Homo faber, homo otiosus: Early retirement, health and mortality risks in Belgium, 2001 – 2004

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Abstract

Early retirement in good health, and with an adequate pension, offers the possibility of living a full life and fulfilling life-long dreams, without the pressures, trials and tribulations of work. On the other hand, stopping work implies a lesser-embeddedness in a network of meaningful social relations and a release from the imperative social discipline of the work-place. Previous analysis has indicated that the mortality risk of those currently not working may be up to double that for those who are working. However, these analyses have not controlled for selectivity by health status, nor have they distinguished between those retired and those not working, but not legitimately retired. We consider the effect of various work statuses on the mortality risk of Belgian men and women aged 50 – 64, controlling for age, sex and subjective health status at the census. We use a 20 percent sample of Belgian nationals who were working at the time of the Belgian 1991 census and enumerated in the 2001 census, linked to individual mortality records over 39 months after the 2001 census. We find that ill health is the major mortality risk, and that the net effect of not working is to increase the mortality risk by about a third, far lower than previous estimates. However, in view of the very low probability of dying at this age, as well as the dynamic interrelations between health, working and antecedent conditions (education, material wealth, occupation and marital status) we suggest that these results need to be treated with caution.

Keywords: mortality; work; retirement; Belgium

Introduction

As work patterns change, a growing number of middle-aged men and women are choosing, or being enticed by the offer of a golden handshake, to take early retirement. In Belgium, at the time of the census in 1991, only 18.8 percent of men and 3.8 percent of women aged 60 – 64 defined themselves as actively working. By the census of 2001 the proportion working had dropped to 15.5 for men, though it rose to 5.5 percent for women (authors' calculations from raw census data). Even if latest figures from the Labour Force surveys indicate a slight turnaround in this trend and an increase in the average age at retirement, it is clear that the majority of people are retiring considerably before the official retirement age. Given the drop in mortality at this age group (in Belgium life expectancy for men at age 60 was 18.1 in 1991 and 19.7 in 2001, for women the figures were 22.8 and 24.1 for 1991 and 2001 respectively, see Human Mortality Database) and the secular shift to white collar, service and professional occupations, we may surmise that a growing proportion of these early retirees are retiring in good health.

On the one hand, early retirement in good health, and with an adequate pension, offers the possibility of living a full life and fulfilling life-long dreams, without the pressures , trials and tribulations of work (*homo otiosus)*. On the other hand, stopping work implies a lesser-embeddedness in a network of meaningful

social relations and a release from the imperative social discipline of the work-place. Previous analyses (Stefansson, 1991; Martikainen & Valkonen, 1996; Jin et al., 1997; Mathers & Schofield, 1998; Anson, 2004; Saarela & Finnäs, 2005) have suggested that the mortality risk for those not working may be up to double that for those who are working, but these analyses have generally been based on comparisons between the employed and the unemployed across very broad age groups rather than on early-retirees. They have also not been able to separate out the selective effects of ill health, which may lead to early retirement, or otherwise not working, and to premature mortality, without there being any necessary relation between work and mortality as such. On the other hand, there has been an almost complete dearth of studies analysing the effects of retirement on mortality, in particular amongst those retiring early and in good health. The proposed research will fill this lacuna by focussing on mortality differences between workers and non-workers in the pre-retirement ages (50 - 64). We control for self-declared health as an indicator of selectivity, as well as for other antecedent conditions predictive of early retirement. We thus hope to be able to isolate the direct effects of work and early retirement on mortality risks net of other confounding factors.

Theoretical Background

One of the major implications of Durkheim's (1897) study of suicide is that there are certain social, and not only biological, imperatives for human living, and that if these are not met, human life is liable to be shortened. Durkheim identified two particular imperatives: social integration, being part of a social group towards which the individual has certain rights and obligations; and social control, being subject to social directives which determine the goals individuals set themselves and the means by which they seek to attain these goals. An absence of social integration (egoism) or an excess (altruism), just as an absence of social control (anomie) or an excess (fatalism) will, he argued, decrease human viability and increase the probability of people taking their own lives.

In a series of articles, Gove and his associates (Gove, 1973; Geerken & Gove, 1974; Gove & Hughes, 1980) showed that a lack of social integration, in particular the situation of being unmarried, was liable to increase the risk of mortality in general, and not just the risk of suicide. This finding, which is especially true for men, has been reported by many researchers since (Kobrin & Hendershott, 1977; Trovato & Lauris, 1989; Rogers, 1995; Manzoli et al., 2007). While there have been a number of attempts to show that there is a selection effect by which the sickly are less likely to marry (Goldman, 1993), this selection argument cannot account for the increased mortality of the divorced and the widowed, particularly in the period

immediately following the loss of one's spouse (Lusyne et al., 2001; Manor & Eisenbach, 2003). Furthermore, the effect of marriage on mortality is not constant but is socially variable, being stronger the more marriage is socially required (Hu, 1988; Goldman & Hu, 1993). There is thus a double effect of marriage on mortality. On the one hand a social integration effect: to be married is to be embedded in a set of rights and obligations, to be part of an intense and binding social relationship; and on the other hand, to be married is to act in accord with particular social directives. In this regard it is worth noting that cohabitation has a clear mortality-reducing effect, but this effect does not appear to be as strong as that of marriage (Anson, 2003). It is possible that cohabitants benefit from the social relationship but not from acceding to a normative obligation, though as normative evaluations change, and cohabiting becomes more general (Harper, 2003), the benefits of cohabitation may well approach those of marriage.

Human society, however, extends beyond the family or household, and at the heart of this interdependent communal life lies the capacity consciously to coordinate activities to meet physical and emotional needs (Freud, [1929] 1963, ch. 4). As Marx (1963) noted, work, and more specifically, productive labour, is the quintessential human activity. Through human labour (*homo faber)* we mould nature to our needs in light of some predetermined concept of what we wish to achieve (Avineri, 1968; Yuill, 2005). Even if, under market relations, work activity

is distorted, and appears more as a means to an end rather than an end in itself, nonetheless the essence remains. Through work we are a part of the human enterprise, consciously creating the world in which we live, connected to the social group to which we belong and, indirectly, to humanity as a whole.

Work is thus more than a source of income, and its advantages extend beyond the extrinsic benefit of the pay package at the end of the week or month (Amabile et al., 1994). Apart from the intrinsic satisfactions which may be derived from doing a particular job, work brings us into relations with others and it imposes on us a particular discipline, of time, of coordination and of performance quality. Work "provides an individual not only with an income, but also a set of social relationships which provide a structure and meaning to life" (Junankar, 1991: 305). It is thus an essential element in the integration of individuals into society, and in their subjection to the discipline of social control. This is not to say that there are no substitutes for work, parenting and grand-parenting being the obvious examples. The meaning of work may thus be gendered, not only in terms of its content but also in terms of legitimate alternatives. In the same way, the meaning of work changes with age, so there comes a stage in life when work (employment) becomes a matter of choice rather than a requirement.

We may thus expect work to be related to mortality: those not working are liable to be at greater risk of death than those who are working, irrespective of

background characteristics such as age, education, family income etc. At the same time, we may expect this relationship to be weaker for women than for men, as there are more legitimate alternatives roles for women in the family.

A number of studies have indeed shown that working may decrease the mortality risk by as much as a half, usually through following up a population sample, some of whom were working on a particular date and others not, and noting the effect of working on the risk of mortality over a particular period of time. Moser et al. (1984, 1987), using the OPCS longitudinal survey, compared the mortality over time of men working and seeking work at the time of the 1971 and 1981 censuses of England and Wales, and showed the mortality of those seeking work to be higher than that of those in work. Men not working or seeking work because of sickness were excluded, and the authors thus argued that the mortality inducing ("mortogenic") effects of unemployment could not be attributed to selection. Parant (1984) followed up a sample of men and women aged 25-64 over 5 years in France, from 1975 to 1980, and concluded that those out of work had more than double the average mortality risk of those working, and that the effect of work on mortality was greater for men than for women. Sloggett and Joshi (1994) followed up a sample of nearly 300,000 people aged between 16 and 65 at the 1981 census over nine years, and showed that both men, and women without dependent children, who were not working but in good health had a significantly

higher mortality risk than did those who were working. Wanner (1996), using follow-up data from three Norwegian censuses, showed the mortality risk of those not working to be considerably higher than that of those who were working. Martikainen and Valkonen (1996) found similar results for Finland in the early 1990's, noting in particular that the mortogenic effects of unemployment were greater before than during the recession which began in 1990 (see also Martikainen, 1990). Manor et al. (1999, 2000) and Anson (2004), following up census populations in Israel and in Belgium respectively also found employed men and women to have considerably lower mortality than those who were not employed.

