,86-1,02	
	higher	30216 (738218)	0,2586	1,17	0,96-1,43	
						p = 0,04
	all	110366 (2700860)	0,504	0,97	0,90-1,05	
2nd year	basic	69191 (3120385)	0,57	1,00	0,94-1,07	
	higher	26203 (1175065)	0,2934	1,01	0,87-1,18	
						p = 0,91
	all	95394 (4295450)	0,4943	1,00	0,95-1,07	
3th year	basic	49261 (2102774)	0,5596	1,04	0,96-1,13	
	higher	18725 (800220)	0,2684	1,1	0,91-1,33	
						p = 0,62
	all	67986 (2902994)	0,4793	1,05	0,98-1,13	
full 3 years	basic	92301 (9694440)	0,5965	1,02	0,98-1,05	
	higher	34445 (3598490)	0,2824	1,12	1,02-1,21	
						p = 0,05
	all	126746 (13292930)	0,5112	1,03	1,00-1,07	

Table 8 : widowers/married death rate ratios by age, education and time since bereavement.

time	age	educational attainment	N widowed (total person-weeks at risk)	Control population death rate/1000 person-weeks	RR	95% C.I	heterogeneity
1-26 weeks	< 65 yrs.	basic	8032 (198750)	0,2658	1,68	1,19-2,41	
		higher	7312 (180186)	0,0831	3,4	1,89-6,52	
							p = 0,03
	≥ 65 yrs.	basic	25167 (602465)	1,519	1,27	1,16-1,38	
		higher	9338 (223578)	1,0505	1,5	1,27-1,78	
							p = 0,07
27-52 weeks	< 65 yrs.	basic	7200 (176870)	0,2771	1,12	0,75-1,68	
		higher	6523 (159764)	0,169	1,22	0,71-2,11	
							p = 0,8
	≥ 65 yrs.	basic	20475 (492959)	1,5322	1,17	1,06-1,29	
		higher	7688 (185017)	1,0661	1,3	1,07-1,57	
							p = 0,31
2nd year	< 65 yrs.	basic	6323 (287718)	0,2387	1,81	1,33-2,46	
		higher	5692 (256806)	0,1477	1,63	1,07-2,52	
							p = 0,7
	≥ 65 yrs.	basic	16632 (726438)	1,6293	1,08	1,00-1,17	
		higher	6322 (273565)	1,2652	1,1	0,95-1,28	
							p = 0,81
3th year	< 65 yrs.	basic	4662 (202010)	0,2865	1,3	0,91-1,86	
		higher	4136 (178690)	0,1618	1,63	1,00-2,68	
							p = 0,44
	≥ 65 yrs.	basic	10392 (430223)	1,5847	1,15	1,04-1,28	
		higher	4008 (167277)	1,3317	0,99	0,82-1,20	
							p = 0,16
full 3 years	< 65 yrs.	basic	11279 (875858)	0,2648	1,51	1,28-1,79	
		higher	4756 (780438)	0,1439	1,74	1,37-2,21	
							p = 0,33
	≥ 65 yrs.	basic	28731 (2403841)	1,6211	1,15	1,10-1,20	
		higher	5138 (889085)	1,1874	1,22	1,13-1,33	
							p = 0,17

Table 9 : widows/married death rate ratios by age, education and time since bereavement.

time	age	educational attainment	N widowed (total person-weeks at risk)	Control population death rate/1000 person-weeks	RR	95% C.I	heterogeneity
1-26 weeks	< 60 yrs.	basic	15058 (372737)	0,0697	2,04	1,25-3,40	
		higher	12065 (298331)	0,0402	1,75	0,82-3,9	
							p =0,72
	≥ 60 yrs.	basic	77243 (1881488)	0,7191	1,04	0,97-1,13	
		higher	22380 (544708)	0,3926	1,23	1,02-1,48	
							p= 0,1
27-52 weeks	< 60 yrs.	basic	13608 (335786)	0,0864	1,03	0,60-1,79	
		higher	10858 (266833)	0,0562	1,8	0,92-3,64	
							p = 0,18
	≥ 60 yrs.	basic	66542 (1626856)	0,7016	0,94	0,86-1,02	
		higher	19358 (471385)	0,3731	1,12	0,91-1,38	
							p = 0,11
2nd year	< 60 yrs.	basic	12130 (558505)	0,0895	1,26	0,86-1,87	
		higher	9598 (436730)	0,0572	1,48	0,87-2,57	
							p = 0,61
	≥ 60 yrs.	basic	57061 (2561880)	0,6749	0,99	0,93-1,06	
		higher	16605 (738335)	0,4332	0,98	0,83-1,14	
							p = 0,82
3th year	< 60 yrs.	basic	9244 (404994)	0,0987	1,4	0,92-2,16	
		higher	7128 (309388)	0,0517	1,63	0,84-3,24	
							p = 0,70
	≥ 60 yrs.	basic	40017 (1697780)	0,6697	1,03	0,95-1,12	
		higher	11597 (490832)	0,4049	1,06	0,87-1,29	
							p = 0,82
full 3 years	< 60 yrs.	basic	21309 (1678947)	0,0862	1,4	1,12-1,74	
		higher	7200 (1314269)	0,0524	1,63	1,19-2,23	
							p = 0,41
	≥ 60 yrs.	basic	88034 (8015493)	0,7039	1,01	0,97-1,04	
		higher	10203 (2284221)	0,4146	1,08	0,99-1,18	
							p = 0,15

