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The health hazards of marriage. A cohort study of work related disability within 12,500 Norwegian couples – the HUNT Study

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Abstract

Aims: Work disability and sickness absence increase following partner's retirement, which similarities in spouses' health could explain. We therefore studied the risk of work disability within couples, taking account of baseline health, lifestyle and socioeconomic factors.

Methods: A cohort of 12,511 couples from the HUNT Study (aged 20-67 in HUNT2 1995-97) was linked to national registries, identifying all new cases of disability pension until December 2007. Data were analysed with discrete time multilevel logistic regression and Cox regression models. Partners' disability pension was included as a time-varying covariate. Follow-up time was split to examine the association dependent of time. Analyses were adjusted for age only, adjusted for health, and for lifestyle and education along with health.

Results: About 15 % of an individual's propensity to receive a disability pension could be attributed couple similarity. There was an increased risk of work disability following the spouse's disability retirement [HR (hazard ratio) 1.43 (95% confidence interval 1.20–1.71) for men, HR 1.49 (95% confidence interval 1.28–1.74) for women]. The association was somewhat attenuated after adjustments for health, lifestyle and education.

Conclusion: There was a substantial clustering of disability pensions within couples, which cannot be explained by similarities in health, lifestyle and education. This suggests partner's influence each other's work ability. From a clinical perspective, the family situation needs to be taken into account when addressing health promotion and work participation.

Introduction

Disability pension, although being a medical benefit, does not solely depend on health (1). Spouses influence each other's decisions about retirement by voluntary retirement schemes (2, 3). Clustering of disability retirements are less studied. Having a retired spouse might increase the risk of receiving a disability pension (4, 5) and increase the duration of sickness absence (6), particularly for women. However, these studies had limited adjustment for health.

Spouses of disability pensioners could be of increased risk of applying for a disability pension due to spousal health concordance, spousal health influence, spousal influence on motivation to work, or decreased capability to cope with simultaneous demands of work, caregiver roles and own reduced health. Spouses' health statuses are associated, as regards depressive and other psychological symptoms (7, 8), cardiovascular risk factors (7, 9) and health behaviours (7); in different age groups and cultural settings (7). Health concordance between spouses can be caused by similarities existing before marriage (7) or social influence during marriage (10). Some degree of convergence between spouses is likely , at least during the early stages of a relationship (10, 11). Furthermore, caregiving increases morbidity (12).

The present prospective study of 12,500 couples examined the importance of the closest social relationships for the risk of not coping with working life because of problems with health and disease. The development of work disability, assessed as receiving disability pension, was analysed within couples, taking account of baseline health, lifestyle and education.

Methods

Study sample

Information from the second wave of the Nord-Trøndelag Health Study (HUNT2) was linked by a personal identification number to data on retirement, marriage, education and mortality from national registries. The HUNT2 Survey was conducted in 1995–97, and every county resident aged 20 years or older was invited to participate. Information was gathered by questionnaire and a clinical examination. The response rate was approximately 70% (13).

Couples were identified based on household serial numbers from national registries, along with information on legal marriage and self-reports on living with a spouse or cohabitant. Two legally married individuals with the same household serial number constitute a couple, as do individuals with the same household number if they have reported to live with a spouse or cohabitant. When more than two persons with equal serial numbers reported to live with a spouse or cohabitant, the two older were assumed to be a couple, an assumption that was evaluated by comparing the age and marital status of the respective individuals. Individuals with equal household serial numbers, who were not legally married and had an age difference of more than 16 years were excluded, as they could represent a parent and adult child. Manual checking of married couples with an age difference of more than 20 years using household registers revealed one erroneously linked parent and adult child. We only included couples in which both partners participated in the HUNT 2, and in which neither partner was retired at the time of the health survey. Same-sex couples were excluded. The inclusion procedure is shown in Figure 1. For simplicity, we refer to partners as spouses, men as husbands and women as wives, irrespective of whether they were married or cohabiting.

From the total study sample of 12,511 couples, 5,193 individuals were excluded because of missing data (n=4,146), retirement before start of follow-up (n=799) or both (n=248) (see figure 1), and 305 individuals were censored before the end of follow-up because of emigration or death. Their spouses were kept in the sample if not also lacking data or follow-up time. The analyses therefore included 19,829 individuals, of whom 9,636 were

men and 10,193 were women. Of those excluded due to missing data, 17% received a disability pension during follow-up versus 13% of the total sample.

