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Why do those out of work because of sickness or disability have a high mortality risk? Evidence from a Scottish cohort

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Background: Existing evidence on the association between being out of work because of sickness or disability and high mortality risk suggests that most of the association cannot be explained by controlling for health, health behaviour or socio-economic position. However, studies are often based on administrative data that lack explanatory factors. Here, we investigate this high mortality risk using detailed information from a cohort study. **Methods:** Data from the West of Scotland Twenty-07 prospective cohort study were used to follow those (average age 56 years) employed, unemployed and out of work in 1988 to death or end of follow-up in 2011. Using a parametric survival model, mean survival was calculated for each employment group after adjustment for health behaviours, health and socio-economic position. **Results:** The difference in survival between those sick or disabled (30% survival at end of follow-up), and those unemployed (49%) or employed (61%) was mostly accounted for by adjusting for the higher levels of poor heath at baseline in the former group (49, 46 and 56%, respectively, after adjustment). After controlling for all variables, the difference between those sick or disabled (51%) and those employed (56%) was further attenuated slightly. **Conclusion:** Our results suggest that the present health of those out of work and sick or disabled should be taken seriously, as their long-term survival prospects are considerably poorer than other employment groups.

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Introduction

In recent decades, there has been a substantial rise in the percentage of the workforce out of work because of sickness or disability, and claiming related benefits, in many developed countries.[1] This is concerning because research has shown that as a group, they have a much higher mortality risk than both those employed and unemployed (out of work but actively seeking work).[2–5] The reasons for this excess mortality risk are not clear, despite a growing number of studies; a particular issue of contention is whether the excess mortality is mostly because of higher levels of baseline sickness or disability within this group.[6] Alternative explanations include worse health behaviours or higher levels of socio-economic disadvantage.[5] These are difficult to assess, as studies have tended to lack comprehensive physical, mental and self-rated health measures in addition to health behavioural and socio-economic measures. One reason for this is that population-level studies are often based on administrative data sets linked to mortality records, which although powerful in terms of size, lack explanatory information. Even survey based studies in the UK and

elsewhere have found that after adjustment for health, health behaviours and socio-economic differences, the raised mortality rate of those out of work because of sickness or disability is not explainable.[5,7] However, the factors adjusted for in these studies were still not extensive, which leaves open the possibility that the unexplained excess could be further attenuated with the addition of further and/or more appropriate baseline measures.[8]

In this article, we add to the literature by exploring the reasons for this excess mortality using a detailed cohort study from the West of Scotland.[9] The study area experienced a large growth in those out of work because of sickness or disability particularly from the 1980s onwards related to the deindustrialization occurring.[10] There is evidence, in this region, the UK as a whole[10] and internationally,[11] that much of this rise is a form of hidden unemployment among workers vulnerable to losing their jobs (lower social class and sick or disabled) who then are also least likely to regain work, particularly in poor labour markets. As a consequence, the employment rate of those sick or disabled, particularly those in low social class positions, has fallen in this period[12] and, hence, may also have importance for health inequalities.[13]

We, therefore, compare three employment status groups employed, sick or disabled and unemployed.

Methods

The West of Scotland Twenty-07 Study is a prospective observational study of three age cohorts (aged ~15, 35, 55 years at recruitment), first interviewed in 1987/1988 and since resurveyed four times, ~5 years apart living in Glasgow city and the surrounding conurbation (see Benzeval *et al.*[9] for a map). We use the oldest cohort in this analysis. Participants have been linked to death registration records (followed up to 2011 for this analysis). As two slightly different sampling frames were used at baseline (see Benzeval *et al.*[9] for full details), we controlled for sample in all models.

Measures

Using self-reported data, participants were classified at baseline into those in paid employment (including self-employment), those unemployed but seeking work and those out of work and not seeking work classifying themselves as sick or disabled, as retired, as caring for the home or as in education.

We deliberately adopted a non-parsimonious approach to covariate selection to maximize our ability to attenuate any association between employment status and subsequent mortality. We have split theses covariates into three broad groups: health behaviours, socio-economic and cognitive function variables and health variables, all measured at baseline.

