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Psychotropic medication before and after disability retirement by pre-retirement perceived work-related stress

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Abstract (250/250)

Background Retirement has been associated with improved mental health, but it is unclear how much this is due to the removal of work-related stressors. We examined rates of psychotropic medication use before and after the transition to disability retirement due to mental, musculoskeletal, and other causes by pre-retirement levels of perceived work stress (effort-reward imbalance, ERI).

Methods Register-based date and diagnosis of disability retirement of 2766 participants of the Finnish Public Sector study cohort were linked to survey data on ERI, social- and health-related covariates, and to national records on prescribed reimbursed psychotropic medication, measured as defined daily doses (DDDs). Follow-up for DDDs was two to five years before and after disability retirement. We assessed differences in the levels of DDDs before and after retirement among those with high versus low level of pre-retirement ERI with repeated measures regression.

Results Those with high (vs. low) levels of ERI used slightly more psychotropic medication before disability retirement due to mental disorders (rate ratio (RR) 1.14, 95% CI 0.94−1.37), but after retirement this difference attenuated (RR 0.94, 95% 0.80−1.10, p for interaction 0.02). Such a change was not observed for the other causes of disability retirement.

Conclusions The level of psychotropic medication use over the transition to disability retirement due to mental, but not musculoskeletal or other, causes was modified by pre-retirement perceived work-related stress. This suggests that among people retiring due to mental disorders those who had stressful jobs benefit from retirement more than those with low levels of work-related stress.

Key words: disability retirement; mental health; medication use; perceived work-related stress

Introduction

Mental disorders are highly prevalent among employed people, and are one of the main reasons for early exit from paid employment in Finland.[1] Previous studies have shown that a key indicator of mental disorders, namely psychotropic medication use, tends to increase before the transition to disability retirement followed by decrease after the transition, particularly if retirement was due to mental disorders.[2-5] Moreover, in some studies this decrease has been greater among people from a higher socioeconomic background,[3] suggesting that socioeconomic differences in work-related exposures may modify changes in psychotropic medication use around the retirement period. Some studies from Asia found that mental health problems may increase after transition from work to non-work,[6] and voluntary[7] or non-voluntary retirement,[8] but at least in three European studies, retirement has been associated with a decrease in mental fatigue[9] and sleep disturbances[10, 11] and an improvement in mental well-being.[12] Improvements in self-rated health in general as well as in mental health, as indicated by sleep quality, have been found to be greater for people with highly demanding but non-satisfying jobs compared to those working in less stressful jobs.[10, 11, 13] This suggests that relief from stressful working conditions, that naturally occurs at retirement, could positively affect mental health.[14] However, this hypothesis has not been tested in relation to psychotropic medication use as most previous studies on medication use have been register-based, and thus have lacked data on perceived work stress.

Thus, we examined whether psychotropic medication before and after the transition to disability retirement differ between employees with high versus low levels of pre-retirement effort-reward imbalance (ERI), i.e. perceived work-related stress. We used ERI as according to a recent review it is associated with an increased

risk of depressive disorders.[15] We examined separately disability retirement due to any cause, mental disorders, musculoskeletal diseases, and other reasons. The level of psychotropic medication use was assessed using defined daily dose (DDD). According to WHO, DDD is the assumed average maintenance dose per day for a drug used for its main indication in adults.[16] Based on the earlier evidence, we hypothesised that there should be a decline in the level of psychotropic medication after the transition to disability retirement, and that this decline is larger among those reporting high versus low levels of ERI prior to the transition.