Health

Health at baseline was assessed using self-reported information. The number of chronic somatic conditions was enumerated from zero to three or more. This variable included asthma, cardiovascular conditions (stroke, myocardial infarction or angina pectoris), diabetes, thyroid disease (hyperthyroidism, hypothyroidism, goitre or other thyroid diseases), rheumatologic conditions (rheumatoid arthritis, osteoarthritis or ankylosing spondylitis), osteoporosis, epilepsy, cancer, or other long-standing diseases. Traumas (hip fractures or other trauma necessitating hospital admission) were also included, due to potential sequels. The number of organ systems from which the participants reported somatic symptoms or symptom-based diagnoses was also counted, ranging from zero to five, generating the variable somatic symptoms. These included respiratory/cardiac symptoms (cough, dyspnoea, wheezing or palpitations), gastrointestinal symptoms (dyspepsia, nausea, constipation or diarrhoea), muscle/joint symptoms (pain or stiffness or diagnoses of fibromyalgia), headache and sleep disturbance (difficulty in falling asleep or waking early often or almost every night). Somatic conditions and somatic symptoms were included in the Cox regression model as continuous variables after finding an approximately linear association with the outcome. Physical handicap (reduced vision, reduced hearing or motor handicap) was included as a dichotomised variable. Depression and anxiety were assessed with the Hospital Anxiety and Depression Scale, a validated screen for general population samples (14), and included as continuous scales. Global self-rated health was added as a separate covariate and assessed by the question “How is your health at the moment?”. In addition, health-related risk factors

(hereafter called lifestyle) were included as separate covariates and assessed by body mass index, smoking status (present, former or never smoker), alcohol use (units per month), hypertension (currently medically treated) and levels of physical activity. Level of physical activity was categorised as high for those who exercised vigorously for more than one hour per week, moderate for those with vigorous activity less than one hour per week or light exercise more than one hour per week, and low for those with less activity.

Disability pension

The National Insurance Database, which covers the total study population, provided data on disability pensions. The pension secures the income of individuals whose earning ability is permanently impaired by at least 50% mainly due to disease, injury or defect. A temporary disability benefit granted for any four-year period between 2004 and 2010 (when the benefit was available) was also included in the current study as a disability pension.

Covariates

Education level at baseline was collected from the National Education Database. Data on contractual early retirement, old-age retirement, emigration and death were also collected from national registries.

Statistical analyses

The clustering of spousal disability pensions was assessed with multilevel discrete-time logistic regression with individuals nested within couples. Time was split in one-year intervals, and the risk of disability retirement estimated within each interval, conditional on not already having been retired (15). Time intervals were treated as dummy variables in the analyses. We estimated *conditional intraclass correlation coefficients* (ICC) and *median odds*

ratios (MOR). The ICC is an estimate of the relative importance of the couple level for an individuals' propensity to receive a disability pension (15). The MOR is the median of the odds ratios between the individual with the highest propensity and the individual with the lowest propensity when randomly selecting individuals from different clusters, and can be considered the median increase in risk attributable to the cluster level (16). We performed the analyses adjusted for age and sex only, adjusted for health variables, and adjusted for lifestyle and education along with health. Previous research has suggested a non-linear association between both body mass index and alcohol intake and disability retirement (17, 18), hence, quadratic terms were included to allow for non-linear associations.

In Cox regression models with age as the time axis, we evaluated the relative risk of receiving a disability pension among those whose partner was receiving a disability pension, for men and women. To examine the time-dependent disability risk following partner's disability pension, we split the follow-up time in four periods (1) the period before the partner received a disability pension, 2) the first three years following the partner's disability retirement, 3) the subsequent three years and 4) for any follow-up time 6 years or more after the partner received a disability pension). We analysed the same models as in the multilevel analyses, but with separate analyses for men and women due to statistical evidence of an interaction between sex and the time dummy (p–value<0.01 in model 2 and 3). Follow-up started two years after participation in the health survey to avoid biased health reports, as symptom load is reported to increase around the time of a disability retirement (19), and ended on 31 December 2007. Additional sensitivity analyses were performed, adjusting for profession, age difference between partners and censoring divorcees. Stata version 12 for Windows (Stata Corporation, College Station, Texas) was used for statistical analyses.

The proportional hazards assumptions were assessed based on Schoenfeld residuals. There was evidence of non-proportionality for somatic conditions and global health

assessment for both sexes, for alcohol consumption for men and for education for women. We therefore included interaction terms between these variables and a variable categorising age in five-years categories from less than 45 to more than 60. Following this procedure, the proportional hazards assumptions were met for each model (all Schoenfeld residuals $p \geq 0.1$).