The conclusion to be drawn from these studies is that work is health inducing (salutogenic) and being out of work mortogenic. Not all results point this way, however. A number of studies, using aggregate data for national subregions or international comparisons (Ruhm, 2000 for the United States; Neumayer, 2004, for Germany; Tapia Granados, 2005, for Spain; Gerdtham and Ruhm, 2005 for OECD) have argued that mortality trends are pro-cyclical with regard to economic cycles and that mortality *increases* when unemployment declines. This they attribute to work-related increases in stress, injuries and substance abuse (particularly alcohol), and to decreases in diet quality and health-related activities. Ruhm (2000) even presents analysis of microdata as evidence that tobacco consumption and body-mass index trends are pro-cyclical, while healthy diets and

exercise move counter-cyclically. As this is the only consistent body of research arguing against the inverse work-mortality relationship, it is worth considering it more deeply, especially as we find these results problematic, and not only because they fly in the face of the consistent evidence that unemployment increases the mortality risk:

a. All these analyses were undertaken in the latter third of the twentieth century, a period when mortality was declining, average wealth (as expressed in GDP) was rising and unemployment rates, at least in Europe, were particularly high (OECD, 2008). These three trends may be closely allied through the logic of globalisation (Barber, 2003), but it takes more than correlation to make a causal relationship (Ní Bhrolcháin & Murphy, 2007).

b. As Neumayer (2004) recognises, there is an implicit ecological fallacy in arguing that because mortality rates are negatively correlated with unemployment rates, therefore unemployment reduces mortality and the stress of high-powered managerial employment increases mortality. Just as feasibly, mortality of the unemployed may rise in "good times" (Martikainen and Valkonen, 1996) and the jobs created could be of the insecure, low-paying, benefit-bereft kind of the sort generally reserved for

migrants. Micro-level analysis of mortality and business cycles indicates a counter-cyclical, not a pro-cyclical pattern (Gerdtham & Johannesson, 2005).

c. The authors of these papers recognise the cross-sectional and micro-level evidence on the relationship between unemployment and mortality, but they make no attempt to bridge the contradiction between these findings and their conclusions of pro-cyclical mortality changes. Nonetheless, Neumayer appears to be aware of the problem, and in his conclusions there are what appear to be two slips of the keyboard when he notes that " . . . total mortality as well as mortality for other age groups, gender-specific mortality as well as the important mortality cause cardiovascular disease all move *counter-cyclically*"(p.1044, emphasis added), and also " . . we show that overall mortality rates as well as some specific rates are *counter-cyclical*. . . " (p.1046, emphasis added).

Our conclusion, thus, is that while this line of research raises a number of interesting methodological questions, it is nonetheless more of a red herring than a substantial challenge to the accumulated evidence on the relation between work, unemployment and mortality. As Brenner (2005) points out, the long term relation between economic growth and mortality decline is irrefutable, and we should not confuse short term fluctuations with long term effects.

This does not mean, however, that research in this area has been problem free. In particular, there has been a tendency to focus on the unemployed, often assuming that those not in the labour force are sick or otherwise incapacitated and, implicitly, that those working are necessarily healthy. In fact, these are two related, but not overlapping dimensions that need to be treated separately. At the same time, we need to beware of treating the work condition as primordially given. Like health, a person's labour force status, at any age, can be regarded as a stage in the life-course, one which is heavily dependent on previous stages, and with clear implications for subsequent stages (Wunsch et al., 1996). Not only is the probability of leaving work early socially structured, but structural and health inequalities persist into, and build upon, those existing during peoples' working lives (Hyde et al., 2004). Blekesaune and Solem (2005) argue that the decision to retire early hinges on three major factors: the match (or mismatch) between the individual's abilities and the job requirements (push factors); income after retirement relative to current income (pull factors), and the relation between the non-monetary utilities and disutilities of work versus leisure time (jump factors). In practice, this means that the probability of retirement not only increases with age, it also decreases with education and control of the work situation (autonomy), is higher in occupational sectors where work is more physical (manufacturing and construction), and it has a parabolic relation with income, increasing as income

increases, then decreasing (Dahl et al., 2003; Blekesaune and Solem, 2005). Except for those with a very high income and the enticement of a high and early pension, the probability of retirement, whether willingly or by inducement, increases as an individual's general employability decreases. Retirement thus may, indeed, often be a form of hidden unemployment (Armstrong, 1999).

Our purpose in this analysis is to avoid some of these pitfalls, and to evaluate the effects of work on mortality probabilities, net of the confounding effects of antecedent conditions which may both increase the risk of not working and of mortality. We shall focus our analysis on the age groups 50-64 and compare those retired and otherwise not working with those still working, while controlling for antecedent conditions and concurrently measured health status. In the light of the above discussion, we hypothesise:

1. For any given level of health, work will reduce the risk of mortality;
2. This work advantage will decline with age;
3. This advantage will be less for women than for men.

Data

Our data set links the Belgian censuses of 1991 and 2001 with a follow up of all deaths over 39 months following the 2001 census, to the end of December, 2004. We took a 20 percent sample from the 1991 census and from this we selected all

a. Belgian nationals

b. in paid employment at the time of the 1991 census

c. alive and living in Belgium at the time of the 2001 census.

This sample was then linked with the national register of deaths to follow-up deaths to the sample until the end of December, 2004 (39 months). From the total of 202,746 cases, we removed 12,886 cases with missing data (six percent) leaving a total of 189,860 individuals in the sample. Of these, 3,911 (2.06 percent) died during the follow-up period, to give annual mortality rates of 7.97 per thousand for men, and 3.72 per thousand for women.

The 2001 census included a question on respondents' assessment of their health, dichotomised to "very good / good" (69 percent of respondents) and "fair / very bad" (31 percent). Within the limits of census questions, we consider this an adequate indicator of individuals' current health status and predictor of mortality risks (Idler & Benyamini, 1997; Burström & Fredlund, 2001). Figure 1 plots the probability of dying over the 39 months of follow up for men and women, by age and health status. The fitted lines are from logistic regression models with a linear age component, and no interactions between the terms. Essentially, male and female mortality risks follow the same trajectory, with male probabilities of dying by any age consistently about double the female probabilities; and similarly the

healthy and unhealthy trajectories are parallel (on the logit scale) with the unhealthy mortality risk about 3.3 times the healthy risk.

Figure 1 about here

We divided work status into four categories: Working, Looking for work, Retired, and Not Currently Working, of which the first two categories are in the labour force and the latter two are not. Table 1 presents the distribution in these categories for men and for women, by health status. Overall, more men than women are working, and the unhealthy are more likely to be out of work, both with and without a pension. In particular, the unhealthy, though less than a third of the total sample make up over three quarters of the men and about a half of the women who are neither working nor officially retired. Nonetheless, as health and work status are measured concurrently, we can say nothing about the effects of one on the other. Instead, we shall see how other, antecedent conditions affect the probabilities of work and health status, and then use these as control variables in order to assess the net effect of health and work statuses on the probability of dying.

Table 1 about here

Antecedent determinants of work status

We regressed current job status on antecedent conditions: education; marital status (separated combined with divorced); work status in 1991; home ownership and housing quality. Age (linear and quadratic) was included as a control variable. The analysis was by multinomial regression, with coefficients for each of the four job statuses, constrained so that the coefficients summed to zero (Goeman and Oosting, 2007). The analysis was performed separately for men and for women. The results of these regressions are presented graphically in Figure 2, the height of the bars representing the coefficients (log odds of being in a particular job status category), with lines representing 95 percent confidence intervals.

The probability of being in work, for both men and women, varied directly with social status, increasing with education, with occupational status and with quality of housing, though home ownership slightly increased the probability for men, and decreased it for women. The effects of marital status were reversed, however. For men, the married were the most likely to be working, and for women they were least likely (see also Blekesaune and Solem, 2005). The pattern for not working (without a pension) is the mirror image of the working pattern, decreasing with social status, higher for non-married men and lower for non-married women. The probability of retirement was less clearly patterned, we note in particular the high probability for women with tertiary education and widows,

and the low probability of line workers and the unskilled, compared with a high probability for all but senior managers, among the men. The small group looking for work showed a similar pattern to those not working, except that among men, the probability rose with education, and was low for widowers.

In interpreting these push and pull factors for being in the various job statuses, we need to bear in mind the cross-sectional nature of these data. If those in senior positions and the more highly educated are more likely to be working, this may well reflect the greater demand for their work, the greater intrinsic satisfaction they find in their work and their better health (but note the high probability of retirement for tertiary-educated women). Home owners may be more likely to retire out of a sense of security, and on the other hand, if home renters rather than owners, and those with poor quality housing are more likely to be without either work or a pension, or actively looking for work, this could also reflect the inability of those with an unsteady income to accumulate resources over the years.

Figure 2 about here

Figure 3 presents the same analysis for reported health condition, by logistic regression, with coefficients for the probability of a person being in good health. The results are as expected, health rises with material resources, being more likely

as education, occupational status, home ownership and housing quality increase. For men, all the non-married categories show poorer health than the married, but for women the pattern is not so clear and only the divorced have significantly poorer health. However, despite the similarity between the predictor pattern for work and health, the fit of the health regression is poor, with a large deviance relative to the degrees of freedom and a pseudo-R^2 of only 0.03.

Figure 3 about here

Work status and health

Given that the prediction pattern for working and being in good health were so similar, it is not surprising that the proportion of in good health amongst those working is fairly constant (Figure 4). Among men the proportion declines slightly with age, as may be expected, among women it declines to age 60 (at the time, the official retiring age) and then increases, possibly indicative of a selective mechanism by which those who are (or feel themselves to be) healthy are more likely to stay working. This selective mechanism can be seen more clearly when we consider those who are retired. At age 50 the proportion healthy is very low (fewer than 50 percent among the men) and then rises to a maximum about five years before retirement age (at around 60 for men, 55 for women) before declining gradually as a greater proportion of healthy persons enter formal retirement with

a pension. Those without work are in the poorest health (around 20 percent healthy for men, 45 percent for women) suggesting that the majority of people in this category are people forced to stop working because of poor health, even if they have no formal pension arrangement (recall that all persons in the sample were working in 1991). For the small group seeking work, the pattern is very similar to that for the working population, but at a considerably lower level of health, suggesting a combination of people who have lost their job and are looking for a new one together with people who left work for reasons of ill health and are now seeking to reenter the labour force.

Figure 4 about here

Analysis: Work status and mortality

Direct effects of health and current work status

Table 2 analyses mortality risks by occupational status, controlling for age and health, for men and women separately[1]. At the baseline (age 57 in poor health) those working have a significant advantage, the mortality risk being significantly higher for all other work statuses, with the exception of women looking for work. Good health reduces the mortality risk by a factor of about three for men and four for women and as can be seen from both the coefficients and the deviance

associated with each variable, the health effect is clearly dominant. As hypothesised (Hypothesis 2), women, on the average, benefit less from work – or pay a lesser penalty for not working – than do men, in particular those who are neither working nor officially retired. The mortality risk increases linearly with age, rising by about five percent a year. We shall test for the interaction of work status with age and health after controlling for background variables (see below).

