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Job loss is bad for your health – Swedish evidence on cause-specific hospitalization following involuntary job loss☆

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ABSTRACT

This paper examines the impact of job loss on a number of non-fatal health events, which are nonetheless severe enough to require hospital in-patient care. We focus on job loss due only to establishment closures, as this reduces the problem of distinguishing between causation and selection. Using linked employee–employer register data, we identify the job losses due to all establishment closures in Sweden in 1987 or 1988. During a subsequent 12-year period, we find that job loss significantly increases the risk of hospitalization due to alcohol-related conditions, among both men and women, and due to traffic accidents and self-harm, among men only. We find no evidence, however, that job loss increased the risk of severe cardiovascular diseases such as myocardial infarction or stroke.

Introduction

The association between job loss, or unemployment, and ill-health has been documented in a vast number of published studies (see Kasl & Jones, 2000). Nonetheless, the existence of a causal link is still debated (Goldney, 1997), since not only may job loss lead to ill-health (i.e., a causal effect) but an observed association may also be due to those with poor health being more likely to lose their jobs or remain unemployed (i.e., a direct selection effect), or have characteristics that makes them more susceptible to both unemployment and ill-health (i.e., an indirect selection effect). Reviews of earlier research (e.g., Morris & Cook, 1991; Weber & Lehnert, 1997) have argued that no study satisfies the requirements for establishing causality as opposed to merely an association. However, three more recent studies claim to nearly fulfil the requirements in the earlier review. Using administrative register data, Browning, Danø, and Heinesen (2006) found no impact of job displacement on hospital admission for stress-related diseases in Denmark, whilst in Sweden Eliason and Storrie (in press) found increased mortality from alcohol-related conditions and suicide. In New Zealand, Keefe et al. (2002) found increased risk of hospital admission or death only due to self-harm.

The postulated mechanisms through which job loss may affect health include stress associated with financial strain and the loss of psychosocial assets such as time structure, personal status, and work relationships. This may also trigger, or increase vulnerability to, subsequent adverse life events or destructive coping strategies. Both financial and psychological strain may undermine the resources needed to cope with other subsequent adverse life events (Kessler, Turner, & House, 1987). Moreover, coping strategies may be harmful as, for example, increased smoking (Falba, Teng, Sindelar, & Gallo, 2005; Lee, Crombie, Smith, & Tunstall-Pedoe, 1991) and alcohol consumption (Catalano, Dooley, Wilson, & Hough, 1993; Dooley & Prause, 1998) and, perhaps most prominently, suicidal behaviour (Blakely, Collings, & Atkinson, 2003; Kposowa, 2001; Lewis & Sloggett, 1998).

This article focuses on the impact of involuntary job loss on health by investigating subsequent non-fatal health events requiring hospital admissions. We limit the study to five groups of primary causes for hospitalization, whereof the two first are common, but severe, clinical manifestations of cardiovascular disease: myocardial infarction and stroke. Previous longitudinal studies have produced mixed results. Gallo et al. (2004, 2006) found that job loss increased twofold the risk of subsequent non-fatal myocardial infarction and stroke among older workers in the Unites States. In Denmark, Iversen, Sabroe, and Damsgaard (1989) found a more than doubled increase in the risk of hospital admission due to myocardial infarction following a shipyard closure,

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while Keefe et al. (2002), did not find any increase in, either fatal or non-fatal, stroke following the closure of a meat-processing plant in New Zealand.

The three other causes are injuries from deliberate self-harm, injuries from traffic accidents, and alcohol-related causes. Several studies have shown about twofold increase in suicides following job loss (Blakely et al., 2003; Lewis & Sloggett, 1998). Keefe et al. (2002), found a large, but statistically insignificant, impact on hospital admission due to non-fatal self-harm and when collapsing fatal and non-fatal self-harm the estimate was statistically significant.

Although there is no consensus in the literature regarding the relationship between job loss and alcohol use (Gallo, Bradley, Siegel, & Kasl, 2001), several Nordic studies have reported increased alcohol-related mortality following job loss and unemployment (e.g., Eliason & Storrie, in press; Martikainen, 1990; Voss, Nylén, Floderus, Diderichsen, & Terry, 2004). Traffic accidents following job loss may also be attributed to changed drinking behaviour. Leigh and Waldon (1991) showed that higher unemployment increased the rate of highway fatalities per distance driven, but also that unemployment decreased driving to the extent that the net effect was found to be negative.

Like several previous studies on the health effects of job loss, we exploit plant (i.e., establishment) closures as a strategy to overcome the problem of health selection and to establish causality. Early examples of plant closure studies are Beale and Nethercott (1985) and Kasl, Gore, and Cobb (1975), while a more recent one is Keefe et al. (2002). To some extent, one can view a plant closure as a natural experiment, since all workers are laid off irrespective of their individual characteristics (e.g., health status) and behaviour (e.g., alcohol abuse). In contrast to most earlier plant closure studies, the present study is not a case study. In fact, using linked employee–employer register data, we identify all establishment closures in Sweden in 1987 and 1988. The use of register data allows us to follow the workers for 3 pre-displacement years and up to 12 post-displacement years, which provides both pre-initial measures of health and may allow enough time to observe diseases that only become manifest in the longer run.

Data

The registers

To create the linked employee–employer data used in this paper, containing information from 1983 to 1999, three registers were merged: the Hospital Discharge Register (*Patientregistret*), the Register Based Labour Market Statistics (*Registerbaserad arbetsmarknadsstatistik*), and the Income and Wealth Register (*Inkomst – och förmögenhetsstatistiken*). These registers can be merged and one can link employees to their establishments due to the fact that every resident and every establishment in Sweden has a unique identity number (i.e., a civic registration number or an organization number) and that the obligatory income statements, filed to the taxation authorities by the employer, contain both the employee's civic registration number and the establishment's organization number.

The samples

The study population comprised the workers in all establishments in Sweden with at least 10 employees that shut down in 1987 or 1988. The problem with 'false firm deaths' (i.e., that a change of owner, for example, is interpreted as a closure) emphasized in Kuhn (2002) has been eliminated by Statistics Sweden by surveying the firms.

However, the absence of selection in plant closure studies can be questioned as one has reason to suppose that those with better outside options will be more likely to quit before the actual shutdown, but that the firm will be more likely to first lay off its less valuable workers in a preceding period of downsizing. Thus, it is essential to identify not only the employees laid off at the time of the actual shutdown but also the workers separating earlier as a consequence of the impending closure. Therefore, if a closing process was deemed longer than 1 year, based on establishment size and worker flows during the 3 years prior to closure, we included in addition to the workers who separated from this establishment in the same year as the shutdown also the workers who separated in the preceding year and in a few cases also those who separated in the year before that. Most of the closing processes, however, were considered to be no more than a calendar year.