Health behaviours were smoking status, physical activity (work, housework and leisure combined based on activities that lasted at least 20 min and made the respondent out of breath and/or sweaty or participation in specific leisure activities that involved this level of exertion) and previous week's alcohol consumption (with binge drinking distinguished $\geq 6\,U$ in a day for women and $>9\,U$ for men).[14]

Socio-economic variables were home owner or renter, deprivation of area of residence (1991 Carstairs score),[15] social class of parents and present household social class (based on the 1980 Registrar General's Classification),[16] height (as a marker of early life circumstances),[17] education (highest qualification), household composition adjusted[18] weekly household income and whether respondent felt their income was adequate. Cognitive function may reflect socio-economic circumstance over the life course,[19]; therefore, cognitive function measures general intelligence [measured using part 1 of Alice Heim-4 test (AH4)[20]], and reaction time[21] was included alongside socio-economic position measures. However, because the precise interrelationship between cognition and socio-economic circumstances, and their association with mortality, is not clear,[22] we also excluded these cognition variables from the socio-economic group in a sensitivity analysis.

Health variables included nurse measured and self-report. Nurse-measured variables were diastolic and systolic blood pressure adjusted to account for blood pressure medication,[23] body mass index (BMI, weight in kg/height in cm^2), forced expiratory volume in 1 s (FEV_1) standardized by height squared[24] and resting pulse rate. Self-reported measures included reported conditions like hypertension, respiratory condition, cancer, cardiovascular disease (CVD), diabetes and musculoskeletal problems (coded using Royal College of General Practitioners scheme).[25] Self-reported health satisfaction, life satisfaction and general health for the past 12 months were also used. Validated self-report questionnaires were used to measure bronchitis (Medical Research Council (MRC) Bronchitis questionnaire),[26] angina (WHO angina questionnaire),[27] disability (some items only as the full questionnaire was not asked),[28] psychiatric morbidity (General Health Questionnaire (GHQ) 30)[29] and separate depression and anxiety scales [Hospital Anxiety and Depression Scale (HADS)].[30]

Statistical analysis

Although missing values were generally low for each variable (0–13% maximum on household income), a complete case analysis would have excluded 38% of the sample because of the large number of variables. We, therefore, imputed 20 data sets with no missing values, using multiple imputation through the Stata ICE command. Imputation was based on all included variables, additionally including sample and the outcome variable of death and the cumulative hazard.[31] These imputed data have been used in all analysis, with a sensitivity analysis using the complete cases. To compare the socio-economic circumstances, health behaviours and health of those employed, unemployed and sick or disabled, we used models controlling for age, sex and sample (using either linear, logistic or multinomial logistic regression) to derive adjusted means or prevalence.

The literature suggests that the relationship between employment and mortality risk may vary with length of follow-up (it is time dependent) because those suffering from acute illness that may have caused job loss may be more likely to die sooner.[4] This would challenge the proportional hazards assumption of a standard Cox regression, and it suggests we should model employment status as a time-dependent quantity. In this situation, a single effect estimate (e.g. a hazard ratio) is likely to be insufficient to capture the underlying relationship.[32] We capture this potential time-dependent effect of employment status by fitting a Royston–Parmar parametric survival model (using the stpm2 command written for Stata) that uses cubic splines to model both the hazard and also the time dependent effect of a variable.[33] This is a particularly attractive survival model, as it allows smoothed prediction of the adjusted survival curve, which is an informative way to present results.[32] We fitted a series of models initially controlling for age, sex and sample and then additionally controlling for socio-economic circumstances and cognition, health behaviours, health and finally all variables together.

Results

Overall there were 1551 people surveyed at baseline, 14% (221) were of work and sick or disabled, 7% (109) were unemployed and 58% (901) were employed. The remainder (21%) was either people early retired, in education or caring full time for the home; whose results are not included here. Just over half those employed (51%), 36% of those sick or disabled and 18% of those unemployed were female; the average age of all groups at baseline was 56. There were 573 (47%) deaths among those in the three groups of interest during the 23-year period of follow-up.

On average, those sick or disabled and those unemployed were socio-economically similar to each other, but both groups were socio-economically disadvantaged compared with those employed, on most measures (Table 1). In terms of cognitive function, those employed had higher IQ than the other two groups, whereas reaction time was slowest in those sick or disabled. Table 2 shows that, compared with those employed, those unemployed and those sick or disabled were more likely to be current smokers (although smoking was common in all groups), inactive, binge and ex-drinkers. Table 3 shows that in general, those unemployed were similar in health terms to those employed and in some cases had the suggestion of somewhat better health. There were clear differences in health between those sick or disabled, who had the worst health across all measures and the other two groups.