Table 2 about here

The effects of background variables

As we have already seen (Figure 2 above), an individual's work status is socially conditioned. Those with a higher education are more likely to be working, as are those with greater personal resources (home ownership, housing quality), and those working in higher status occupations in 1991. Marital status, too, is linked with work, though in a different manner for men and for women: married and cohabiting men are more likely to be working than men in other statuses, married women less so. In order to evaluate the effects of work and ill health on mortality net of these effects we regress the probability of dying on work, age and ill health, controlling for these antecedent conditions.

Table 3 about here

Tables 3a and 3b extend the analyses in Table 2 for men and women respectively, adding in the background variables. For both men and women, the major predictor is undoubtedly self-assessed health, with a significantly greater effect for men than for women. For all three non-working statuses, the risk of mortality is greater than for those working, and it is greater for the Not Working category than for the Retired and Looking for Work categories. Working thus clearly has a mortality-reducing effect, but this effect is far less than the double risk attributed to work in previous analyses, in which health status was not controlled.

The effects of the antecedent variables on mortality are considerably less than those of current (2001) health and work status. For men, all the effects except education are significant and in the expected direction. For women, only age, home ownership and education have a significant effect on the mortality risk, and in the latter the direction is reversed, so that the mortality risk *rises* slightly with education. However, it is to be noted that without controls, for women, education is *not* related to mortality, and the apparently positive effect only appears when health is introduced into the model (details not shown). We suggest, therefore, that this positive effect may be an artifact deriving from differential tendencies of people of different educational levels to declare themselves to be in poor health.

Figure 5 about here

Figure 5 looks at the interactions, and considers whether the effects on mortality of age or health differ by work status. The bars indicate the regression coefficients when the interactions are added to the regressions in Table 3, and the lines represent the 95 percent confidence intervals. For women, the interaction effects are quite insignificant, both statistically and substantively. For men, the overall reduction in deviance after introducing these interactions is significant, but the effects themselves are relatively small. As hypothesised (Hypothesis 3), the mortality risk rises slightly less with age in the non-working categories, particularly those retired or not working. We also note that the health effect is significantly less for the retired than for those who are working.

Caveat: mortality as a rare event

In considering these results, it is important to look not only at the substantive aspect, the size and direction of the regression coefficients, but also at the quality of the regression equations themselves. For both men and women, the null deviance is not significant, indicating that mortality, in this age group, is largely a random process. This does not mean that there is no effect of health, work or antecedent conditions, it does mean that these effects can only explain a small part of the overall pattern.

Figure 6 presents the predicted mortality probabilities from the final analysis, including interactions. The bars represent the distribution of mortality probabilities for all the sample, men in the left-hand plot, women in the right-hand plot. The lines represent density plots for two sub-populations, the solid line plot curve being the distribution of predicted probabilities of dying for those who did die; the dashed line for those who did not die.

For the total sample, men and women, the probability of dying is essentially unimodal, and with a heavy positive skew, and a mode of between 0.005 and 0.01 for women, and between 0.01 and 0.015 for men. The distribution is considerably more concentrated around the mode for the women than for the men. For those who did not die in the 39 months following the census (dashed curves), the distribution for both men and women is essentially unimodal with a modal predicted probability of dying of about 0.005 for women, 0.01 for the men. For those who did die (solid curves), the distributions are bimodal, with a lower mode just under 0.01 for the women, 0.02 for the men, and an upper mode at about 0.03 for women and at just below 0.06 for men. Amongst those men with a predicted mortality risk of 0.04 and above (the boundary between the two distributions), which includes about 99 percent of the men who defined themselves as unhealthy, 6.3 percent died, compared with 1.7 percent amongst those with a predicted mortality risk less than or equal to 0.04. For women, taking 0.02 as the cut-point

between the two distributions, which includes all but 0.1 percent of unhealthy, the respective figures are 2.9 percent and 0.8 percent respectively. The prediction equations should thus be seen strictly as an analytical evaluation of risk factors, which at these ages are still very low, not as a reliable discriminator between those with a high and a low probability of dying.

Figure 6 about here

Discussion

We have analysed the effects of work on the mortality risks over 39 months of Belgians aged 50 – 64 at the time of the 2001 census. Our analysis has focussed on a 20 percent sample of men and women who were employed at the time of the 1991 census, and were still alive and living in Belgium at the time of the 2001 census. We hypothesised that those still in work in 2001 would have a lower mortality risk than those who had retired or were otherwise out of work at that time, that this differential risk would decline with age, and that the difference would be greater for men than for women. We also attempted, as best the data would allow, to control for antecedent and concurrent circumstances that may affect both the probability of working and of dying. Mortality at these ages is still a comparatively rare event, and fewer than three percent of the study population

died during the period under analysis. Nonetheless, our analysis has enabled us to identify particular situations which are liable to increase the mortality risk.

Our major conclusions are that mortality is greater for the unhealthy than for the healthy, and for those not working, whether formally retired or not, than for those who are working. The greatest mortality risk is undoubtedly a condition of ill-health. However, while ill-health does have a certain dependence on antecedent conditions, its predictability on the basis of these conditions is small. The logistic regression model regressing ill health on education, marital status, home ownership, house quality and occupation in 1991 did indicate that these conditions did have a significant effect on ill health, but it was not able to provide an adequate fit to the data. At the same time, in the mortality models, Tables 3a and 3b, the null deviance is non-significant, even though the fit is improved by the addition of the predictor variables. Despite the differences between social groups, death remains a chance event.

Self-evident as it may seem, it is thus nonetheless essential to draw a distinction between our argument, that ill health and not working increase the probability of dying, and the statement that they are predictive of an early death. The former statement describes a group property, based on the aggregation of individual experiences in order to compare between categories of such individuals, the latter a prognostic statement made about a particular individual *as if* current

work and subjective health status were sufficient to determine the probability of that person's dying – and our results clearly indicate that this is not the case.

There is a complex interrelationship between work, health and the antecedent conditions. Those who are retired or not working are considerably more likely to be in poor health than those who are working, especially at younger ages, and this is especially true for men. Furthermore, those with lower education, less material wealth (as reflected in housing conditions) and lower status jobs are also more likely to retire early. We have no data on actual incomes, but all this does suggest that there is an inverse relation between income and early retirement. However, low income is also associated with physical, rather than office work, a situation which increases the possibility of skeleto-muscular problems, themselves a major cause of disability and sick-leave. The present data do not enable us to disentangle these two effects or ascertain whether the wealth-health-work association derives from early retirement packages appearing more attractive to people with lower incomes, or whether it is the greater likelihood of poor health and disability which encourages early retirement – or maybe a mixture of the two. There is also an important difference in the work prediction between men and women, in that men are most likely to be working if they are married, and women least likely. The obverse is found in the Not Working category, where unmarried men and married women are the most likely marital categories.

The probability of working is thus itself dependent on the very factors which have an independent effect on ill health and on mortality. We have attempted as best we can to separate out the effects of these antecedent conditions in order to present the net effects of work on mortality, but there is clearly a complex dynamic between these factors which the data at hand cannot unravel. Net of the antecedent effects and of health, those working had a lower mortality risk than those in the other work status categories, but this effect was considerably less than the value previously reported in the literature, without due controls, in particular for ill health. Although the relative risks for the different work statuses were very similar for men and for women, statistically the mortality differences between those working and those retired or otherwise not working was considerably more important among men than among women.

For women, there is no interaction between work status, age and health in their effects on mortality, and there is only a small effect for men. Even this, however, needs to be evaluated in the light of the effects of ill health on the process of retirement. Given that health and work status were both measured at the 2001 census, that we have no data on the process of retirement either before or after the census, and that the focus of this research is on the effects of working on mortality risks, it would be presumptuous to argue for a causal direction between these two variables. It is highly likely that ill-health encourages people to retire, or otherwise

leave the labour force early, but this does not preclude an independent effect of work on mortality, which is precisely what our analysis (Table 3) shows. Thus, being out of work may actually *compound* the condition of ill health, particularly if the work itself is not health- or life-threatening. Women are less affected by being out of work, perhaps because of the greater role women play in the extended family. We should be seriously considering comparable alternatives for men.

Finally, we should point out that the sense of ill-health, reflected in the subjective evaluation people give in response to the census question, may itself be dependent on the different types of work that people do, and on the decision they have already taken on taking early retirement. A physical malaise may appear more important to someone doing physical work, and for whom it is restrictive in the work they are doing, than for someone doing white-collar work for whom it is not restrictive. An educated person, with a greater sense of control, may be less concerned by an objective condition which someone else may see as more threatening. Similarly, those who are retired may describe themselves as less healthy in order to justify their early retirement. All of these possible interactions are liable to lead to an overestimate of ill health, and an underestimate of its effects, among lower level workers, the lesser educated and the retired, and this needs to borne in mind when we assess the specific coefficients obtained in the present study.

Conclusion

In a study of women who went from welfare to work (London et al. 2004), Dorothy, a 38 year old woman describes how working made her feel:

> It [work] made me go out with people…mingle with people, and that helped because I was getting at the point where I was in the house all the time . . . But, getting out every day and meeting new people, and it just made me feel like, 'hey, this is what it's about.' (p. 152).

Work, and more specifically, conscious, productive labour, is the quintessential human activity. It is a critical tie in the integration of individuals into society and in their subjection to the discipline of social control. Work, despite its stresses, and even, at times, its apparent futility, has a number of implicit benefits which make it more than just a source of income. It is not surprising, therefore, that work is related to mortality: those not working are liable to be at greater risk of death than those who are working, though in both cases this risk will also depend on their health condition and on their background characteristics such as age, education, family income etc.