We identified 17,008 displaced workers, of age 20–64 years, corresponding to 760 establishment closures, and a comparison group comprised of a random sample of about 188,000 workers of the same ages and employed in November of 1986, also at establishments with at least 10 employees, but which were not closing. Those working in mining and quarrying or in electricity, gas, and water supply were excluded as no or only few displaced workers were found in these sectors. After dropping also observations with missing information for any of the baseline covariates, 14,926 displaced and 164,193 non-displaced workers remained. Most of the dropped observations corresponded to workers living in any of the few counties, which did not report hospital stays to the National Board of Health and Welfare that compile the register from which we draw much of the baseline health information.

All workers could be followed first during a pre-displacement period of 3 years and then during a post-displacement period of a maximum of 12 years. During the post-displacement period, we put no restrictions on either the displaced or the non-displaced workers. Thus, the non-displaced workers cannot be regarded never-displaced as they may have lost a job at any time during this period. Likewise, the displaced workers could have experienced multiple job losses.

Outcome measures

The outcomes examined were hospitalization for five categories of primary causes. All are related to the postulated hypotheses that job loss increases the levels of stress, depression, anxiety, and that persons experiencing job loss adopt health damaging strategies to cope. As to not overlap with the work in Eliason & Storrie (in press), only non-fatal events (i.e., where the patient did not die during the hospital stay) were included.

Cardiovascular diseases are the most common cause of in-patient care in Sweden (Alfredsson, 2006, chap. 3). Job loss could potentially increase the risk of such diseases through both increased psychosocial stress and changed lifestyle habits. The focus here is on two common, but severe, clinical manifestations of cardiovascular diseases that would require hospital in-patient care (ICD-8, ICD-9, and ICD-10 codes within parentheses): myocardial infarction (410; 410; I21; I22) and stroke (430–438; 430–438; I60–I69).

Although mental ill-health (e.g., depression) is among the top three causes for contact with a GP, long-term sick-leave, and drug prescription (Alfredsson, 2006, chap 3), it would only rarely require in-patient treatment, as is also the case with many other medical conditions (e.g., hypertension) which potentially could be

a consequence of losing a job. As no register contains information on out-patient care or drug prescription, we focus on an alternative, but related, set of categories of diagnoses: alcohol-related diagnoses (291, 303, 571.0, 577.0, 577.1, 980; 291, 303, 305.0, 357.5, 425.5, 535.3, 571.0–571.3, 577.0, 577.1, 980; F10, G31.2, G62.1, I42.6, K29.2, K70, K85, K86.0, K86.1, X45, X65, Y15), injuries from self-harm (E950–E959, E980–E989; E950–E959, E980–E989; X60–X84, Y10–Y34) and injuries from traffic accidents (E807–E847; E800–E849; V01–V99). Poor mental health is a major risk factor for alcohol use and alcohol-related problems, and both mental ill-health and alcohol-related conditions are major public health problems. In Sweden, as many as a quarter of all deaths at ages 20–49 years are alcohol-related (Boström, 2006, chap. 9) and mental and behavioral disorders due to use of alcohol (303; 303; F10) are the most common diagnosis for in-patient treatment among men of age 25–64 years (Centre for Epidemiology, 2003). Both mental illness and alcohol consumption increase the risk of suicidal behaviour. Despite suicides constituting only a small fraction of all deaths, attempted suicides are 15 times as common and about half of them require in-patient treatment (Stefansson, 2006, chap. 5.5). Alcohol is also a contributing factor behind many traffic accidents and some of the accidents may also be disguised suicide attempts.

In Sweden, most of the expenses for medical services are covered by taxes and in principle receiving care must not be influenced by ability to pay. There is, however, evidence that socioeconomic differentials nonetheless exist in the utilization of both physician and hospital care (Gerdtham, 1997). Thus, a focus on outcomes severe enough to require hospital in-patient care, as opposed to out-patient care, is likely to diminish the risk of measuring help-seeking behaviour associated with socioeconomic differences, or closeness to health care facilities, instead of the need for health care.

In Table 1, we show the incidences of hospitalization, due to the outcome diagnoses above, during 2 baseline years. Comparing displaced and non-displaced workers, we see that there was no difference regarding the incidence of myocardial infarction, while the incidences of the other diagnoses, especially alcohol-related diagnoses, were more pronounced among the displaced workers. Hospitalization with an alcohol-related diagnosis is also the most common cause among those covered here. Among men, 1.63% of the displaced and 0.66% of the non-displaced had received hospital in-patient treatment with such a diagnosis, while the corresponding figures for women were much lower (0.27% and 0.19% of the displaced and non-displaced, respectively). Self-harm leading to hospitalization was much less common, but twice as common among displaced men compared to the non-displaced. Both the prevalence and the difference between displaced and non-displaced was again less for women.

Table 2 contains the corresponding figures for the full 12-year follow-up. Neither for men nor for women there was any excess hospitalization, due to myocardial infarction or stroke, among the displaced. If anything, the figures are somewhat larger for the non-displaced. Hospitalizations from the three other diagnoses, however, were much more common among the displaced and especially among displaced men. Both hospitalizations with alcohol-related diagnoses and from self-harm, were about twice as common among displaced men compared to those men who were not displaced. Hospitalization following traffic accidents was more common among men than among women and any difference between displaced and non-displaced was also limited to men. Among the displaced men, 2.32% were hospitalized following traffic accidents while the corresponding figure among non-displaced men was 1.53%.

Hence, the raw data suggest that there were some post-displacement differences in hospital admission, but similar differences even prior to the job loss points to the importance of controlling for pre-displacement health status.

Baseline measures

The data also contains information on other personal characteristics for 3 pre-displacement years. However, many measures for the calendar year immediately preceding the job loss were not used as they may already have been affected by the anticipation of the impending closure.

In addition to baseline incidence of the outcome diagnoses above, we controlled for three major risk factors (ICD-8 codes within parentheses): diabetes (250), mental disorders (290–309), and other heart diseases (390–398, 402, 404, 411–429). This set of risk factors is not exhaustive but is limited by the fact that information on medical conditions is only available if hospital in-patient treatment was required. We also controlled for the total number of both hospital in-patient stays and days, as well as for recorded disability and annual number of insured sick-leave days. Several other covariates were used in the analysis in order to control for baseline, or pre-displacement, differences in demographic, socioeconomic, regional, and occupational characteristics, associated with health (see Table 3).