The survival rate at end of follow-up for those employed was 61% [95% confidence interval (CI) 58–64%], for those unemployed it was 49% (40–59%) and for those sick or disabled it was 30% (24–36%)—see top left panel in figure 1 (after adjusting for sex, age and sample). Figure 1 also illustrates how poorer survival for those unemployed compared with those employed only appeared after ~10 years, but was apparent from the start for those sick or

Table 1 Socio-economic position and cognition at baseline by employment status (age, sex and sample adjusted)

Socio-economic position	Employed	Unemployed	Sick/ disabled	Difference employed/ unemployed (95% CI)	Difference employed/ sick or disabled (95% CI)
Owns home (%)	52	16	14	−36 (−43 to −28)	−38 (−44 to −33)
Area deprivation (mean score × 10—higher more deprived)	16	37	39	21 (13 to 30)	23 (17 to 29)
Own household social class					
I Professional (highest %)	6	1	1	−6 (−8 to −3)	−5 (−7 to −3)
II Intermediate (%)	32	13	12	−19 (−26 to −12)	−19 (−25 to −14)
III Skilled non-manual (%)	25	20	12	−5 (−14 to 3)	−14 (−19 to −9)
III Skilled manual (%)	19	26	31	7 (−2 to 15)	12 (5 to 18)
IV Partly skilled manual (%)	13	23	27	10 (2 to 19)	14 (8 to 21)
V Unskilled manual (%)	5	17	17	13 (5 to 21)	12 (7 to 17)
Parental social class at age 15 years					
I Professional (highest %)	4	0	1	−4 (−6 to −2)	−3 (−5 to −1)
II Intermediate (%)	10	1	4	−9 (−12 to −6)	−6 (−10 to −3)
III Skilled non-manual (%)	8	3	4	−4 (−9 to 0)	−3 (−6 to 0)
III Skilled manual (%)	48	63	47	15 (−33 to 64)	−1 (−9 to 7)
IV Partly skilled manual (%)	17	16	23	−1 (−15 to 13)	6 (−1 to 12)
V Unskilled manual (%)	14	17	21	3 (−11 to 18)	7 (1 to 13)
Height (cm mean)	165	164	163	−1 (−2 to 0)	−2 (−3 to −1)
Qualifications					
None (%)	43	70	65	27 (18 to 35)	22 (15 to 28)
Lower (%)	44	29	33	−14 (−23 to −6)	−11 (−18 to −4)
Higher (%)	13	1	3	−13 (−15 to −10)	−11 (−14 to −7)
Income assessment					
More than enough (%)	16	3	3	−13 (−17 to −9)	−13 (−16 to −10)
Just about enough (%)	64	23	37	−42 (−50 to −33)	−28 (−35 to −21)
Not enough (%)	20	74	60	54 (46 to 63)	41 (34 to 48)
Weekly equivalent household income (£ mean)	162	69	93	−92 (−108 to −76)	−69 (−81 to −57)
Cognitive function					
IQ—AH4 (mean score)	28	21	21	−7 (−10 to −5)	−7 (−9 to −5)
Simple reaction time (milliseconds mean)	349	369	434	20 (−8 to 47)	85 (65 to 105)

Because of rounding, the differences given may not exactly match the difference if calculated from the percentages or means displayed in the table.

Table 2 Health behaviours at baseline by employment status (age, sex and sample adjusted)

Health behaviours	Employed %	Unemployed %	Sick/ disabled %	Difference employed/ unemployed (95% CI)	Difference employed/ sick or disabled (95% CI)
Physically active work, housework or leisure	66	51	36	−16 (−25 to −6)	−30 (−37 to −23)
Non drinker	11	18	15	7 (−2 to 16)	4 (−1 to 10)
Ex drinker	3	7	10	3 (−2 to 8)	6 (2 to 10)
Current drinker—no alcohol in last week	17	17	19	0 (−9 to 8)	1 (−5 to 7)
Current drinker—no binge drinking	55	38	41	−17 (−27 to −6)	−14 (−22 to −7)
Current drinker—binge drinking (>9 U for men and >6 U for women)	13	20	16	7 (1 to 13)	3 (−2 to 7)
Never smoker	38	26	19	−11 (−21 to −2)	−19 (−25 to −13)
Ex-smoker	24	11	18	−14 (−20 to −8)	−6 (−12 to 0)
Current smoker	38	63	63	25 (15 to 35)	25 (18 to 32)