However, the strength of the relationship will also depend on the substance of the work condition, and on functional alternatives to work, most of which cannot be accessed through census data. Women are more likely than men to be

involved in family relations, through their role as mothers and grandmothers, hence it is not surprising that work is less beneficial for women than for men, in terms of reducing mortality. Similarly, we may expect other work substitutes, such as volunteering or participation in social activities, to moderate the mortality-increasing effect of not working. Nonetheless, work is not just an activity, work is a commitment and a social requirement. Just as cohabitation may provide the benefits of couplehood, but does not necessarily provide the benefits of marriage, so too volunteering activities can only be partial substitutes for work.

Work and ill-health are not mutually exclusive, far from it. Ill health may increase the probability of not working, but nevertheless the majority of people who were working in their mid-40's, were still working in their mid 50's, even if they declared their health as fair or poor. A finer tuned measure of health may give us better insights on the conditions under which people stop work, but we suspect that it would only fine-tune rather than annul our present findings: ill health increases the risk of mortality irrespective of working, and working reduces that risk irrespective of health status. This is not to say, of course, that work is a guarantor of long life, or that retirement or being out of work is necessarily a death sentence, far from it. The effect is there however, especially for men, and if market conditions continue in their pressure for early retirement, this effect is likely to become ever more important in national mortality patterns, particularly in those

groups who are most likely to retire early. As these are the groups (non-independent, non-managerial labour of all grades) who are also at higher mortality risks because of their general level of access to social resources, the effect is liable to be compounded. Further research needs to consider in greater depth the effects of different types of work on mortality risks and, in particular, the effects of different patterns of retirement. In particular, we need to consider more deeply ways in which life can be imbued with long-term social meaning, for those who are retired, and also for those who, against their will, are not currently working.

In conclusion, we repeat the caveats noted earlier. This analysis has been severely limited by its inability to monitor effectively the process by which people leave work, and its relationship to ill health. We have information on work and health status at the start of the follow up, but not of any changes during the follow up. Two censuses taken 10 years apart can tell us very little about why people take early retirement, we can at best identify those categories most likely to do so. Furthermore, the 1991 census did not provide any information on current health status, thus making even more difficult the untangling of the work-health relationship. On the other hand, the low probability of death in this age group makes it extremely difficult to use regular panel surveys for this purpose, due to their comparatively small sample size. We would thus hope that the health question will be maintained in subsequent Belgian census-surveys so that the long

term effects of self-evaluated health on stopping work can be better evaluated.

Our analysis has focussed on mortality, and can say nothing about quality of life. Those who are most likely to take early retirement are those in the physically more demanding, and also the more health-threatening occupations. These are also likely to be those in which people have least control over their work conditions and environment. Under these circumstances, early retirement, especially under conditions which do not involve a substantial drop in income, may be an attractive proposition. We clearly need to investigate further the effects of work and retirement on health and mortality, and we need also to consider possibilities for "gentle retirement", enabling people to reduce their work load, or turn to work which is physically less strenuous, rather than making work and retirement an all-or-nothing decision.

Notes

1. Statistical analysis was performed using R, version 2.7.0 R Development Core Team, 2008)

Acknowledgements

Data for this analysis were made available by Statistics Belgium. The analysis and its conclusions are those of the authors and in no way do they purport to represent the official opinion of Statistics Belgium.

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Table 1: Occupational Status, Belgian Nationals, 2001, by Sex and Self-Declared Health Status

	Men			Women		
Status	Unhealthy	Healthy	Total	Unhealthy	Healthy	Total
Working	42.6	66.1	59.0	36.3	58.2	51.5
Pension	33.9	29.2	30.7	31.9	27.4	28.8
Unemployed	3.6	1.8	2.3	5.2	3.3	3.9
Not Working	19.9	2.8	8.0	26.6	11.1	15.8
% Total	100	100	100	100	100	100
Total	36,741	83,453	120,194	21,165	48,501	69,666

Source: Belgian Census, 2001, authors' calculations. For data selection, see text.

Table 2a: Logistic regression, mortality risks by health, work status, and age,

Relative odds-ratios and (confidence intervals): Men

Coefficient		Relative odds-ratio	Deviance	df	p
(Intercept)		0.038 (0.035 – 0.041)			
Health Status	Healthy	0.345 (0.319 – 0.373)	728.6	1	<0.001
(Base = Unhealthy)					
	Pension	1.421 (1.286 – 1.571)			
Work Status	Looking	1.717 (1.388 – 2.101)	158.8	3	<0.001
(base = Working)	No Work	2.022 (1.809 – 2.258)			
Age (centred at 57)		1.048 (1.037 – 1.059)	78.8	1	<0.001

Null Deviance = 28,601 Deviance = 27,068 Deviance gain = 1533, df = 5

Null df = 120,193 df = 120,188 $p < 0.001$

Pseudo $R^2 = 0.054$ $p > 0.999$

Table 2b: Logistic regression, mortality risks by health, work status, and age,

Relative odds-ratios and (confidence intervals): Women

Coefficient		Relative odds-ratio	Deviance	df	p
(Intercept)		0.021 (0.018 – 0.024)			
Health Status	Healthy	0.282 (0.244 – 0.326)	304.2	1	<0.001
(Base = Unhealthy)					
	Pension	1.323 (1.082 – 1.618)			
Work Status	Looking	1.066 (0.709 – 1.542)	24.0	3	<0.001
(base = Working)	No Work	1.592 (1.318 – 1.920)			
Age (centred at 57)		1.055 (1.034 – 1.077)	26.0	1	<0.001

Null Deviance = 9,074.6 Deviance = 8,608.7 Deviance gain = 465.9, df = 5

Null df = 69,665 df = 69,660 $p < 0.001$

Pseudo $R^2 = 0.051$ $p > 0.999$

Table 3a: Logistic regression, mortality risks by work status, with sex, age, health and background variables.

Relative odds-ratios and (confidence intervals): Men

Coefficient		Relative odds-ratio		Deviance	df	p
(Intercept)		0.067	(0.056 – 0.078)			
Health Status	Healthy	0.361	(0.334 – 0.390)	658.1	1	<0.001
(Base = Unhealthy)						
	Pension	1.381	(1.248 –1.529)			
Work Status	Looking	1.571	(1.269 – 1.925)	123.6	3	<0.001
(base = Working)	No Work	1.887	(1.684 – 2.112)			
Home ownership	Owners	0.700	(0.642 – 0.763)	63.4	1	<0.001
(base = Renting)						
	Low	0.907	(0.793 – 1.040)			
Housing quality	Middle	0.798	(0.682 – 0.934)	25.9	3	<0.001
(base = Very low)	High	0.755	(0.662 – 0.864)			
	Single	1.268	(1.108 – 1.446)			
Marital status	Divorced	1.223	(1.073 – 1.389)	18.7	3	<0.001
(base = Married)	Widowed	1.153	(0.822 – 1.569)			
	Workers	0.862	(0.780 – 0.954)			
Occupation	Junior Managers	0.863	(0.758 – 0.981)	11.4	3	0.010
(base = unskilled)	Senior Managers	0.808	(0.706 – 0.924)			
	Low Secondary	1.038	(0.941 – 1.145)			
Education	High Secondary	1.020	(0.921 – 1.129)	0.61	3	0.894
(base = elementary)	Tertiary	1.031	(0.908 – 1.169)			
Age (centred at 57)		1.054	(1.043 – 1.065)	96.01	1	<0.001

Deviance = 26,892 Deviance gain = 176

df = 120,175 df = 18

$p > 0.999$ $p < 0.001$

Pseudo $R^2 = 0.060$

Table 3b: Logistic regression, mortality risks by work status, with sex, age, health and background variables. Relative odds-ratios and (confidence intervals): Women

Coefficient		Relative odds-ratio		Deviance	df	p
Intercept		0.020	(0.014 – 0.028)			
Health Status (Base = Unhealthy)	Healthy	0.284	(0.245 – 0.329)	293.3	1	<0.001
Work Status (base = Working)	Retired	1.345	(1.123 – 1.693)	28.1	3	<0.001
	Looking	1.073	(0.755 – 1.635)			
	No Work	1.671	(1.422 – 2.100)			
Home ownership (base = renting)	Owners	0.814	(0.687 – 1.954)	5.9	1	0.015
Education (base = Elementary)	Low Secondary	1.309	(1.079 – 1.586)	8.7	3	0.034
	High Secondary	1.163	(0.947 – 1.426)			
	Tertiary	1.292	(1.023 – 1.631)			
Occupation (base = unskilled)	Workers	1.180	(0.969 – 1.444)	5.3	3	0.149
	Junior Managers	1.230	(0.963 – 1.574)			
	Senior Managers	1.015	(0.768 – 1.337)			
Housing quality (base = very low)	Low	0.923	(0.657 – 1.213)	4.15	3	0.246
	Medium	0.926	(0.645 – 1.224)			
	High	0.806	(0.544 – 0.979)			
Marital status (base = married)	Single	1.152	(0.877 – 1.488)	2.9	3	0.402
	Divorced	1.172	(0.951 – 1.433)			
	Widowed	1.083	(0.696 – 1.602)			
Age (centred at 57)		1.057	(1.035 – 1.079)	27.0	1	<0.001
Deviance = 8,574.2	Deviance gain = 34.5					
df = 69,647	df = 18					
p > 0.999	p = 0.011					
Pseudo R^2 = 0.055						