Although more displaced than non-displaced workers were young and immigrants, the most pronounced differences at the baseline were work-related. Especially, there were differences in which sectors they were employed. Displaced workers were particularly overrepresented in the sector containing wholesale and retail trade, restaurants and hotels, while underrepresented in the sector containing community, social, and personal services. Moreover, there were quite large differences in baseline earnings, experience of unemployment, and utilization of means-tested social assistance. All such differentials were in the favour of the non-displaced workers. The health differences at baseline, other than those already discussed above, were less, but displaced workers also had more insured sick-leave days and hospital in-patient days.

Table 1
Unadjusted baseline incidence of hospitalization due to myocardial infarction, stroke, alcohol-related diagnoses, and injuries from traffic accidents and deliberate self-harm.

Sample	Myocardial infarction		Stroke		Alcohol-related diagnoses		Injuries from traffic accidents		Injuries from self-harm	
	N	%	*N*	%	*N*	%	*N*	%	*N*	%
Men										
Displaced	22	0.27	12	0.15	135	1.63	34	0.41	18	0.22
Non-displaced	212	0.25	93	0.11	555	0.66	260	0.31	89	0.11
Women										
Displaced	2	0.03	5	0.08	18	0.27	10	0.15	15	0.23
Non-displaced	32	0.04	47	0.06	153	0.19	109	0.14	122	0.15

Table 2
Unadjusted follow-up incidence of hospitalization due to myocardial infarction, stroke, alcohol-related diagnoses, and injuries from traffic accidents and deliberate self-harm.

Sample	Myocardial infarction		Stroke		Alcohol-related diagnoses		Injuries from traffic accidents		Injuries from self-harm	
	N	%	*N*	%	*N*	%	*N*	%	*N*	%
Men										
Displaced	189	2.28	171	2.07	300	3.63	192	2.32	100	1.21
Non-displaced	2,093	2.51	1747	2.09	1507	1.81	1280	1.53	573	0.69
Women										
Displaced	36	0.54	78	1.17	75	1.13	80	1.20	92	1.38
Non-displaced	562	0.70	986	1.22	500	0.62	890	1.10	771	0.96

Methods and estimations

Propensity score weighting

We will adopt a propensity score weighted estimator similar to those proposed in Hirano and Imbens (2001) and Robins, Hernán, and Brumback (2000). By propensity score weighting, as by matching, one will ideally obtain a pseudo-sample where the distribution of observed characteristics is the same in the samples of exposed (displaced workers) and non-exposed (non-displaced workers). The propensity score (p) is the probability of exposure (Rosenbaum & Rubin, 1983), which is usually not known but has to be estimated. Our estimates will be based on a logit model: $p_i = \Pr[D_i = 1|X_i] = \{1 + \exp(-\alpha - \beta X_i)\}^{-1}$, where D_i is an indicator taking the value 1 if worker i was displaced at baseline and 0 otherwise, and X_i is a vector of baseline covariates.

To estimate the effect on those actually displaced a weight defined as $w_i = D_i + (1 - D_i)\cdot p_i/(1 - p_i)$ was assigned to each worker i (see Hirano & Imbens, 2001). Hence, all the displaced workers were assigned a weight equal to one, while each non-displaced worker j was assigned a weight equal to $p_j/(1 - p_j)$. Thus, as opposed to matching estimators no comparison observations are discarded, but some may of course be assigned very small weights.

After normalizing the weights, as suggested in Hirano and Imbens (2001), they were used to estimate a weighted discrete-time logit model: $\ln\{h_i(t)/[1 - h_i(t)]\} = \lambda(t) + \gamma Z_i + \delta D_i$, where $h(t)$ is the hazard rate, or the conditional probability of hospitalization from a specific diagnosis category, $\lambda(t)$ is a time-varying intercept, Z_i is a vector of baseline covariates, and δ is the estimated effect of job loss at baseline. The latter is assumed to be constant, since any year-by-year effects could not be estimated with any precision. No time-varying covariates were included as they may mediate the effect of job loss on health and including them may then bias the estimated effect of job loss.

The choices of covariates included in X_i and Z_i can produce four different estimators: (1) if no covariates are included in either the estimation of the propensity scores or the following discrete-time logit model, we have an unadjusted estimator; (2) if covariates are included only in the estimation of the propensity scores, we will have a propensity score weighted estimator without further covariate adjustment (PSW); (3) if covariates are included only in the discrete-time logit model, we will instead have the usual unweighted discrete-time logit model (DTL); and finally, (4) including covariates in both estimations results in a propensity score weighted discrete-time logit model (PSW + DTL).

Estimation of the propensity scores

The estimation of the propensity scores was performed separately for men and women, and also for each of the subgroups (i.e., three age groups, and three categories of educational level and marital status, respectively) investigated in Section 4.2. The covariates included in the model specification were those discussed in Section 2.3 (see Tables 1 and 3). For brevity, we report no estimation results other than summary statistics for the propensity scores and corresponding weights. However, the coefficient estimates for the male sample is presented in Table A2 for illustrative purpose.

From an assessment of the summary statistics in Table A1, it is evident that the samples of displaced and non-displaced workers are fairly similar with respect to the estimated propensity scores. As is also evident from Table A1, only a very few displaced workers were discarded if limiting the following estimations to those observations within the common support of the propensity score distribution. Moreover, as the propensity score in no case is close to one there are no corresponding weights that are unduly large for any comparison observation.

Assessment of the covariate balance

To investigate whether the propensity score weighted pseudo-samples of non-displaced workers were comparable to the samples of displaced workers, with respect to the baseline covariates, the standardized differences in means were examined for each sample. The standardized difference in means is the difference in covariate means between the displaced and weighted non-displaced workers, in percent of the pooled standard deviation (before weighting) of that covariate (Rosenbaum & Rubin, 1985). Other balancing tests have been suggested (Smith & Todd, 2005), but there is no consensus on which to apply or on what degree of balance is satisfactory. However, an absolute value of the standardized difference in means of 20 was considered substantial in Rosenbaum and Rubin (1985), while less than 10 was considered small in Normand et al. (2001).

The standardized difference in means was calculated for all covariates included in the estimation of the propensity scores. Neither the weighted means nor the corresponding standardized difference in means can be presented for each covariate due to space limitations. However, summary statistics within each sample are displayed in Table 4.

The average of the absolute values of the standardized differences in means was about 10 in all samples before weighting. Nonetheless, the weighting process substantially decreased the differences in covariate means. After weighting the samples, the averages decreased to between 0.18 and 0.50, and the largest value for a single covariate in any of the samples is 5.72.

Results

The impact of job loss on hospitalization

Table 5 shows the estimated hazard ratios, with 95% (robust) confidence intervals, of job loss on cause-specific hospitalization using the four estimators (with and without imposing common

Table 3
Sample characteristics of the displaced ($D=1$) and non-displaced ($D=0$) workers by sex.