Ethics

The Regional Committee for Medical Research Ethics approved the study (reference number 4.2005.230). All participants gave their informed written consent.

Results

The study population is described in Table 1. More women than men received a disability pension during more than 160,000 person-years of follow-up (mean follow-up of 8.4 years). The man was older in 76% of the couples, and in 10% both partners were at the same age. The mean age at baseline was 44 years.

The ICCs and MORs are presented in Table 2. About 15% of individuals' propensity to receive a disability pension could be attributed to the couple level, with MORs of around 2. Adjustment for baseline health status, education or risk factors gave only minor changes of the ICC and the MOR for receiving disability pensions.

Those whose partner received a disability pension had a higher risk of receiving a disability pension, as shown in Table 3. Adjustment for health status at baseline decreased the estimates, compared with the age-adjusted analysis. Adjustment for lifestyle and education further decreased the estimates. Additional adjustment for age differences in couples did not substantially change the estimates.. Adjustment for profession did not change the conclusions. The HR for receiving a disability pension was not statistically significantly different for different age groups (*p*-values of interactions in the range 0.1 to 1.0). Results from the fully

adjusted model (model 3) are shown in Figure 2. Censoring couples no longer living together (n=2,856) only marginally altered the results.

We tested for effect measure modification by including product terms between dummy variables for the different periods relative to the partner's disability retirement and numbers of somatic conditions, hospital anxiety and depression subscales, physical handicap and level of education, respectively. We did not find statistical support for effect measure modification for either men or women (*p*-values≥0.1).

Discussion

We found a substantial clustering of disability pensions within couples. Both men and women were at increased risk of receiving a disability pension after the partner got a disability pension – an association which could not be explained by adjustment for baseline health, lifestyle and education. There was also no statistical evidence of the relative association with time since partner's disability retirement being different given different levels of health or education.

Strengths and limitations

This paper reports a longitudinal study with 10 years of follow-up. Furthermore, it is based on a representative population sample, with a high response rate (13). Given the large sample size, we do not expect that our findings would be due to chance only. A broad range of questions assessed baseline health and, plausibly, we captured large parts of the participants' baseline health. A structured medical examination would have given medical diagnostic information other than the data obtained from our self-report measures, but this would not have been feasible given the size of the study. Some residual confounding is possible, though. The outcome data are from highly accurate national registries that provide reliable and

objective measures and prevent loss to follow-up. We chose to categorise couples based on baseline relationship status, because those who were divorced could represent a distinct group with an increased risk of receiving a disability pension (20). However, our sensitivity analysis revealed similar results when censoring those who divorced during the follow-up period. The Norwegian welfare system regarding legislation for disability pension corresponds essentially to welfare systems in many parts of the world. Spousal interactions and the processes by which spouses might influence each other's health are also likely to be unrelated to the insurance systems.

Comparison with other studies and possible mechanisms

Given the association between spouses' health and lifestyle (7), it is not surprising that a medical benefit like disability pension is also clustered within couples. However, the clustering shown in this study was robust to adjustment for health, lifestyle and education. Disability pensions have also been related to labour market conditions (21). However, although unemployment increases the risk of disability retirement, local labour market variations explain only a minor proportion of disability pensions (22). Couples also tend to share social resources, coping strategies and major life events. Major life events, such as the death of a child, are relatively rare in the general population, and therefore not likely to be the main cause of the observed clustering of work disability.

The other main explanation for the observed clustering of disability pensions is that spouses influence each other's work ability. Spouses have been shown to influence each other's lifestyle (11, 23) and mental health (24), caregiving increases morbidity (12), and mortality increase following spousal bereavement (25). As the process of ceasing paid work often implies reduced income, loss of social interaction and reduced self-esteem (26), it is

likely that such a transition will have a substantial impact on the spouse's health, cognition and well-being.

Having a diseased spouse will potentially also increase the total strain on the partner, and if so, increased caregiving demands are associated with reducing weekly hours of paid work (27). The total demands on a person would peak with disease severity, not with timing of spouse's disability retirement, consistent with our finding of increased hazards of disability retirements independent of time since spouse's disability retirement.

Disability retirements might also be influenced by social norms, and these norms may be affected by the frequency of disability pensions (28). Increased awareness of disability pension as a possibility for future predictable income, may influence coping strategies for people with serious health and social challenges. A social interaction effect has been suggested when individuals experience an increase in disability pension participation in their neighbourhood (29). If applying theories of utility functions, often used in studies on retirement by voluntary schemes, the motivation to work could decrease after the spouse's disability retirement, as the utility of spare time might increase if spent together with the spouse. On the other hand, the utility of work could also increase, in order to maintain the economy and social status of the family. Although some degree of social influence cannot be ruled out as a cause of the observed clustering of work disability, it is important not to forget the potential of health influence when one's partner experiences work disability.