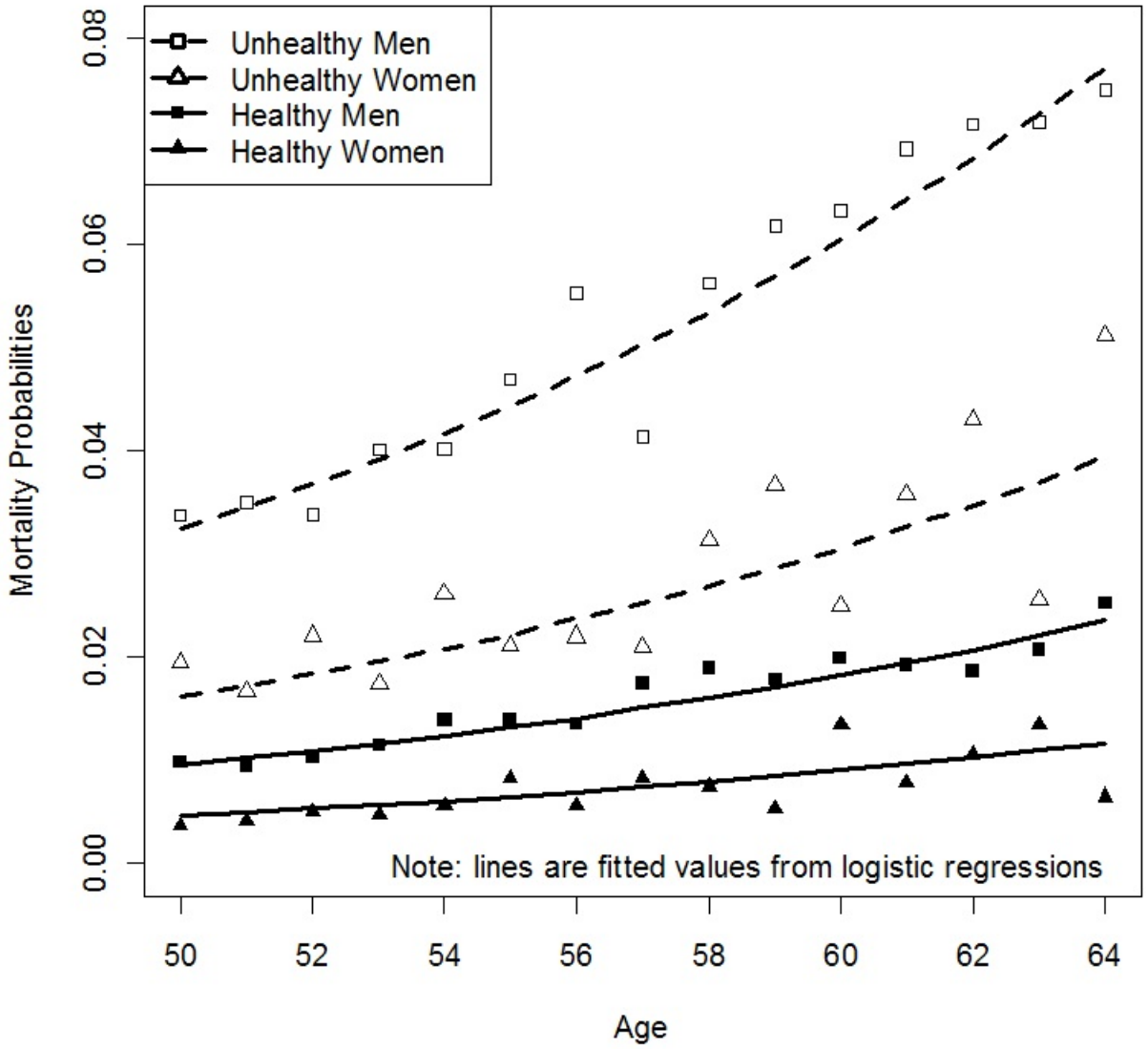
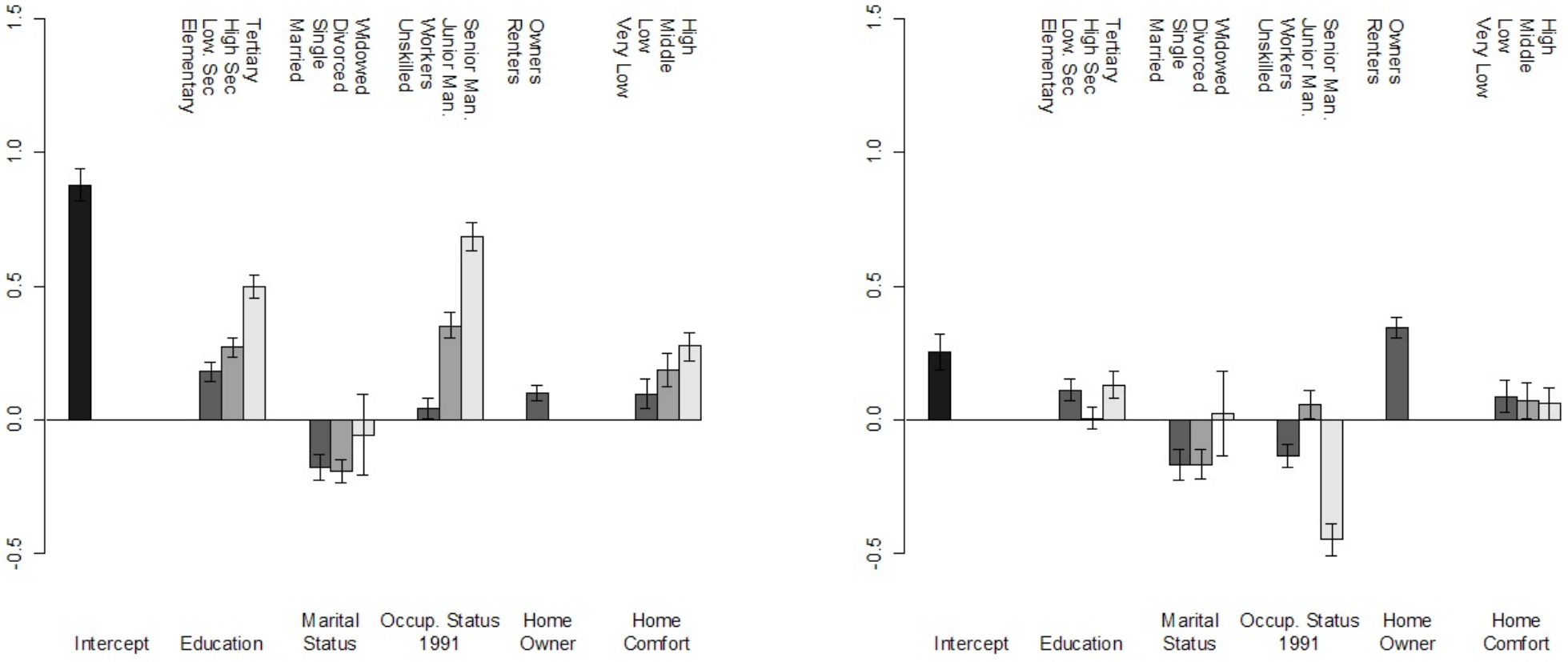


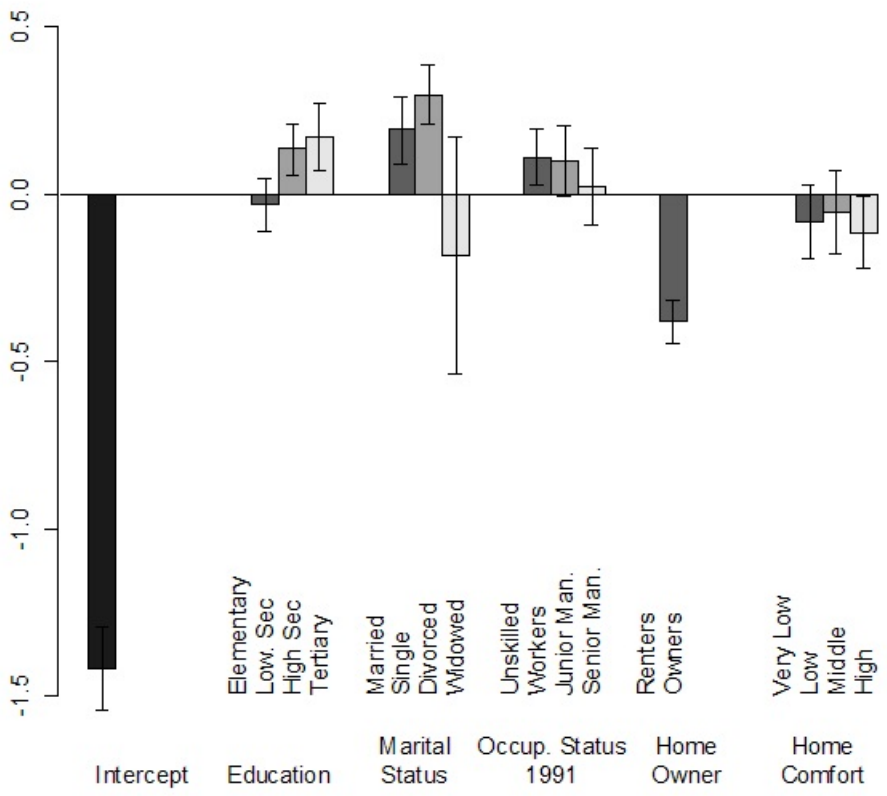
Figure 1: Probability of dying, Belgium, census 2001 to 31 December 2004,