Methods

The study population consisted of participants of the Finnish Public Sector (FPS) study, a prospective occupational cohort study with identifiable questionnaire surveys. The eligible population of the original cohort included all employees who had been working for a minimum of six months in the target sites; 10 towns and six hospital districts, between 1991 and 2005 (n = 151 901). Nested survey cohorts included all participants who were employed by the participating organizations at the time of the surveys or had participated in a survey while employed, but later left the organizations (i.e. 'leavers' including retirees). The participants are from a wide range of occupations, from administrative personnel and professionals (e.g., doctors) to semi-skilled and unskilled workers (e.g., cleaners). Surveys were repeated at 4-year intervals. For this study, all participants of the FPS study cohort who retired due to disability between 2000 and 2009 (N=3279) were included (Figure 1). All of them had register-based follow-up for medication purchases for a minimum of two years before and two years after retirement. All who responded to a questionnaire survey about their perceived work-related stress (N=2961) and covariates before their

retirement (survey for current employees in 2000, 2004, or 2008) were included in the analytical sample of 2766 participants. Information on the cause (based on ICD-10 diagnoses) and date of disability retirement was obtained from the Finnish Centre for Pensions. They maintain the register for earnings-related pension schemes, where a disability pension can be granted to a person aged 18–62 years with a work history that has accrued a pension. This disability pension can be granted either as a permanent or as a temporary disability pension. However, it is required that the incapacity to work should last for at least one year. The following ICD-10 codes were used to group the cause-specific disability retirement: F00-99 for mental disorders, and M00-99 for musculoskeletal diseases. These sub-groups were chosen as they are the most common reasons for disability retirement in Finland.[1] The remaining ICD-codes were grouped as "other causes".

Perceived work-related stress

Perceived work-related stress was defined using reports of effort-reward imbalance in the last survey before retirement. Adapted from the standard 10-item ERI scale,[17] we used one survey question on efforts, and three questions (Cronbach's α=0.64) on rewards to assess the level of ERI. The response format for each question was on a 5-point Likert scale (1=strongly disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, and 5=strongly agree) and greater values indicated greater efforts or rewards. The level of ERI was assessed as the ratio of the effort score and the mean reward score. A higher ratio indicated greater imbalance between efforts and rewards. As in prior studies, we used the highest quartile as the cut-off value when defining those reporting high level of ERI.[18, 19] The 4-item abridged scale has a relatively high correlation (R=0.6) with the 10-item version of the standard ERI scale.[18]

Outcome

Data for medication purchases were obtained from a national register maintained by the Social Insurance Institution. The register contains the dispensing date and the WHO Anatomical Therapeutic Chemical (ATC) code for all purchased medications reimbursed to Finnish residents in non-institutional settings. All ATC codes for antidepressants (ATC code N06A), anxiolytics (NO5B) and hypnotics (NO5C) were considered as psychotropic medications. For each follow-up year, our medication data included information on annual DDDs for all psychotropic medication purchases two to five years before and after the transition to disability retirement. For each participant we summed DDDs for all the included medication groups. The main outcome was the sum of annual DDDs for any psychotropic medication and this was treated as a discrete count variable.

Covariates

From the survey data we obtained information about key covariates. Like information about perceived work-related stress, these covariates were taken from the last survey before disability retirement. Time to disability retirement after responding to the survey was on average 2.7 years. In a sensitivity analysis we adjusted for this, but as it had only a negligible effect on the associations, it was excluded from the final models. Based on prior studies[2, 13] we included as covariates sex, age at retirement, marital status (married/cohabiting vs. other), occupational class (high=ISCO occupational classes 1-4 vs. low=ISCO occupational classes 5-9), smoking status (current smoker vs. other), obesity (BMI ≥30 = obese vs. BMI<30 = non-obese), and chronic diseases

(no vs. any of the following: diabetes, coronary heart disease, cancer, rheumatoid arthritis, and asthma).

Statistical analyses

Repeated measures regression models with negative binomial distribution were fitted to examine the ratio between the average annual sum of DDDs (i.e. rate) for psychotropic medication before and after the transition to disability retirement among people with high vs. low levels of pre-retirement ERI. We used a generalized estimating equation (GEE) approach with GENMOD procedure in SAS with an exchangeable correlation structure that considers intra-individual correlations between repeated measurements. This approach seeks to measure the effect of disability retirement – removal of work-related stress captured by ERI – while controlling for unobserved heterogeneity. We used difference-in-difference design that relies on the assumption of a "parallel trend" which requires that in the absence of a treatment, the difference between the 'treatment' and 'control' group is constant over time. More precisely, a parallel trend assumption posits that counterfactual "post-exposure" (i.e. after disability retirement) time trends of the outcome (i.e. psychotropic medication use) would have been identical in the exposed and unexposed groups, that is in the high and low level ERI groups. Two models were fitted: Model 1 included sex, age at retirement, pre-retirement ERI status (high vs. low), period (pre- vs. post-retirement), and the interaction between the ERI status and period. The interaction term was fitted to examine whether change in medication use from pre- to post-retirement was different among those with high vs. low level of ERI. Model 2 was further adjusted for marital status, occupational class, smoking status, obesity and chronic diseases measured before retirement. The results are presented as rate ratios (RR) with 95%