The time from first registration as sick to receiving a disability pension is highly variable, with an average of 2.3 years in this sample. It is thus plausible that any influence on a couple of a disease or other factors related to ceasing work due to health impairment might start before the actual disability retirement. If the increased risk of receiving a disability pension were related to the granting of the spouse's disability pension per se, we would have expected an induction time of about two years before the spouse's risk of disability retirement

would rise. However, since we found no evidence of such an induction time, the results indicate a minor influence of the actual timing of the couple's disability reception.

Previous studies suggest a greater impact on the spouse when the retiree is male rather than female (4, 6). Such a relation would be in accordance with traditional gender roles of men as the main provider for the family and women as caregivers. Our finding of an association for both men and women was therefore somewhat surprising. However, spousal health influence has been demonstrated for both sexes (24), and although women caregivers are more burdened than men caregivers, these gender differences are smaller than commonly believed (30).

As disability retirement rates increase with age, one could have expected a decrease in the relative importance of partner's disability retirement with increasing age. We did not find evidence of such an effect measure modification. Analyses did not indicate that the association between partner's and own disability retirement at different time periods was modified by own health status or education level.

The recognition of the common risk for dropping out from work should encourage medical doctors treating patients for diseases and complain leading to work disability to include the spouse in the discussions on leaving work or not. To engage the spouse in this difficult process could prevent or delay another disability pension.

Conclusions

There was a substantial clustering of disability pensions within couples, which was robust to adjustment for health, lifestyle and education. The risk of receiving a disability pension subsequent to the spouse receiving a disability pension was increased for both men and women. The present study's results suggest that the work ability of individuals is influenced

by the work disability of their partners, a finding that would be expected to emerge irrespective of insurance system. When considering health promotion and work participation, the family situation needs to be taken into account.

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Table 1. Baseline characteristics of the study population, the Nord-Trøndelag health study, 1995–97.

		Disability pension	
Categorical variables	N	n	%
Sex			
Women	12,511	2,035	16
Men	12,511	1,588	13
Number of somatic conditions			
0	15,127	1,600	11
1	7,541	1,300	17
2	1,772	525	30
≥3	496	178	36
Missing	86	20	23
Number of somatic symptoms			
0	2,947	165	6
1	5,593	590	11
2	6,221	819	13
3	4,770	850	18
4	2,338	574	25
5	476	177	37
Missing	2,677	448	17
Self-rated health			
Very good	4,785	190	4
Good	15,908	1,816	11
Poor/very poor	4,144	1,585	38
Missing	185	32	17
Physical handicap			
Present	3,599	1,137	32
Not present	21,337	2,466	12

Missing	86	20	23
Education			
Compulsory education or less	3,530	908	26
Secondary education	15,845	2,255	14
College/university	5,577	448	8
Missing	70	12	17
Smoking			
Never	11,352	1,188	10
Previous	6,593	1,067	16
Current	6,987	1,355	19
Missing	90	13	14
Medically treated hypertension			
Not current	23,687	3,222	14
Current	1,239	381	31
Missing	86	20	23
Physical activity			
Low	4,172	796	19
Moderate	12,806	1,930	15
High	7,200	657	9
Missing	844	240	28

Continuous variables		
Age (mean/SD)	43.9 (9.9)	49.7 (7.9)
Body mass index (mean/SD)	26.1 (3.7)	27.0 (4.2)
Missing	75 (0%)	14 (0%)
HADS Anxiety (mean/SD)	4.1 (3.1)	5.0 (3.7)
Missing	410 (1.6%)	113 (3.1%)
HADS Depression (mean/SD)	3.1 (2.8)	4.1 (3.3)
Missing	410 (1.6%)	113 (3.1%)
Alcohol intake[a] (mean/SD)	2.5 (3.0)	2.2 (2.8)

Missing	790(3.2%)	163 (4.5%)	
Total	25,022	3,623	14

Abbreviations: HADS, Hospital anxiety depression scale; SD, standard deviation

[a] Number of occasions of alcohol intake per month

Table 2. Conditional intraclass correlation coefficients (ICC) and median odds ratios (MOR)[†] for receiving a disability pension during follow-up, with individuals as first level and couples as second level, among 19,829 individuals in 11,496 couples from the Nord-Trøndelag health study 1995–97 followed until 2007.