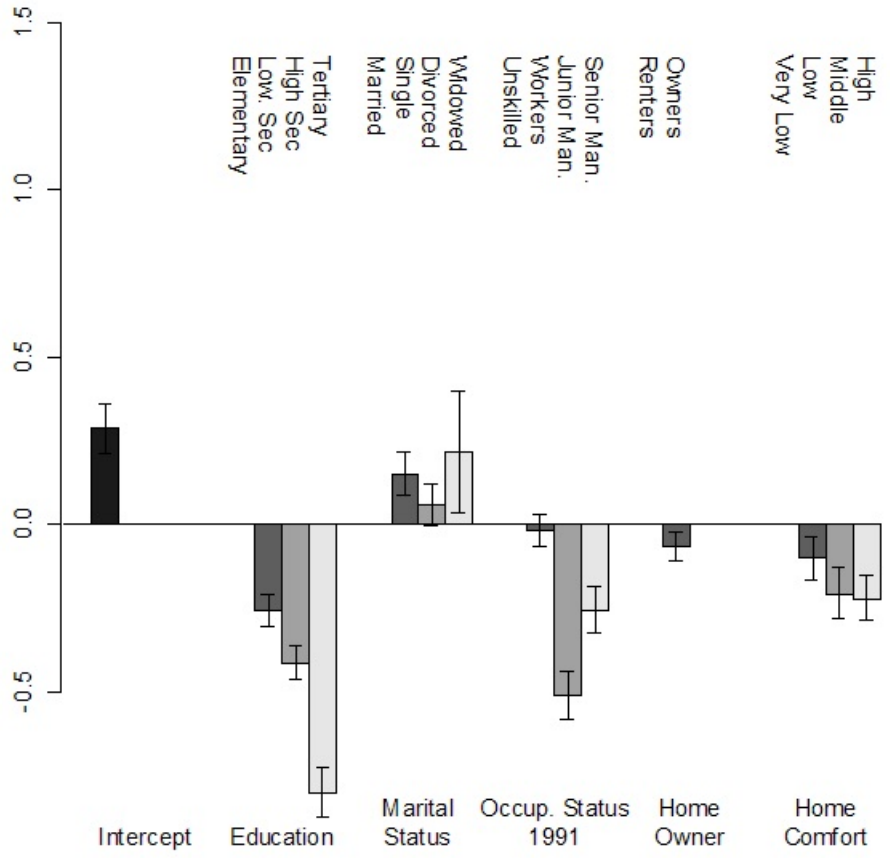
by age at census, sex and health status

Figure 2(a): Predicting work status, 2001 – Men aged 50-64, Belgian census, 2001

Multinomial logistic regression, controlling for age





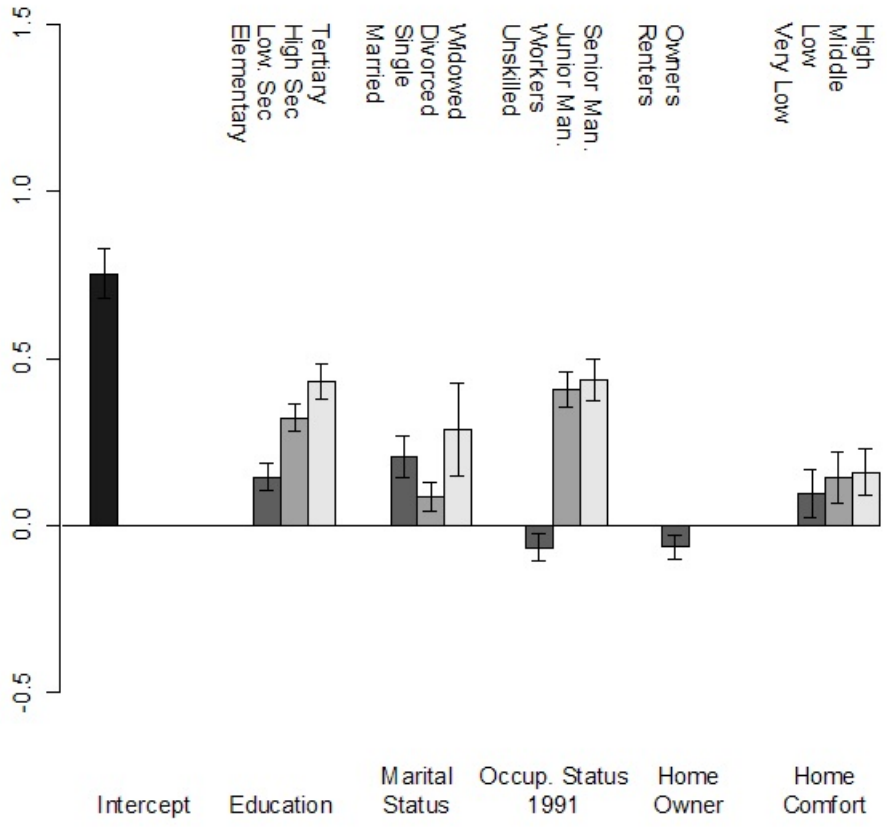


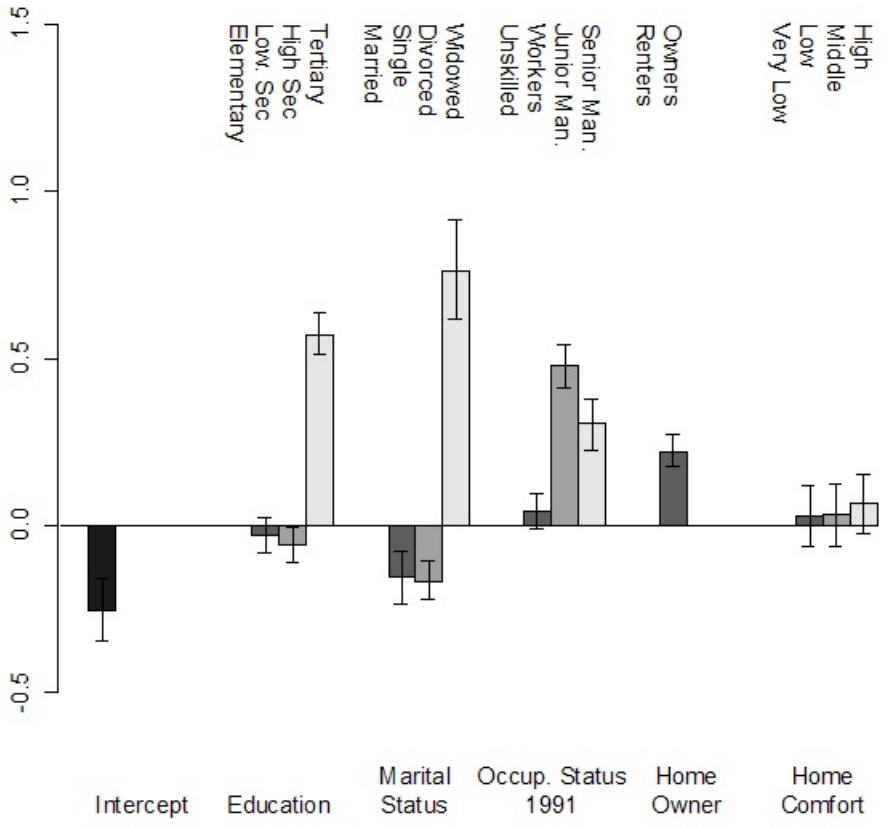
Null Deviance = 231,917	Residual deviance = 174,377	Deviance gain = 57,540	Pseudo R^2 = 0.248
Null df = 360,579	Residual df = 360,534	df = 45	Hit rate = 0.737
N = 120,194	$p > 0.05$	$p < 0.001$	