confidence intervals (CI). All analyses were performed with statistical software SAS.[20]

Results

Most of the analytical sample (80%) were female, and 30% reported a high level of ERI before retirement. Those with a high level of pre-retirement ERI were slightly younger compared to those reporting a low level of ERI. The mean age at retirement due to disability was 54.4 (SD=6.2) years for those with high ERI, and 54.6 (SD=6.2) for those with low ERI. Corresponding mean ages for the mental disorder group were 52.8 (SD=6.7) and 52.2 (SD=7.4) years, for the musculoskeletal disease group 55.6 (SD=5.4) and 55.9 (SD=5.2) years, and for the other diseases group 54.0 (SD=6.5) and 54.5 (SD=6.2) years. Mean levels of DDDs for psychotropic medication in the last survey before disability retirement (on average 2.7 years before retirement) were 213 (SD=417) for any cause, 538 (SD=559) for mental disorders, 89 (SD=258) for musculoskeletal diseases, and 139 (SD=323) for other causes. Other descriptive statistics by cause of disability retirement and pre-retirement ERI status are provided in Table 1.

When we examined the impact of all-cause disability retirement, the level of DDDs for psychotropic medications increased before disability retirement while the post-retirement level of use remained stable (Figure 2a). This was true regardless of the ERI status. Among those retiring due to a mental disorder, the increase in the level of DDDs before retirement was much greater than for the other causes (Figure 2b). Those with high level of ERI reached a mean DDD level of 545 in the year before retirement, but the level decreased by over 110 DDDs by the third year post-

retirement. In contrast, among those with a low level of ERI the corresponding decrease in the mean level was smaller; 40 DDD.

Among those retiring for disability due to a musculoskeletal disease, the level of DDDs was non-significantly lower among those with a high (vs. low) level of ERI during pre- and post-retirement periods (Figure 2c). Level of DDDs among those retiring for other causes of disability was higher and it increased steeper around retirement (from -1 to 1) among those with high (vs. low) level of ERI (Figure 2d). While the post-retirement level of DDDs remained stable among those with high ERI, it continued to slowly increase among those with low ERI.

Table 2 presents the rate ratios for the annual sum of DDDs for psychotropic medications for the two- to five-year follow-up periods before and after disability retirement for those with high (vs. low) ERI. The mean level of DDDs before any disability retirement was higher among those with high (vs. low) ERI (RR 1.18, 95% CI 0.99−1.40). This association was not observed for the post-retirement period, but the interaction between ERI status and period was non-significant ($p>0.11$). Before disability retirement due to a mental disorder, those with a high (vs. low) level of ERI had a higher level of medication use (RR 1.14, 95% CI 0.94−1.37), but this difference was not observed post-retirement (RR 0.94, 95% CI 0.80-1.10) (interaction between ERI status and period $p=0.02$). Those with high and low ERI did not differ in terms of the change in psychotropic medication use around the transition to disability retirement due to musculoskeletal disease or other causes (test of interaction $p>0.3$). Parameter estimates from negative binomial regression model for all covariates are presented in Supplemental Table 1.

Discussion

Our findings suggest that pre-retirement perceived work-related stress slightly modifies changes in psychotropic medication use over the transition to disability retirement due to mental disorders. Pre-retirement differences in medication use attenuated after retirement suggesting a larger decrease in post-retirement medication use among those with high vs. low levels of pre-retirement perceived work-related stress. A similar modification was not observed among those retiring for disability due to musculoskeletal diseases or other causes.