Because of rounding, the differences given may not exactly match the difference if calculated from the percentages or means displayed in the table.

disabled. For both those sick or disabled and those unemployed (after appearing), the survival difference, compared with those employed, widened over time, indicating continued mortality differences between these groups. Figure 1 then shows that controlling for the socio-economic and cognitive differences attenuates the difference in survival between those employed [59% at end of follow-up (56–62%)] and those unemployed [53% (44–62%)] and those employed and those sick and disabled [37% (30–43%)], but still leaves a considerable gap in survival between those sick or disabled and the other two groups at the end of follow-up. Excluding the cognitive measures did not greatly change the attenuating impact of the socio-economic variables (survival at end of follow-up being 36% for those sick or disabled, 53% for

those unemployed and 59% for those employed when only socio-economic differences were controlled for).

On adjustment for health behaviours, the change in survival curves was similar to when adjusting for socio-economic circumstances and cognition (figure 1). With those unemployed [54% survival at end of follow-up (46–63%)] in particular becoming more like those employed [59% (56–62%)], but with a large gap remaining between these two groups and those sick or disabled [38% (31–44%)]. Adjusting for each health behaviour separately showed that smoking had the largest attenuating impact for those sick or disabled (see Supplementary figures S1–S3 for survival curves).

The impact of adjusting for all the health measures on the survival curve for those sick or disabled [survival at the end of follow-up 49%

Table 3 Health and well-being measures by employment status (adjusted for age, sex and sample)

Health and well-being	Employed	Unemployed	Sick/ disabled	Difference employed/ unemployed (95% CIs)	Difference employed/ sick or disabled (95% CIs)
Diastolic blood pressure (mean)[a]	83	82	85	−1 (−4 to 2)	2 (0 to 4)
Systolic blood pressure (mean)	138	137	141	−1 (−5 to 4)	3 (0 to 6)
Self-reported hypertension (%)	14	7	22	−7 (−12 to −2)	8 (2 to 14)
BMI (mean)[b]	26	26	26	0 (−1 to 1)	0 (−1 to 0)
No bronchitis	87	79	71	−7 (−15 to 1)	−15 (−22 to −9)
Grade 1 bronchitis (%)	8	11	11	3 (−3 to 9)	4 (−1 to 8)
Grade 2 bronchitis (%)	6	10	17	4 (−2 to 10)	12 (6 to 17)
Self-reported respiratory condition (%)	1	2	8	1 (−2 to 3)	6 (3 to 10)
Standardized maximum FEV (mean)	85	83	73	−2 (−6 to 2)	−11 (−14 to −8)
Self-reported cancer (%)	1	2	4	1 (−2 to 4)	2 (−1 to 5)
Self-reported CVD (%)	6	3	25	−3 (−6 to 1)	20 (14 to 26)
No angina (%)	95	95	76	0 (−5 to 5)	−18 (−24 to −12)
Grade 1 angina (%)	3	1	11	−2 (−5 to 0)	8 (3 to 12)
Grade 2 angina (%)	2	4	12	2 (−2 to 6)	10 (6 to 15)
Pulse rate (per minimum mean)	72	74	74	2 (0 to 4)	2 (1 to 4)
Self-reported diabetes (%)	1	3	4	2 (−1 to 5)	3 (1 to 6)
Self-reported musculoskeletal condition (%)	32	32	51	0 (−9 to 10)	19 (12 to 26)
Disability questionnaire items (all %)					
Difficulty bending to brush floor	3	3	38	−1 (−5 to 3)	35 (28 to 42)
Difficulty reaching behind back	4	8	28	4 (−2 to 10)	24 (17 to 31)
Difficult picking and carrying pint of milk	1	2	22	0 (−3 to 4)	20 (14 to 27)
Issues with incontinence	7	6	22	−1 (−7 to 5)	15 (9 to 21)
Poor sight—can't recognize friend across road	8	10	18	2 (−4 to 9)	10 (5 to 16)
GHQ30 (higher worse—minimum 0 to maximum 90—mean)	24	26	36	2 (0 to 4)	12 (10 to 14)
HADS anxiety (higher worse—minimum 0 to maximum 21—mean)	7	7	10	0 (−1 to 1)	2 (2 to 3)
HADS depression (higher worse—minimum 0 to maximum 21—mean)	4	4	7	0 (−1 to 1)	3 (2 to 3)
Health satisfaction (1 very content to 7 very uncontent—mean)[b]	3	3	4	0 (0 to 1)	2 (1 to 2)
Life satisfaction (1 very content to 7 very uncontent—mean)[b]	2	4	4	1 (1 to 1)	1 (1 to 1)
Excellent self rated health (%)	21	16	2	−6 (−13 to 1)	−19 (−22 to −16)
Good (%)	44	45	13	1 (−10 to 11)	−31 (−37 to −26)
Fair (%)	28	33	46	5 (−4 to 15)	18 (10 to 26)
Poor self-rated health (%)	6	6	39	−1 (−6 to 4)	32 (25 to 39)