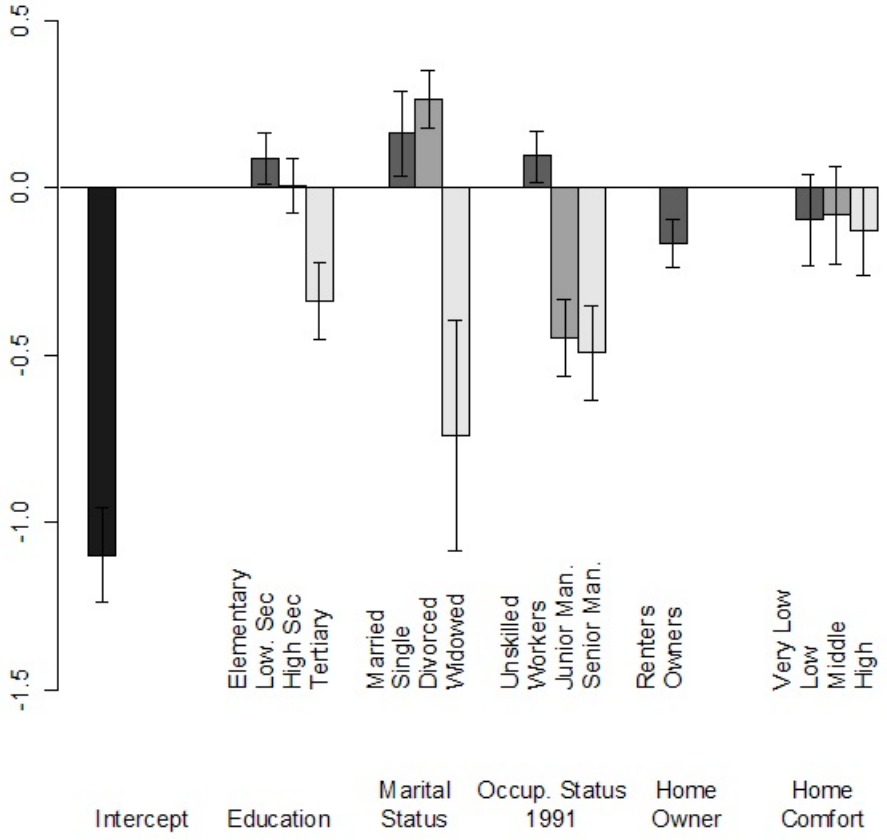
For sample selection see text

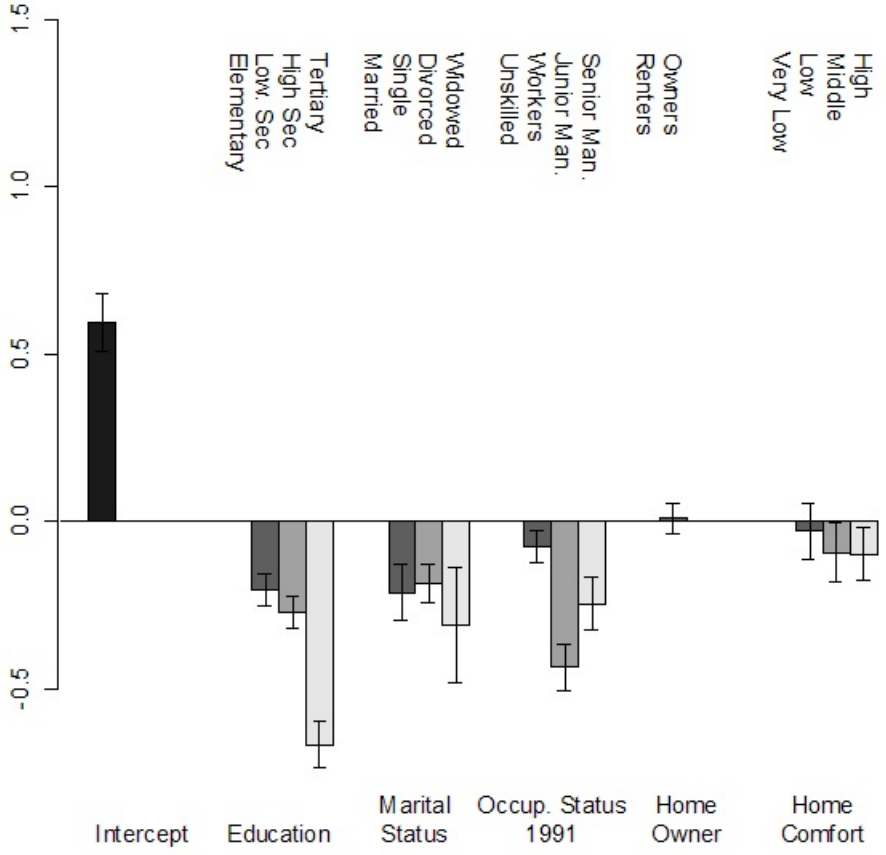
Hit rate = proportion of accurate predictions, assigning to category with highest predicted probability

Figure 2(b): Predicting work status, 2001 – Women aged 50-4, Belgian census 2001
Multinomial logistic regression, controlling for age







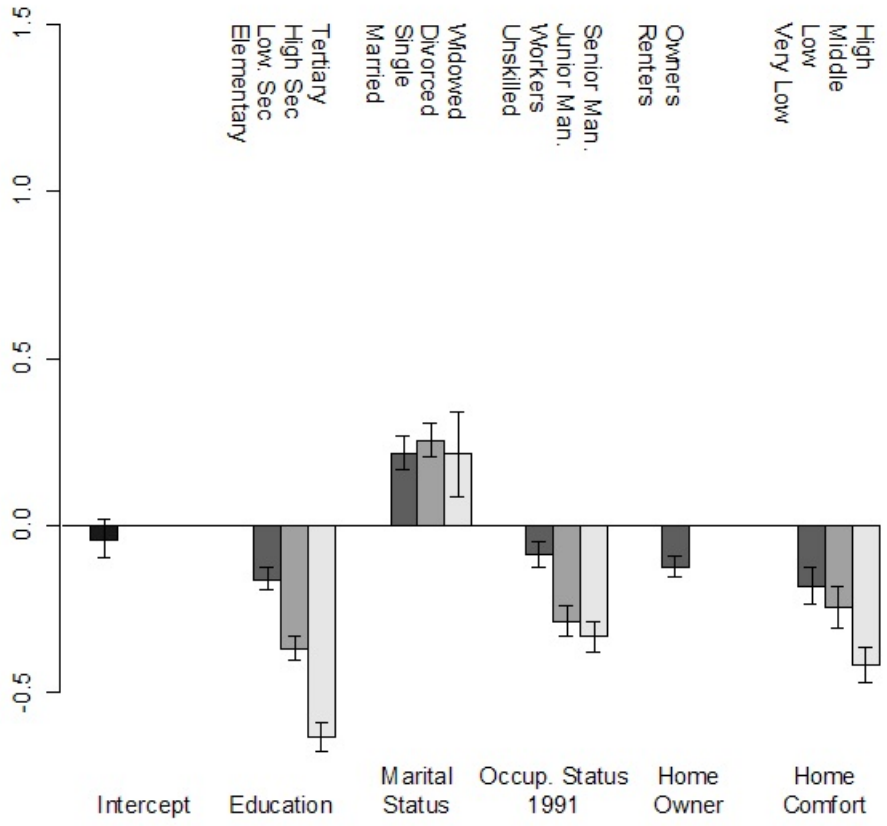


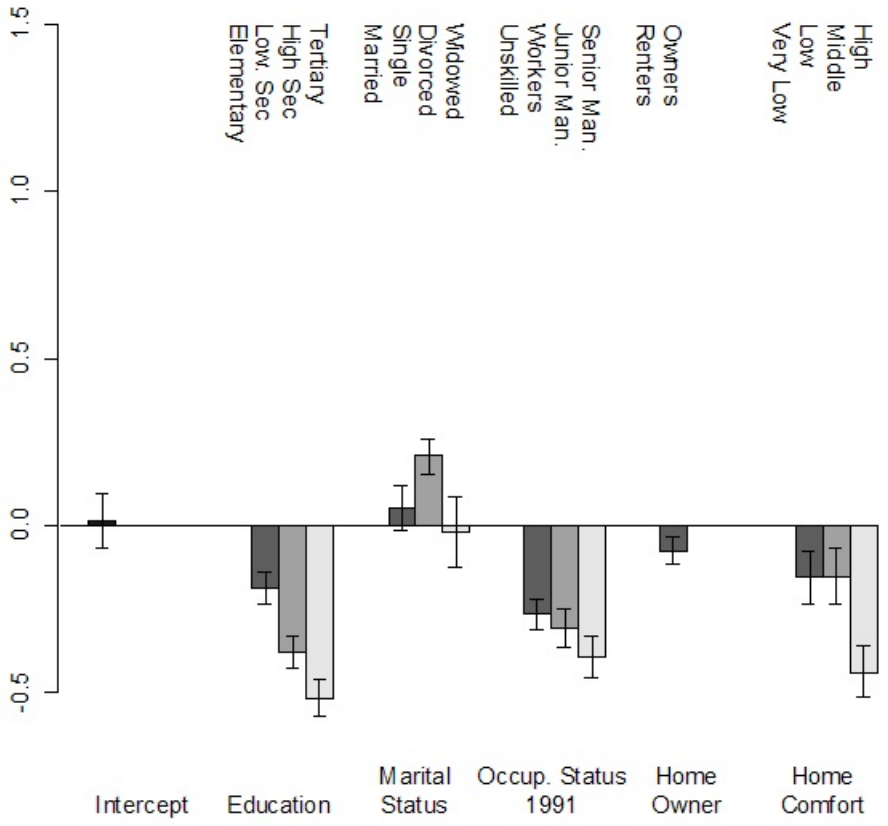
Null Deviance = 155,705	Residual deviance = 120,723	Deviance gain = 34,982	Pseudo R^2 = 0.225
Null df = 208,995	Residual df = 208,950	df = 45	Hit rate = 0.658
N = 69,666	$p > 0.05$	$p < 0.001$	

For sample selection see text

Hit rate = proportion of accurate predictions, assigning to category with highest predicted probability

Figure 3: Predicting health status: Logistic regressions, controlling for age,
Belgian census, 2001, population aged 50-64,

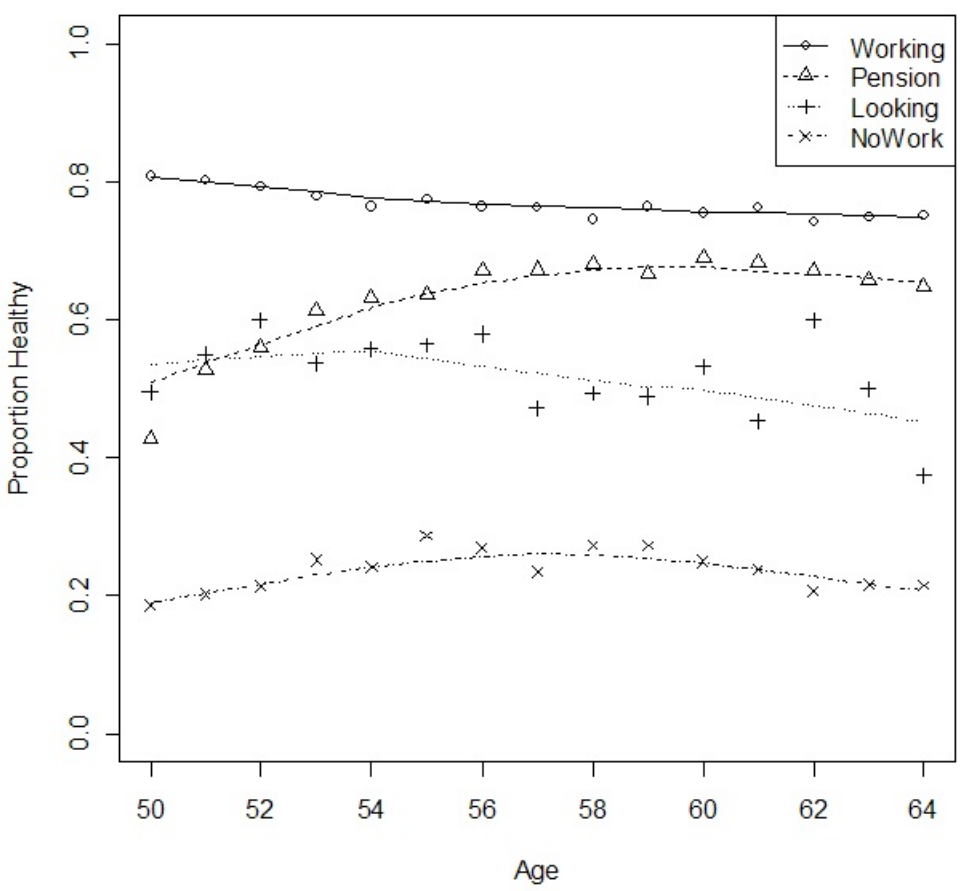




Men:
Null Deviance = 148,000, df = 120,193
Residual Deviance = 143,100, df = 120,178, $p < 0.001$
Deviance gain = 4,900, df = 15, $p < 0.001$
Pseudo $R^2 = 0.033$,
Hit rate = 0.588