Baseline characteristics	Men		Women	
	$D=1$	$D=0$	$D=1$	$D=0$
Demographic covariates				
Age				
20–34 years	0.449	0.371	0.460	0.376
35–49 years	0.343	0.393	0.348	0.398
50–64 years	0.208	0.235	0.192	0.227
No. of children aged 0–17 years	0.467	0.592	0.681	0.752
Marital status				
Single	0.465	0.381	0.402	0.317
Married	0.426	0.528	0.445	0.539
Divorced/widowed	0.109	0.091	0.153	0.144
Immigrant	0.137	0.094	0.141	0.096
Regional covariates				
Local unemployment rate (log)	−3.407	−3.335	−3.455	−3.344
Metropolitan area	0.233	0.180	0.246	0.192
Socioeconomic covariates				
Attained educational level				
Compulsory/unknown schooling	0.405	0.357	0.412	0.322
Upper secondary schooling	0.459	0.429	0.452	0.447
University studies	0.136	0.214	0.136	0.231
Employment/unemployment				
Earnings (SEK)	352,497	406,410	233,615	262,788
Unemployment days[a]	20.266	8.438	15.888	9.226
Wealth, social assistance, etc				
Taxable wealth[b]	0.046	0.060	0.055	0.068
Disposable income (SEK)	372,765	418,012	372,882	419,260
Social assistance receiver	0.119	0.052	0.104	0.050
Baseline health status				
Diagnosed disease or condition				
Diabetes	0.002	0.002	0.002	0.002
Mental disorders	0.021	0.009	0.009	0.008
Other heart disease	0.005	0.005	0.002	0.002
Disability[c]	0.005	0.006	0.005	0.008
Hospital in-patient care and insured sickness				
Hospital in-patient stays	0.227	0.184	0.313	0.315
Hospital in-patient days	2.276	1.601	2.329	2.331
Insured sick-leave days	37.874	29.824	43.804	39.657
Occupational covariates				
Type of industry sector				
Agriculture, fishing, and forestry	0.027	0.014	0.010	0.005
Manufacturing	0.300	0.388	0.215	0.154
Construction	0.129	0.079	0.014	0.010
Trade, restaurants and hotels	0.195	0.115	0.247	0.125
Transport, storage, and communication	0.108	0.102	0.041	0.049
Financing, insurance, real estate, etc	0.115	0.078	0.125	0.079
Community, social, and personal services	0.128	0.224	0.348	0.578

[a] Unemployment days is a measure derived by dividing the annual income from unemployment insurance by the maximum daily amount. This will underestimate the true number of days for the few who do not reach the ceiling.
[b] Taxable wealth is an indicator of having a wealth over the threshold amount.
[c] Disability is measured as incidence of disability pension.

support) presented in the previous section. The baseline covariates included in the discrete-time logit model are the same as those included in the estimations of the propensity scores. For illustrative purpose, the estimates for all baseline covariates on hospitalization due to myocardial infarction are displayed in Table A2, while the other estimates are suppressed for brevity.

Table 4
Summary statistics of the absolute standardized difference in means (SDM) within each sub-sample.

Sample	Absolute SDM before weighting			Absolute SDM after weighting		
	Mean	Min	Max	Mean	Min	Max
Men						
All	11.49	0.24	25.39	0.28	0.00	1.14
Age						
20–34 years	11.59	0.43	41.03	0.30	0.00	1.66
35–49 years	11.95	0.76	33.03	0.34	0.01	1.54
50–64 years	8.32	0.11	33.25	0.44	0.01	5.72
Marital status						
Single	11.06	0.19	36.09	0.32	0.00	1.31
Married	8.08	0.14	33.74	0.21	0.00	2.33
Divorced/widowed	12.08	0.55	31.76	0.37	0.00	1.90
Education						
Compulsory school	10.69	0.13	29.07	0.50	0.00	1.98
Upper secondary school	11.09	0.20	25.22	0.37	0.01	1.10
University studies	10.69	0.20	55.12	0.30	0.00	2.54
Women						
All	10.93	0.02	47.30	0.27	0.00	1.03
Age						
20–34 years	12.42	0.06	53.30	0.35	0.03	1.30
35–49 years	9.65	0.04	43.34	0.24	0.00	1.24
50–64 years	9.05	0.11	38.91	0.21	0.00	0.66
Marital status						
Single	11.08	0.24	53.10	0.33	0.00	1.08
Married	9.33	0.16	41.71	0.18	0.01	0.52
Divorced/widowed	9.46	0.03	42.67	0.50	0.00	2.01
Education						
Compulsory school	8.75	0.82	26.17	0.30	0.02	1.30
Upper secondary school	12.19	0.34	53.27	0.27	0.00	1.07
University studies	8.27	0.61	36.87	0.25	0.00	1.76

Note: the standardized difference in means (SDM) is the difference in covariate means between the two samples, in percent of the pooled standard deviation (before weighting) of that covariate.

All the estimators adjusting for the baseline covariates produced very similar estimates, suggesting that any findings are robust to the choice of estimator. Also the confidence intervals are of similar width. Those corresponding to the weighted estimators do not account for the fact that the weights have been estimated and should, therefore, be considered conservative (Robins, 1999).

In line with some recent studies, it is also evident from Table 5 that job loss does not seem to have had any effect at all on cardiovascular events such as myocardial infarction and stroke. No estimated hazard ratio is statistically significant and all are close to one.

However, the estimates provide some evidence that the risk of hospitalization due to alcohol-related conditions and self-harm, increased following job loss. For men, the unadjusted estimates for hospitalization due to both alcohol-related diagnoses and self-inflicted injuries show about a twofold increase following job loss. Much of this increased risk, however, seems to be due to differences in baseline risk factors as the adjusted estimates only suggest an about 20% increased risk. It is notable that the adjusted impact on alcohol-related hospitalization following job loss, among women, is even larger, while the increase in hospitalization from self-harm is smaller and not statistically significant.

Displaced men also seem to have been more likely to be engaged in traffic accidents causing injuries requiring hospital in-patient

Table 5
Estimated impact of job loss on hospitalization due to myocardial infarction, stroke, alcohol-related diagnoses, and injuries from traffic accidents and deliberate self-harm, by sex and estimator, expressed as hazard ratios (HR) with 95% confidence intervals (95% CI).