Because of rounding, the differences given may not exactly match the difference if calculated from the percentages or means displayed in the table.
a: Blood pressure adjusted for medication use.
b: Although summarized parsimoniously using a mean in the table, in the survival modelling these variables were included as categorical variables (the categories for BMI were minimum to 18.4, 18.5–19.9, 20–22.4, 22.5–24.9, 25–27.4, 27.5–29.9, 30–34.9, 35–39.9, 40 to maximum).

(42–56%)] was stark with a clear attenuation of difference between them and the other two groups, so that the survival curve for those sick or disabled now closely resembled that of those unemployed [at end of follow-up 46% (37–54%)], with both groups diverging slightly from the employed [56% (53–60%)] in terms of survival after ~10 years (figure 1). Reflecting the general health similarities between the two groups, the survival curve difference between those unemployed and those employed was not greatly changed. Analysis controlling for individual measures of health status are shown in the Supplementary data. It is clear that none reach the level of attenuation of all the measures combined, although the starkest impact of a single variable seems to be from adjusting for self-rated general health (Supplementary figure S37).

Simultaneous adjustment for all health behaviours, socio-economic and health variables slightly attenuated the differences further (figure 1); survival at the end of follow-up estimated from this final model was 56% (53–59%) for those employed, 51% (44–57%) for those sick or disabled and 47% (39–56%) for those unemployed.

In the Supplementary Data, we include an alternative figure 1 (Supplementary figure S38) that is based solely on complete cases on all variables, that is, without imputation. Qualitatively, the result is similar to figure 1, although in the later years, there is a slightly wider gap in the survival curves than in the imputed models. This slight difference may be because the initial model in the complete case analysis shows a wider survival gap at end of follow-up between those employed and those sick or disabled than is seen in the initial model for all respondents (there are no missing data in the variables included in the initial model; therefore, imputation does not affect these associations) as illustrated in Supplementary figure S39.

We ran separate models for men and women to test for gender differences. As illustrated in the Supplementary figure S40, results for those sick and disabled were similar for men and women, as their differences in survival to those employed were heavily attenuated when all control variables were adjusted for. However, the small group of female unemployed (18%) seemed to have better survival than those women employed. This was in contrast to those men unemployed whose results were similar to the overall results.