	ICC	MOR	*P*-value
Model 1[a]	0.14	2.00	<0.001
Model 2[b]	0.16	2.15	<0.001
Model 3[c]	0.15	2.05	<0.001

[†]Analysed with a discrete-time, logistic multilevel model

[a] Adjusted for age and sex

[b] Adjusted for age, sex, somatic diagnoses, physical handicap, and symptoms and anxiety and depression symptoms (Hospital anxiety depression scale)

[c] Adjusted for age, sex, somatic diagnoses and symptoms, physical handicap, anxiety and depression symptoms (Hospital anxiety depression scale), smoking, hypertension, physical activity, body mass index, alcohol intake and education

Figure 1. Flow chart of study sample, the Nord-Trøndelag health study (HUNT2 survey 1995–97), Norway.

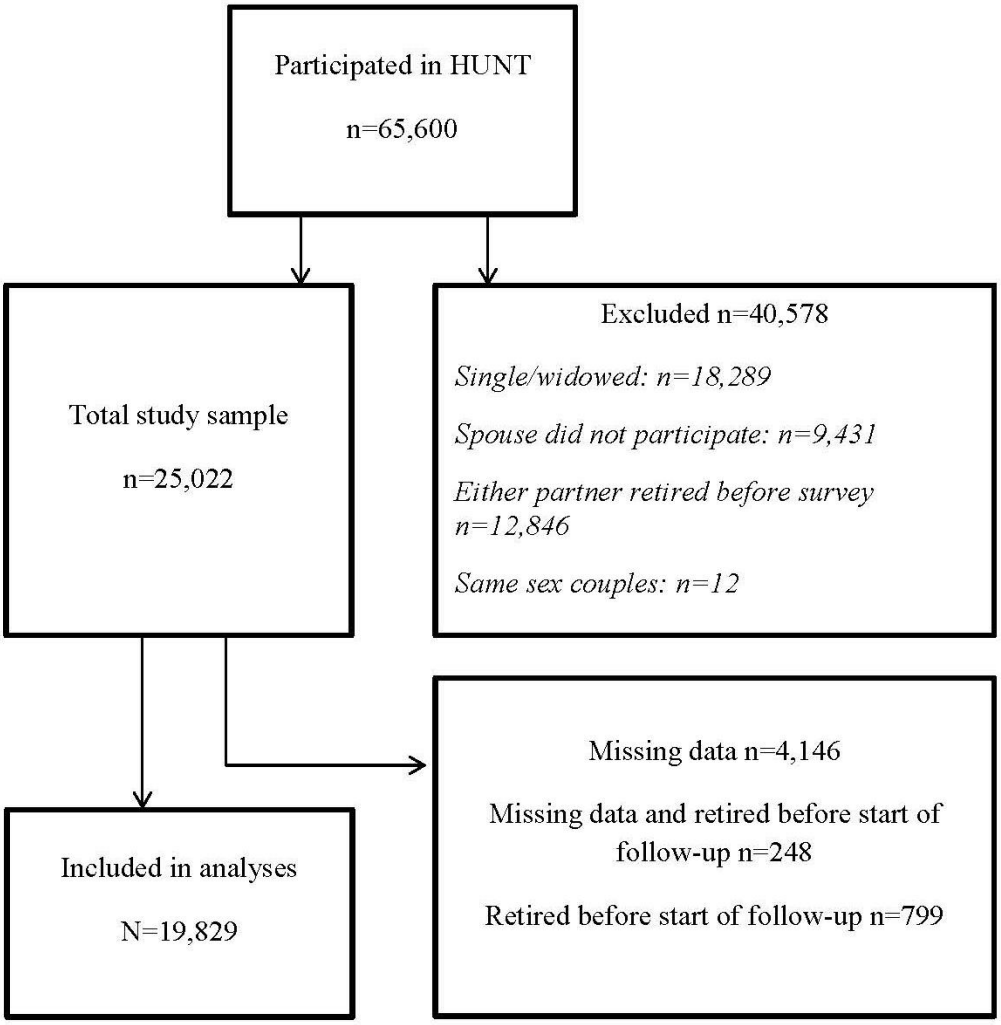

Figure 2. Hazard ratios for disability pension (DP) if husband or wife received a disability pension. Adjusted for age (time variable), somatic conditions, somatic symptoms, symptoms of anxiety and depression (Hospital anxiety depression scale), global health, smoking, body mass index, alcohol intake, physical activity, hypertension and education, presented separately for men (n=9,636) and women (n=10,193). The Nord-Trøndelag health study, 1995-1997, follow-up until 2007