Sample and estimator	Myocardial infarction		Stroke		Alcohol-related diagnoses		Injuries from traffic accidents		Injuries from self-harm	
	HR	95% CI	HR	95% CI	HR	95% CI	HR	95% CI	HR	95% CI
Men										
Unadjusted	0.92	0.79–1.07	1.00	0.86–1.17	2.05	1.81–2.32	1.54	1.32–1.79	1.78	1.44–2.21
PSW$^{common\ support}$	1.02	0.87–1.18	1.05	0.89–1.23	1.24	1.08–1.41	1.36	1.16–1.59	1.24	1.00–1.55
PSW$^{no\ common\ support}$	1.02	0.87–1.18	1.04	0.89–1.23	1.24	1.08–1.41	1.36	1.16–1.59	1.24	1.00–1.55
DTL	1.01	0.87–1.18	1.07	0.91–1.25	1.25	1.09–1.44	1.39	1.19–1.62	1.24	1.00–1.54
PSW + DTL$^{common\ support}$	1.04	0.89–1.21	1.08	0.92–1.26	1.22	1.05–1.41	1.40	1.20–1.64	1.25	1.00–1.57
PSW + DTL$^{no\ common\ support}$	1.04	0.89–1.21	1.08	0.91–1.26	1.22	1.05–1.41	1.40	1.19–1.64	1.25	1.00–1.57
Women										
Unadjusted	0.78	0.56–1.09	0.96	0.77–1.21	1.83	1.44–2.34	1.10	0.87–1.38	1.46	1.17–1.80
PSW$^{common\ support}$	0.86	0.61–1.21	1.02	0.81–1.29	1.38	1.07–1.77	1.12	0.88–1.41	1.17	0.93–1.46
PSW$^{no\ common\ support}$	0.86	0.61–1.21	1.02	0.81–1.29	1.38	1.07–1.77	1.10	0.87–1.40	1.15	0.92–1.44
DTL	0.84	0.61–1.20	1.03	0.81–1.31	1.35	1.04–1.77	1.13	0.90–1.43	1.19	0.95–1.48
PSW + DTL$^{common\ support}$	0.88	0.62–1.24	1.01	0.80–1.28	1.43	1.09–1.86	1.12	0.88–1.41	1.18	0.94–1.48
PSW + DTL$^{no\ common\ support}$	0.88	0.62–1.24	1.01	0.80–1.28	1.43	1.10–1.87	1.10	0.87–1.40	1.17	0.93–1.47

Note: PSW – propensity score weighted estimator without further covariate adjustment; DTL – discrete-time logit model; PSW + DTL – propensity score weighted discrete-time logit model. All propensity score weighted estimators are applied both with and without imposing common support.

care, while the estimates are smaller for women and not statistically significant. The *a priori* expectation, however, would be ambiguous; although, for example, changed drinking behaviour may increase the risk of traffic accidents, decreased driving due to both reduced income and work-related driving will have a reverse effect.

The impact of job loss on hospitalization across subgroups

In this section, we will explore whether it might be that certain socio-demographic subgroups, nonetheless, experienced an increased risk of myocardial infarction or stroke events and whether the increased hospitalization due to alcohol, traffic accidents, and self-harm, was disproportionately pronounced among any subgroups.

In multiple subgroup analyses, both more false negative results (i.e., failing to reject the null hypothesis given that the alternative hypothesis is actually true), due to the smaller size of the groups, and more false positive results (rejecting the null hypothesis given that it is actually true), due to multiple comparisons, are expected. Thus, the findings should be interpreted with caution. Due to the reduced number of hospitalizations in each subgroup, we only applied the propensity score weighted estimator, imposing common support, without further covariate adjustment. When the outcome event is rare, whilst the exposure (here the job loss) is much more common, propensity score methods are particularly useful as the number of covariates that can be conditioned on increases (Braitman & Rosenbaum, 2002; Cepeda, Boston, Farrar, & Strom, 2003).

Table 6 shows the estimates by sex and age group (i.e., 20–34, 35–49, and 50–64 years). The conclusion from the previous section, that job loss did not increase the risk of myocardial infarction or stroke, applies to all age groups with one exception: male displaced workers aged 35–49 years experienced an about 40% increase in the risk of hospitalization due to stroke. They also seem to be those with the largest increased risk of hospitalization due to traffic accidents, while the increased risk of hospitalization due to alcohol-related diagnoses and self-harm seems to be the most pronounced among the youngest men. For self-harm, the increased risk corresponds exclusively to the younger age group.

For women, however, the confidence intervals are quite wide and the point estimates do not indicate any striking differences across age groups either. The only statistically significant estimates refer to increased risk of alcohol-related conditions among those aged 35–49 years and increased self-harm among the youngest; the point estimate for the oldest age group is larger, however, but not statistically significant.

We performed an equivalent analysis by marital status. Several studies have shown that marriage is associated with better health (Wilson & Oswald, 2005) and a spouse may provide valuable support, both financially and emotionally in difficult times. On the other hand, a spouse can also be a burden in such times, depending on how the couple cope with the job loss, and marital instability and divorce can subsequently follow in a chain of adversity (Hansen, 2005; Kraft, 2001).

The results by marital status are displayed in Table 7. Again we find no larger impact of job loss on the risk of myocardial

Table 6
Propensity score weighted (PSW) estimates of the impact of job loss on hospitalization due to myocardial infarction, stroke, alcohol-related diagnoses, and injuries from traffic accidents and deliberate self-harm, by sex and age, expressed as hazard ratios (HR) with 95% confidence intervals (95% CI).

Sample	Myocardial infarction		Stroke		Alcohol-related diagnoses		Injuries from traffic accidents		Injuries from self-harm	
	HR	95% CI	HR	95% CI	HR	95% CI	HR	95% CI	HR	95% CI
Men										
20–34 years	1.13	0.56–2.27	0.91	0.44–1.87	1.38	1.09–1.74	1.29	1.03–1.62	1.42	1.06–1.90
35–49 years	1.18	0.93–1.51	1.39	1.05–1.85	1.16	0.96–1.40	1.57	1.19–2.06	1.04	0.71–1.53
50–64 years	0.88	0.72–1.08	0.91	0.74–1.12	1.19	0.87–1.63	1.23	0.83–1.84	0.79	0.32–1.99
Women										
20–34 years	0.40	0.05–3.09	1.21	0.57–2.57	1.23	0.79–1.92	1.12	0.79–1.58	1.26	0.93–1.71
35–49 years	0.79	0.40–1.56	1.13	0.74–1.70	1.44	1.01–2.05	1.19	0.80–1.78	0.99	0.68–1.45
50–64 years	0.90	0.61–1.36	0.96	0.71–1.30	1.66	0.89–3.08	0.83	0.48–1.44	1.34	0.61–2.93

Table 7
Propensity score weighted (PSW) estimates of the impact of job loss on hospitalization due to myocardial infarction, stroke, alcohol-related diagnoses, and injuries from traffic accidents and deliberate self-harm, by sex and marital status, expressed as hazard ratios (HR) with 95% confidence intervals (95% CI).