Discussion

Our results suggest that the difference in survival between those sick or disabled in later working life and those unemployed or employed can largely be accounted for by adjusting for the higher levels of poor health and well-being at baseline in the former group. There was also some attenuation from controlling for a more limited range of health behaviour and socio-economic variables, although this was more apparent for the difference between those unemployed and those employed. It is important to emphasize that these are inter-related variables not mutually exclusive domains. When controlling for all variables together, the difference between the
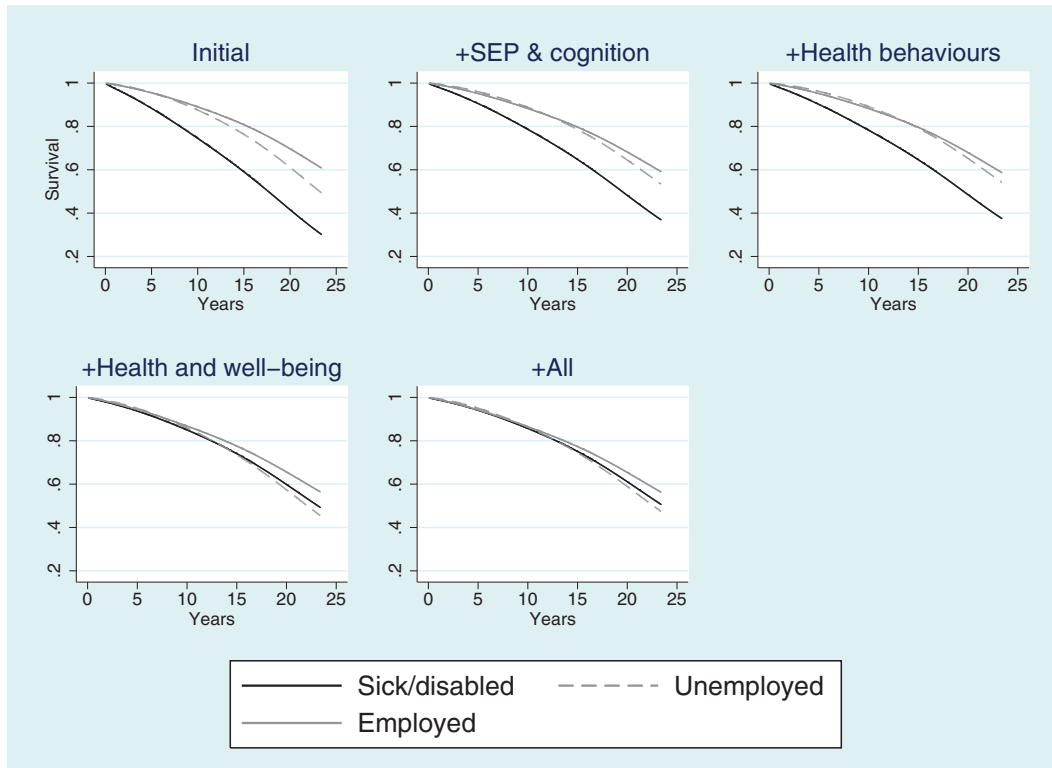
Figure 1 Survival curves

sick or disabled compared with the employed was further attenuated slightly. After adjustment, long-term survival was still slightly worse compared with those employed, but any difference did not appear until much later in the follow-up period.

Comparison with existing studies

Our results are in contrast to a number of UK and Scandinavian studies that have found excess mortality among working age (at baseline) sick or disabled or disability pensioners after accounting for differences in health, health behaviours and socio-economic position.[4,5,7,34] One reason for this contrast may be that we control for a larger number and wider range of variables than in these studies. Similarly, another study suggested that there was no excess mortality for Swedish male disability pensioners from the construction industry once health differences had been accounted for. This study included only those who were disability pensioners because of a musculoskeletal diagnosis (because this is unlikely itself to directly lead to increased mortality risk it was argued). It also excluded those disability pensioners hospitalized around the time of starting their disability pension.[35] This work has been criticized, as similar exclusions were not made among the non-disability pension comparison group.[6]

Strengths and limitations

Key strengths include the use of a representative general population cohort, the longer than usual follow-up compared with many studies, the detailed adjustment for baseline characteristics, the graphical representation of adjusted survival and the incorporation of the possibility of a time-dependent impact of employment status. The use of imputation may overcome any bias associated with limiting the analysis to complete cases only, but whether it does this is not testable.[36] However, restricting to a complete case analysis gave qualitatively the same result. The initial model had no missing data and showed a slightly smaller survival gap between those employed and those sick or disabled compared with

the complete case initial model. As this slightly smaller gap was then observed at each stage in the imputation model compared with the complete case it gives us some confidence in the imputation. Another limitation is that we did not explore beyond employment status whether there were time-dependent impacts for other variables. Also, we only included baseline employment variables and future studies could explore the impact of people's changing employment circumstances. Perhaps the main potential limitation of this analysis is that it may not be generalizable to other regions or countries, to other age groups or to the current group of people who are sick or disabled. Although our baseline survey was conducted during a period of rapid growth in those out of work because of sickness or disability, it is specific to the older working age in a deindustrializing region. As numbers of those out of work, sick or disabled continued to grow, there was a shift in profile towards younger age groups, more women and changes in the principle reason for claim from musculoskeletal problems to mental health, although in the UK, there was still a concentration in former deindustrialized areas.[37] However, as can be seen, those sick and disabled in this study had both physical and mental health problems, and recent survey work in the UK suggests there are still high levels of poor health in the current group of people out of work claiming sickness-related benefits[38]; therefore, the findings are still relevant for current policy concerns. Moreover, national mortality studies suggest that the relative excess of those sick or disabled over time has not improved, despite the continuing growth in their numbers and the changes in profile outlined.[2,3]