References.

Bowling, A., (1987), Mortality after bereavement: a review of the literature on survival periods and factors affecting survival, *Social science and medicine*, 24, 2, 117-124.

Helsing, K.J., Szklo, M., (1981), Mortality after bereavement, *American journal of epidemiology*, 114, 1, 41-52.

Jagger, C., Sutton, J.C., (1991), Death after marital bereavement. is the risk increased?, *Statistics in medicine*, 10, 395-404.

Kessler, R.C., Cleary, P.D., (1980), Social class and psychological distress, *American sociological review*, 45, 463-478.

Kessler, R.C., McLeod, J., (1984), Sex differences in vulnerability to undesirable life events, *American sociological review*, 49, 620-631.

Martikainen, P., Valkonen, T., (1996a), Mortality after death of a spouse in relation to duration of bereavement in Finland, *Journal of epidemiology and community health*, 50, 264-268.

Martikainen, P., Valkonen, T., (1996b), Mortality after the death of a spouse: rates and causes of death in a large Finnish cohort, *American journal of public health*, 86, 1087-1093.

Martikainen, P., Valkonen, T., (1998), Does education and income buffer the effects of death of spouse on mortality?, *Epidemiology*, 9, 5, 530-533.

Mellström, D., Nilsson, A., Odén, A., Rundgren, A., Svanborg, A., (1982), Mortality among the widowed in Sweden, *Scandinavian journal of social medicine*, 10, 33-41.

Mendes de Leon, C.F., Kasl, S.V., Jacobs, S., (1993), Widowhood and mortality risk in a community sample of the elderly: a prospective study. *Journal of clinical epidemiology*, 46, 6, 519-527.

Mérenne, B., Van der Haegen, H., Van Hecke, E., (nd.), *België ruimtelijk doorgelicht.*, DWTC and Gemeentekrediet, Brussels, 144

Niemi, T., (1979), The mortality of male old-age pensioners following spouse's death, *Scandinavian journal of social medicine*, 115-117.

Parkes, M.C., Benjamin, B., Fitzgerald, R.G., (1969), Broken heart: A statistical study of increased mortality among widowers, *British medical journal*, 1, 740-743.

Rees, W.D., Lutkins, S.G., (1967), Mortality of bereavement, *British medical journal*, 4, 13-16.

Schaefer, C., Quesenberry, C.P., Wi, S., (1995), Mortality following conjugal bereavement and the effects of a shared environment, *American journal of epidemiology*, 141, 12, 1142-1152.

Smith, K.R., Zick, C.D., (1996), Risk of mortality following widowhood: age and sex differences by mode of death, *Social biology*, 43, 59-71.

StataCorp, (1997), *Stata reference manual*, volume1, Stata Press, College Station, Texas, 465.

Stroebe, M.S., Stroebe, W., (1983), Who suffers more? sex differences in health risks of the widowed., *Psychological bulletin*, 93, 2, 279-301.

Thoits, P.A., (1984), Explaining distributions of psychological vulnerability: lack of social support in the face of life stress, *Social Forces*, 63, 2, 453-481.

Notes.

[1]This linkage was carried out by Patrick Deboosere of the Interface Demography, Vrije universiteit Brussel.

[2]These characteristics relate to the time of the census.

[3] From a substantial number of persons in the census there is no information on highest diploma in the census. We suspect these are largely individuals with full or partial primary education, but are not sure. They are excluded here from the analyses that include education as a variable.

[4] The absolute excess, however, is smaller at younger than at older ages because of much lower mortality in general at younger ages.