Sample	Myocardial infarction		Stroke		Alcohol-related diagnoses		Injuries from traffic accidents		Injuries from self-harm	
	HR	95% CI	HR	95% CI	HR	95% CI	HR	95% CI	HR	95% CI
Men										
Never-married	1.29	0.90–1.87	0.87	0.57–1.34	1.25	1.03–1.52	1.37	1.10–1.70	1.16	0.86–1.58
Married	0.96	0.80–1.16	1.05	0.86–1.28	1.45	1.11–1.90	1.45	1.11–1.89	1.51	1.00–2.29
Divorced/widowed	0.97	0.67–1.40	1.26	0.88–1.79	1.03	0.80–1.33	1.16	0.72–1.86	1.15	0.67–1.96
Women										
Never-married	1.00	0.43–2.84	0.89	0.47–1.67	1.64	1.08–2.48	1.15	0.79–1.69	1.28	0.91–1.80
Married	0.77	0.48–1.24	1.14	0.85–1.52	1.02	0.62–1.66	1.36	0.97–1.89	0.86	0.54–1.36
Divorced/widowed	0.98	0.55–1.74	0.84	0.50–1.40	1.61	1.05–2.46	0.58	0.30–1.15	1.44	0.96–2.15

infarction or stroke. For alcohol-related diagnoses, and injuries from traffic accidents, the adverse impact of job loss seems to be the most evident among the men who were married, although the estimates for never-married men are almost as large. For women, on the other hand, marriage seems to have had a protecting effect on both alcohol-related conditions and self-harm. For never-married and divorced or widowed women the impact on hospitalization from alcohol-related diagnoses actually seems to have been quite large.

Finally, we present, in Table 8, the estimates by attained educational level. A positive association between education and health is well established (Ross & Wu, 1995), but the question here is whether higher education also may protect against adverse health effects following job loss. As above, the reduced number of events in each subgroup provides less statistical power to draw any firm conclusions. The estimates indicate, however, that the coping strategies of displaced workers with a university education may differ from the coping strategies of those with lower education, since we find no effect of job loss on hospitalization from either alcohol-related diagnoses, traffic accidents, or self-harm for those with a university education. A competing explanation would, of course, be that those who with a university education had less difficulty quickly finding an equally good job as the one lost.

Causation or selection

We have presented evidence that displaced workers to some extent experienced a higher risk of hospitalization. These estimates do not seem to be sensitive either to minor changes in the model specification or to the choice of estimator, as long as we somehow control for the baseline covariates. However, all the estimators assume that conditional on the observed characteristics there are no unobserved differences, between the displaced and non-displaced workers, affecting health. This is both a strong and untestable assumption. We will, however, argue that in the light of the design of the study and the available data this assumption may not be as unrealistic as it at first appears. A first argument is that an establishment closure is close to a natural experiment. When an establishment shuts down all workers are separated from their jobs irrespective of their individual characteristics and behaviour. Hence, the focus on job loss due only to establishment closures is likely to greatly reduce any selection bias. Most of the early closure studies, however, have had several shortcomings. In their review of factory closures, Morris and Cook (1991) described an 'ideal study' as having the following characteristics: a large number of workers, an adequate comparison group, high response rate, pre-closure information, both self-reported and objective measures of health, a post-closure period of ideally 10 years, and minimal attrition. A second argument then is that by utilizing high-quality administrative registers this study satisfies most of the requirements for being an 'ideal study.'

A remaining concern, however, is related to the fact that closing establishments in general are new establishments (Persson, 2004) and firm, or establishment, age is not available from the data. Possibly, workers at new establishments have characteristics, or behaviours, associated with higher risk of morbidity, since new businesses, for example, may have less developed hiring and screening processes. The years preceding the closures were also characterized by very low unemployment levels, which may have implied a smaller pool of available good healthy workers for new firms to recruit from. From the descriptive statistics in Tables 1 and 3, it is, for example, evident that the displaced workers already at baseline more often had diagnoses related to excessive alcohol consumption. At first, this may indicate that closures do not provide a good natural experiment for the study of the health consequences of job loss. However, there are also differences in which industry sectors they were

Table 8
Propensity score weighted (PSW) estimates of the impact of job loss on hospitalization due to myocardial infarction, stroke, alcohol-related diagnoses, and injuries from traffic accidents and deliberate self-harm, by sex and attained education, expressed as hazard ratios (HR) with 95% confidence intervals (95% CI).

Sample	Myocardial infarction		Stroke		Alcohol-related diagnoses		Injuries from traffic accidents		Injuries from self-harm	
	HR	95% CI	HR	95% CI	HR	95% CI	HR	95% CI	HR	95% CI
Men										
Compulsory	1.00	0.82–1.23	1.07	0.86–1.32	1.25	1.05–1.49	1.38	1.09–1.75	1.11	0.80–1.55
Upper Secondary	0.98	0.76–1.27	1.04	0.79–1.37	1.22	0.99–1.50	1.41	1.12–1.77	1.42	1.04–1.94
University	1.16	0.72–1.89	0.97	0.57–1.65	1.17	0.61–2.23	1.12	0.64–1.95	0.64	0.20–2.09
Women										
Compulsory	0.94	0.63–1.41	1.28	0.96–1.70	1.31	0.93–1.85	1.07	0.75–1.54	1.27	0.94–1.72
Upper Secondary	0.68	0.33–1.39	0.73	0.47–1.16	1.67	1.12–2.50	1.11	0.78–1.59	1.07	0.74–1.54
University	0.89	0.22–3.65	0.66	0.24–1.79	0.83	0.29–2.33	1.17	0.64–2.16	0.93	0.42–2.02

employed. This is what one would expect as closures are not randomly distributed over the economy. Moreover, between industry sectors there are differences in wages, job security, and working environment, which might explain these health differentials. Anyhow, these are differences observable in the data, which we have controlled for; hence, the remaining question is whether similar, but unobserved, differences remained after conditioning on the observed characteristics.

Summary and discussion

That an association between job loss, or unemployment, and ill-health exists is unquestionable, but whether this link is causal has not yet been fully established. Some reviews have claimed that no study satisfies the requirements for establishing causality as opposed to merely an association. Akin to Browning et al. (2006) and Eliason and Storrie (in press), we used linked employer–employee register data to extend the case study approach, which dominated the early plant closure literature.

Like some other recent studies (Browning et al., 2006; Keefe et al., 2002), we found no strong evidence of involuntary job loss increasing the risk of hospital admission due to severe stress-related conditions such as myocardial infarction and stroke. Only for men aged 35–49 years at the time of the job loss did we find a statistically significant elevated risk and then only on the risk of stroke. Thus, we did not reproduce the findings of a twofold increase of myocardial infarction and stroke among job losers over 50 years of age in Gallo et al. (2006).