Meanings and implications

Our results support the idea that a large part of the association between being out of work in later life because of sickness or disability and mortality can be accounted for by health measured at baseline, if a broad range of variables are considered. Our finding may be regarded as supporting the notion that health selection is the

main reason for the elevated mortality rate among those sick or disabled. Health selection means *confounding* by health so that the underlying reason for both being out of work because of sickness or disability and subsequent death is the same health condition, and thus being out of work because of sickness and disability is not itself a cause of increased mortality risk. However, it is probable that job loss to sickness or disability would also lead to (further) deterioration in health,[39] health behaviours and socio-economic position. In short, our control variables are potential mediators as well as potential confounders. Therefore, although 75% of those out of work because of sickness or disability (compared with 15% of the unemployed) stated they had left their last job, at least in part because of ill-health, it is not clear that this particular ill-health also caused the heightened mortality risk. Indeed, studies have found little congruence between the official health reason for disability pension and subsequent cause of death.[5,40] Our results suggest that we should take the health of those out of work because of sickness or disability seriously, as their subsequent mortality risk is high, but to a large degree explainable by their health status. Moreover, given the poor socio-economic circumstances of those sick or disabled, tackling this group's poor health could be important for combating health inequalities.[13]

Conclusion

In contrast to most previous studies, our results suggest that the mortality excess among those sick or disabled can be explained by baseline measures of health and to a lesser extent socio-economic position and health behaviours.

Ethics

Ethical approval for the baseline study was granted in 1986 by the ethics sub-committee of the West of Scotland Area Medical Committees and the GP Sub-Committee of Greater Glasgow Health Board.

Supplementary Data

Supplementary data are available at *EURPUB* online.

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Conflicts of interest: None declared.

Key points

- Much of the poor survival of those out of work because of sickness or disability can be explained by accounting for their poorer health (particularly), socio-economic position and health behaviours.
- Policy makers should take the health and well-being of those in this group seriously.

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Gender difference in sickness absence from work: a multiple mediation analysis of psychosocial factors

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Background: Previous research has shown that job characteristics, private life and psychosocial factors partially account for gender difference in work absences because of sickness. Most studies have analysed these factors separately. The aim of the present study was to evaluate whether these explanatory factors act as mediators when they are considered simultaneously. **Methods:** The evaluated data set comprises the merger of two Belgian longitudinal studies, BELSTRESS III and SOMSTRESS. It includes 3821 workers (1541 men) aged 21–66 years, employed in eight organizations. A multiple mediation analysis was performed to explain the higher prevalence among women. Estimated factors were occupational grade, total number of paid working hours per week, job strain, overcommitment, home-work interference and social support at and outside work. Prospective data concerning duration and frequency of medically justified sickness absence (registered by the organizations) were used as outcomes. **Results:** Overall, the mediating factors partially account for gender difference in sickness absence. The strongest mediator for both outcomes is job strain. In addition, difference in absence duration is mediated by social support at work, whereas difference in frequency is mediated by professional grade and home-work interference. **Conclusions:** Our results call attention to the necessity to elaborate actual preventive actions aiming at favouring a better positioning of women on the labour market in term of hierarchical level as well as in terms of quality of work for reducing sickness absence in this group.

Introduction

The recent financial crisis has once more brought the issue of sickness absence from work to the front of the research scene because of its well-acknowledged public health implications, and because its economic consequences have become a central cause of worry for the government and companies. Recent Belgian data[1] have shown that, during the past decade, the incidence of medically certified absenteeism has continued to increase. In Belgium, as in the rest of the Western labour market, women present absenteeism higher rates compared with men. Identifying the underlying gender-specific causes of this rise in sick leave is a crucial step towards an effective solution.

The disparity between men and women in sickness absence has been extensively studied.[2–6] Beyond biological sex-related health problems,[7] a number of explanatory factors have been identified that differentiate between the life experiences of men and women (for a critical review see[5]). Because most previous studies analysed these factors separately, the aim of the present study was to evaluate whether these explanatory elements act as mediators for this difference when they are considered simultaneously.

The different gender roles[8] men and women occupy in society, both in the private and the professional domains, seem to be a major explanation for gender difference in medically certified sick leave.