We observed a steep increase in the mean level of DDDs for psychotropic medications before disability retirement due to mental disorders both among those with high and low levels of pre-retirement ERI, which agrees with earlier findings.[2-5] Indeed, those with worsening mental health are likely to increase medication use, which is followed by admittance of disability pension and transition into disability retirement. This increase may also be explained by intensified treatment or rehabilitation activities when there is a threat of losing work ability. In Finland, disability retirement is usually preceded by a 300-day sickness absence period during which medical and vocational rehabilitation are initiated.[21] There was a difference in the pre-retirement rate of psychotropic medication use between participants reporting high vs. low levels of pre-retirement ERI and the trends of psychotropic medication use over time were parallel during employment. This difference attenuated after disability retirement due to mental disorders adding to the evidence of the beneficial effects of retirement on mental health.[9, 12] Our findings suggest that disability retirement due to mental disorders is particularly beneficial for those suffering from work-related stress. Similar trends in the rates of medication use before disability retirement also suggest that the assumption for parallel trends was plausible and the

method we used to examine the association of removal of perceived work-related stress with psychotropic medication use was feasible.

Similar differences in the changes in medication use by ERI status were not observed among those retiring for disability due to musculoskeletal causes. In this group, the levels of psychotropic medication use were very similar regardless of the pre-retirement ERI status, both before and after retirement. These findings differ from those of a prior Finnish study, that did not distinguish between the stressed and non-stressed, where psychotropic medication use slightly increased after disability retirement due to other causes than mental disorders.[4] However, in our data, among those with disability retirement due to other than mental disorder or musculoskeletal disease and no pre-retirement work stress, there was a small increase in the level of psychotropic use after retirement. This suggests that there may have been other post-retirement stressors affecting mental health (and medication use), such as financial strain due to the Great Recession between 2007 and 2009.[22]

Among those retiring for other than mental or musculoskeletal causes the difference in the level of DDDs for psychotropic medications between those with high vs. low ERI was significant both in the pre- and post-retirement periods. This suggests that cessation of perceived work-related stress had little beneficial effects on mental health in the group retiring for disability due to other causes. That differences were not observed may be due to the heterogenous nature of this group with most common disease groups being cancers (malignant tumours) and cardiovascular diseases.

There are some limitations to this study. The study population was female dominated and worked in the public sector that may limit the generalizability of the findings to male dominated populations or other work sectors. The generalizability of these findings to other cultures may be limited. For example, the observed mental

health benefits of transferring to different types of retirement have been reported mainly in studies based on European study populations[2-5] but similar benefits were not observed in studies from the Asian region.[7, 8] We did not have any information on the health care use of the cohort participants, i.e., if they received psychotherapy, counselling or other forms of support for their health problems. Moreover, the observed benefits among those suffering from mental health problems may be underestimations because ERI may not capture all aspects of perceived work-related stress. According to the ERI model, stress results from a perceived imbalance between high efforts at work combined with low rewards in terms of money, esteem, and career opportunities including job security. This concept does not include stressful aspects of work that are unrelated to high efforts, such as bullying or low organizational justice.[23, 24] The main strengths of this study are the register-based outcome data that is not affected by reporting bias, and possibility to control for possible individual-level confounders including health behaviours. We also had a rather long follow-up for the medication use both before and after retirement that increases the validity of the effect estimates.

In summary, pre-retirement perceived work-related stress modified the changes in the rates of psychotropic medication use over transition to disability retirement due to mental disorders. The rate of post-retirement medication use decreased more among those with high than low levels of pre-retirement perceived stress, suggesting that relief of work-related stressors is beneficial for those suffering from mental health problems. Our findings also indicate that it would be important to pay attention to the level of work stress among those employees who use psychotropic medication, so that their early exit from paid employment could be prevented and work careers extended. Changes in psychotropic medication use were not modified by

perceived work-related stress among those retiring for disability due to musculoskeletal diseases or other causes.