However, although men generally drink more alcohol than women, and avoidant coping is more strongly associated with drinking in men, we found here that alcohol-related hospitalization was significantly increased for both men and women following job loss. Consistent with both Eliason and Storrie (in press) and Keefe et al. (2002) we also found an increase in hospitalization due to injuries from both traffic accidents and self-harm. Although this increase was only statistically significant for men, there seem to be no considerable gender disparities in the health effects of job loss. Moreover, women have generally been shown to respond to stressful life events with higher levels of depression and anxiety. Such disorders would on their own only rarely require hospital in-patient treatment and would then not be directly observed in this study.

The reduced number of hospital admissions in each subgroup analysis implied limited statistical power to detect whether the impact of job loss was disproportionately pronounced among certain socio-demographic subgroups. Nonetheless, some interesting differences were revealed. Marriage seems to have mediated the effect of job loss in different ways for men and women. While it had a protective effect for women, the effect was reversed for men. Although our analysis cannot reveal the mechanism behind the protective effect of marriage among women and the reverse effect among men, similar findings have previously been suggested to be accounted for by gender differences in terms of family responsibilities (e.g., Artazcoz, Benach, Borrell, & Cortès, 2004). A more pronounced effect on married men may then be explained by that being married entails additional stress due to greater financial responsibilities and failure in the role as the primary provider for the family, while a protective effect on women may be explained by parental responsibilities. Many studies have also pointed to financial strain as a dominant mediator of the relationship between job loss and mental health problems (e.g., Kessler et al., 1987; Vinokur & Schul, 2002). Although it is not clear that men respond more to financial strain, husbands' job losses may simply induce more financial pressure on the family level, than do wives' job losses, as they typically constitute a larger share of total family income.

University education also seems to have had a protective effect. It might be that those more highly educated had better opportunities to find new jobs than their less educated counterparts. But, higher education has also shown to be associated with less avoidant coping strategies as well as more resilience. (Christensen et al., 2006).

As this study is very close to what Morris and Cook (1991) defined as an 'ideal study,' we find it reasonable to believe that the increased risk of hospital admission, for some diagnoses, found among the displaced workers in this study are indeed causal effects of job loss. However, although our exclusive focus on job loss due to plant closure is likely to have diminished the problem of health selection, the results cannot be generalized to job losses in general but should rather be interpreted as a lower bound. The termination of a job being unrelated to the workers characteristics and behaviour constitutes an appealing situation from the researchers' point of view, but for the same reasons it is also likely to affect the worker less in terms of, for example, self-blame and self-esteem, than then being selectively laid off. Hence, we cannot rule out the possibility that one would find an impact also on the risk of myocardial infarction and stroke if one were able to identify the causal effect of all kinds of job loss. Other potential explanations to the smaller effects found here on myocardial infarction and stroke compared to U.S. studies (e.g., Gallo et al., 2004, 2006) may be related to the research design, time-period under study, or institutional differences. Not only do we believe that we have reduced any selection effects, but the workers in the comparison group may also have lost their jobs at any time during the subsequent follow-up period, so the counterfactual case is not never-displaced. Due to the deep and widespread recession in the early 1990s, it is likely that many workers in the comparison group did experience job loss later on. Although previously displaced workers were more likely to lose their jobs also during the recession (Eliason & Storrie, 2006), it should be kept in mind that we compare workers who lost their job in a particular year with their counterparts that did not lose their job in the very same year. This is likely to have produced smaller adverse effects than if the comparisons were workers who never lost a job.

The job losses in this study also occurred during a time with a very buoyant labour market, when many of the workers got new jobs without an intervening period of unemployment and for those who nonetheless experienced longer periods of unemployment the rather generous unemployment insurance system in Sweden may have eliminated much of the financial stress associated with job loss elsewhere. While recent ecological studies suggest that health at the aggregate population level (most often measured by the mortality rate) improves during economic downturns (e.g., Gerdtham & Ruhm, 2006; Ruhm, 2000; Tapia Granados, 2005), these findings are likely to be driven by improved health among those not unemployed. While some studies also have shown that being unemployed in times of high aggregate unemployment is less harmful (e.g., Martikainen & Valkonen, 1996), possibly because the shared experience is less stigmatizing or shameful, other studies have failed to provide evidence to support this hypothesis (e.g., Béland, Birch, & Stoddart, 2002). Thus, although we do find an adverse impact of job loss, especially on alcohol-related morbidity, it cannot be ruled out that more adverse outcomes would have been apparent in worse times or in a society with a less developed welfare state.

Appendix

Table A1. Summary statistics of the estimated propensity scores (i.e., the conditional probability of being displaced at baseline), the corresponding weights, and the number, and share, of observations discarded due to lack of common support.