Women:
Null Deviance = 85,558, df = 69,665
Residual Deviance = 83,252, df = 69,650, $p > 0.001$
Deviance gain = 2306, df = 15, $p < 0.001$
Pseudo $R^{2"} = 0.027$
Hit rate = 0.589

Figure 4: Proportions healthy, by job status and sex, Belgian census, 2001
Population aged 50-64, for sample selection, see text



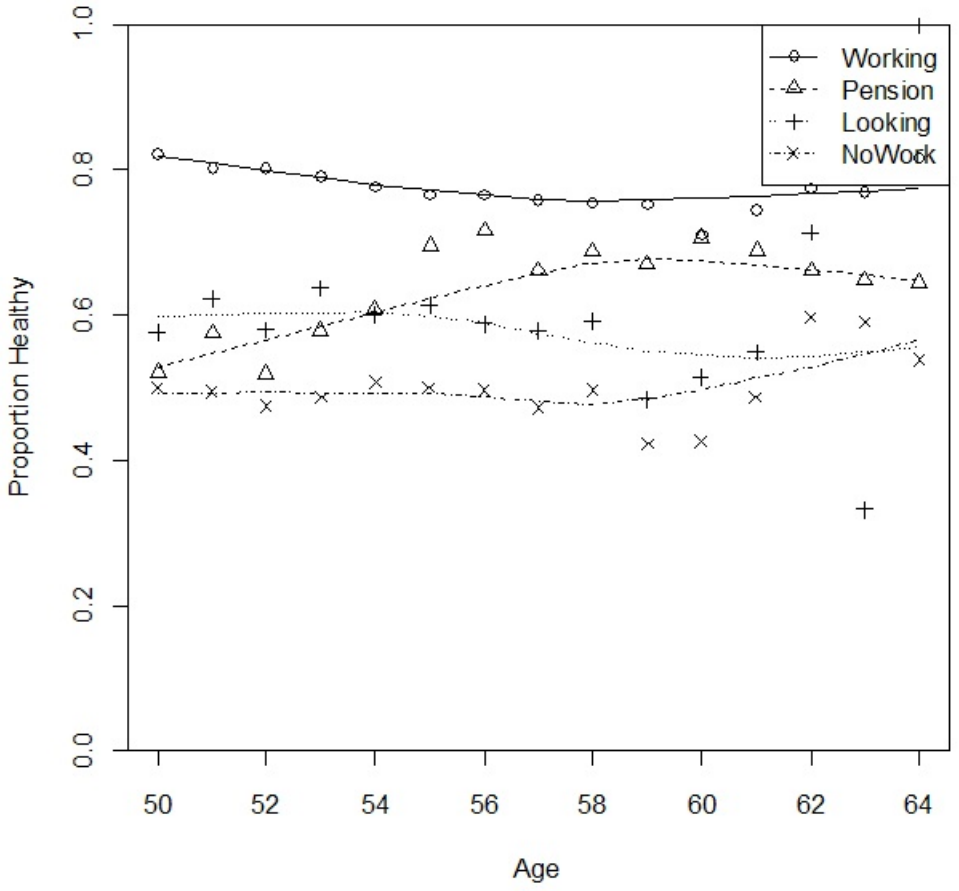
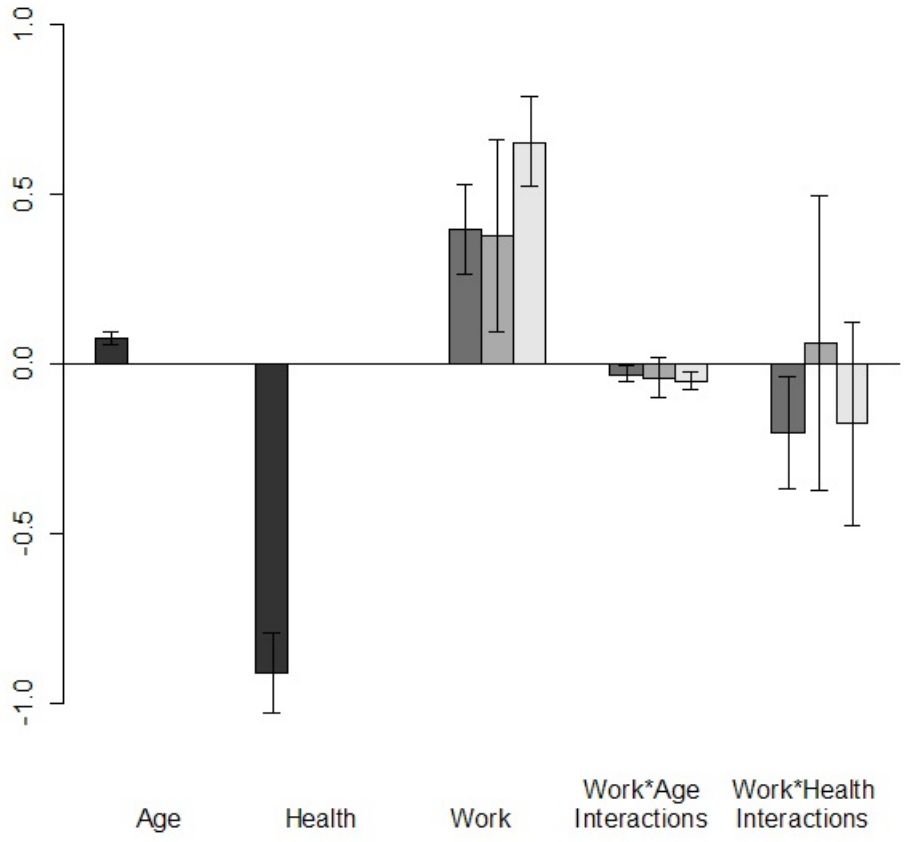
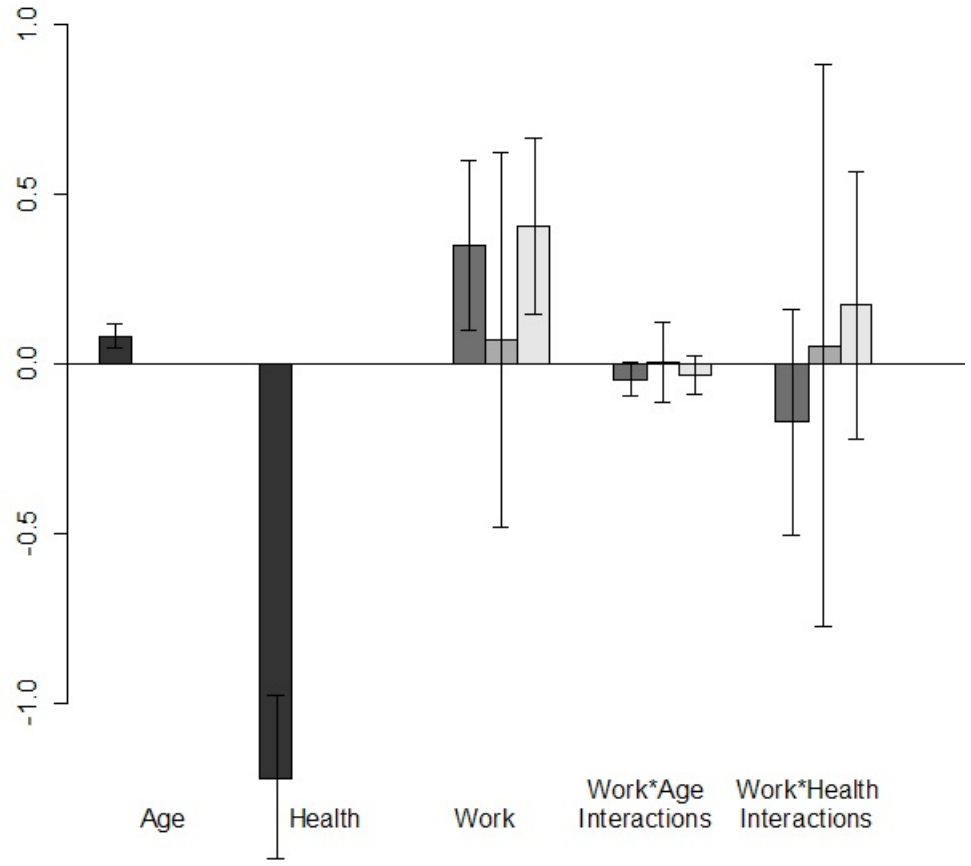


Figure 5: Interaction effects of Work Status with Age and Health Status
Logistic regression, for details see text



Men:
Deviance reduction = 21.1
df = 6
p = 0.002



Women:
Deviance reduction = 6.6
df = 6
p = 0.641

Figure 6: Histogram of Predicted Mortality Probabilities and Densities by Mortality Outcome and Sex