Sample	Propensity score			Propensity score weights			Discarded observations	
	Mean	Min	Max	Mean	Min	Max	#	%
Men								
All								
Displaced	0.12	0.01	0.62	1	1	1	0	0.00
Non-displaced	0.09	0.01	0.60	0.10	0.01	1.49	6	0.01
Age								
20–34 years								
Displaced	0.15	0.02	0.63	1	1	1	5	0.13
Non-displaced	0.10	0.02	0.56	0.12	0.02	1.29	26	0.08
35–49 years								
Displaced	0.11	0.02	0.60	1	1	1	0	0.00
Non-displaced	0.08	0.01	0.62	0.09	0.02	1.50	49	0.15
50–64 years								
Displaced	0.10	0.02	0.71	1	1	1	1	0.12
Non-displaced	0.08	0.01	0.65	0.09	0.02	1.83	72	0.37
Marital status								
Never-married								
Displaced	0.15	0.02	0.64	1	1	1	3	0.08
Non-displaced	0.10	0.01	0.59	0.12	0.02	1.45	47	0.15
Married								
Displaced	0.09	0.02	0.56	1	1	1	2	0.06
Non-displaced	0.07	0.01	0.53	0.08	0.02	1.13	68	0.15
Divorced/widowed								
Displaced	0.15	0.02	0.56	1	1	1	5	0.56
Non-displaced	0.10	0.01	0.50	0.12	0.02	1.00	15	0.20
Education								
Compulsory/unknown schooling								
Displaced	0.13	0.00	0.57	1	1	1	2	0.06
Non-displaced	0.10	0.01	0.55	0.11	0.01	1.22	0	0.00
Upper secondary schooling								
Displaced	0.13	0.01	0.58	1	1	1	0	0.00
Non-displaced	0.09	0.00	0.62	0.11	0.02	1.17	4	0.01
University studies								
Displaced	0.09	0.02	0.55	1	1	1	2	0.18
Non-displaced	0.06	0.00	0.50	0.06	0.02	1.00	163	0.92
Women								
All								
Displaced	0.11	0.01	0.46	1	1	1	0	0.00
Non-displaced	0.07	0.00	0.53	0.08	0.01	0.80	13	0.02
Age								
20–34 years								
Displaced	0.14	0.01	0.51	1	1	1	0	0.00
Non-displaced	0.09	0.01	0.56	0.10	0.01	1.02	22	0.07
35–49 years								
Displaced	0.09	0.01	0.38	1	1	1	0	0.00
Non-displaced	0.07	0.00	0.54	0.07	0.01	0.59	15	0.05
50–64 years								
Displaced	0.08	0.02	0.30	1	1	1	0	0.00
Non-displaced	0.06	0.00	0.32	0.07	0.02	0.43	81	0.44
Marital status								
Never-married								
Displaced	0.14	0.01	0.53	1	1	1	0	0.00
Non-displaced	0.09	0.00	0.63	0.09	0.01	1.08	64	0.25
Married								
Displaced	0.08	0.01	0.36	1	1	1	0	0.00
Non-displaced	0.06	0.00	0.43	0.07	0.01	0.52	28	0.06
Divorced/widowed								
Displaced	0.11	0.01	0.37	1	1	1	0	0.00
Non-displaced	0.08	0.01	0.51	0.09	0.01	0.57	11	0.09
Education								
Compulsory/unknown schooling								
Displaced	0.12	0.02	0.39	1	1	1	0	0.00
Non-displaced	0.09	0.00	0.45	0.11	0.02	0.63	45	0.17
Upper secondary schooling								
Displaced	0.12	0.01	0.75	1	1	1	1	0.03
Non-displaced	0.07	0.00	0.60	0.08	0.01	1.47	119	0.33
University studies								
Displaced	0.06	0.01	0.58	1	1	1	3	0.33
Non-displaced	0.05	0.00	0.32	0.05	0.01	0.48	41	0.22

Note. The weights for the non-displaced workers are here not normalized.

Table A2. Estimated odds ratios (OR) from the estimation of the propensity score (i.e., the probability of job loss) for men, the unweighted and the propensity score weighted (with and without imposing common support) discrete-time logit models on the risk of hospitalization from myocardial infarction.

	Propensity score estimation		Discrete-time logit estimations					
			Unweighted		Weighted common support		Weighted no common support	
	OR	*z*-value	OR	*z*-value	OR	*z*-value	OR	*z*-value
Age								
20–34 years	1	–	1	–	1	–	1	–
35–49 years	0.92	−2.52	8.63	16.41	8.01	9.97	8.01	9.97
50–64 years	0.93	−1.67	23.00	23.51	19.89	14.22	19.90	14.22
No. of children aged 0–17 years	0.93	−4.01	0.87	−3.84	0.97	−0.44	0.97	−0.44
Marital status								
Single	1	–	1	–	1	–	1	–
Married	0.86	−3.77	1.75	6.54	1.49	2.60	1.49	2.60
Divorced/widowed	1.01	0.14	1.66	5.82	1.48	2.73	1.48	2.73
Immigrant	1.29	7.05	1.09	1.34	1.21	1.62	1.21	1.62
Regional conditions								
Local unemployment rate (log)	0.73	−12.86	1.19	3.94	1.21	2.38	1.21	2.38
Metropolitan area	1.28	8.38	0.88	−2.24	0.80	−2.13	0.80	−2.13
Attained educational level								
Compulsory/unknown schooling	1	–	1	–	1	–	1	–
Upper secondary schooling	0.90	−3.95	0.89	−2.42	0.85	−1.81	0.85	−1.81
University studies	0.74	−7.37	0.74	−3.93	0.69	−2.36	0.69	−2.36
Employment/unemployment								
Earnings (tSEK)	1.00	−6.37	1.00	−0.15	1.00	1.99	1.00	1.99
Unemployment days	1.00	14.00	1.00	0.12	1.00	0.37	1.00	0.36
Wealth, disposable income, social assistance								
Taxable wealth	0.99	−0.25	0.81	−2.63	0.83	−1.15	0.83	−1.15
Disposable income (tSEK)	1.00	1.08	1.00	−1.87	1.00	−1.46	1.00	−1.46
Social assistance receiver	1.60	10.97	1.24	1.93	1.18	1.06	1.18	1.06
Diagnosed disease or condition								
Diabetes	0.84	−0.65	2.17	2.95	4.63	3.49	4.63	3.49
Mental disorders	1.28	1.71	1.18	0.59	1.36	0.60	1.36	0.60
Myocardial infarction	1.06	0.25	3.67	7.67	2.91	3.42	2.91	3.42
Other heart disease	0.96	−0.23	1.38	1.79	1.22	0.67	1.22	0.67
Stroke	1.27	0.76	1.77	1.88	1.46	0.97	1.46	0.97
Alcohol-related diagnosis	1.20	1.16	0.61	−1.45	0.76	−0.47	0.76	−0.47
Self-harm	1.24	0.80	1.84	1.22	0.51	−1.13	0.51	−1.13
Accidents	1.04	0.19	1.29	0.67	0.98	−0.03	0.98	−0.03
Disability	0.72	−1.93	1.58	3.14	1.52	1.35	1.52	1.35
Hospital in-patient care and insured sickness								
Hospital in-patient stays	1.00	−0.11	1.05	2.21	1.06	1.49	1.06	1.49
Hospital in-patient days	1.00	−1.28	1.00	−1.03	1.00	−1.29	1.00	−1.29
Insured sick-leave days	1.00	3.22	1.00	3.60	1.00	3.85	1.00	3.85
Type of industry sector								
Agriculture, fishing, and forestry	3.09	13.76	1.09	0.52	0.89	−0.46	0.89	−0.46
Manufacturing	1.26	5.82	1.00	−0.04	0.93	−0.50	0.93	−0.50
Construction	2.59	19.80	0.82	−2.11	0.77	−1.49	0.77	−1.49
Trade, restaurants and hotels	2.58	21.77	0.95	−0.55	1.01	0.05	1.01	0.05
Transport, storage, and communication	1.62	9.73	1.07	0.87	1.07	0.40	1.07	0.40
Financing, insurance, real estate, etc	2.56	19.44	0.92	−0.91	1.04	0.23	1.04	0.23
Community, social, and personal services	1	–	1	–	1	–	1	–
Job loss	–	–	1.01	0.18	1.04	0.46	1.04	0.46
Time effects	No		Yes		Yes		Yes	

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