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Conflict of interest

The authors declare no conflict of interests

Key points

- The decrease in the level of psychotropic medication after transition to disability retirement due to mental disorders was more pronounced among people who reported perceived work-related stress before retirement, as compared to those without work stress.
- This suggests that relief of work-related stressors is beneficial for those suffering from mental health problems, and that focusing on the level of work stress among employees using psychotropic medication could help reduce the medication use.
- Modification by perceived work-related stress was not present among those retiring for disability due to musculoskeletal diseases or other causes.

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Figure legends

Figure 1. Flow chart of the sample selection.

Figure 2. Age at retirement- and sex-adjusted level of defined daily doses (DDD) for psychotropic medications by level of effort-reward imbalance (ERI) in relation to year of disability retirement due to a) any cause of disability, b) mental disorders, c) musculoskeletal disease, and d) other causes.

Table 1. Baseline characteristics (%) of the study population and by the level of pre-retirement effort reward imbalance (ERI), and by type of disability retirement.

	All	High ERI	Low ERI
	%	%	%
Any disability retirement (N)	2766	835	1931
Sex (female)	84	84	83
Not married or cohabiting	27	29	26
Low occupational class	58	59	58
Smoking	24	27	22
Obese	21	20	22
At least one chronic disease	20	20	20
DDD >30*	45	50	43
Disability due to mental disorders (N)	686	241	446
Sex (female)	86	83	88
Not married or cohabiting	32	34	32
Low occupational class	43	41	44
Smoking	25	30	23
Obese	20	22	20
At least one chronic disease	14	16	13
DDD >30*	88	91	87
Disability due to musculoskeletal diseases (N)	1282	386	896
Sex (female)	85	85	85
Not married or cohabiting	25	25	25
Low occupational class	71	75	69
Smoking	22	22	22
Obese	24	21	25
At least one chronic disease	20	20	20
DDD >30*	25	26	25
Disability due to other diseases (N)	797	208	589
Sex (female)	79	82	77
Not married or cohabiting	26	28	25
Low occupational class	50	49	50
Smoking	25	31	23
Obese	18	16	18
At least one chronic disease	26	24	26
DDD >30*	40	47	38

*proportion of those with sum of annual defined daily dose >30

Table 2. Rate ratios (RR) of psychotropic medication annual daily defined dose (DDD) before and after disability retirement among people with high versus low level of pre-retirement effort reward imbalance (ERI).

	Pre-retirement		Post-retirement		*p-value for interaction*
Disability retirement	RR	95% CI	RR	95% CI	*term ERI status*period*[1]
Due to any cause					
Low ERI	1		1		
High ERI - Model 1[2]	1.26	1.05-1.52	1.13	0.97-1.31	0.08
High ERI - Model 2[3]	1.18	0.99-1.40	1.07	0.92-1.24	0.11
Due to mental disorders (ICD F00-99)					
Low ERI	1		1		
High ERI - Model 1[2]	1.21	0.98-1.51	0.99	0.83-1.18	0.02
High ERI - Model 2[3]	1.14	0.94-1.37	0.94	0.80-1.10	0.02
Due to musculoskeletal diseases (ICD M00-99)					
Low ERI	1		1		
High ERI - Model 1[2]	0.73	0.51-1.04	0.78	0.58-1.04	0.66
High ERI - Model 2[3]	0.79	0.54-1.15	0.83	0.61-1.12	0.71
Due to all other causes					
Low ERI	1		1		
High ERI - Model 1[2]	1.65	1.13-2.42	1.49	1.08-2.04	0.38
High ERI - Model 2[3]	1.53	1.07-2.18	1.36	1.02-1.82	0.32

[1] Shows if the change in the level of DDD from pre- to post-retirement period is different among people reporting high vs. low level of pre-retirement effort-reward imbalance

[2] Model includes sex, age at retirement, ERI status (high vs. low level of ERI), period (post- vs. pre-retirement), and ERI status*period

[3] Model includes sex, age at retirement, marital status, occupational class, smoking, obesity, chronic diseases, ERI status (high vs. low level of ERI), period (post- vs. pre-retirement), and ERI status*period

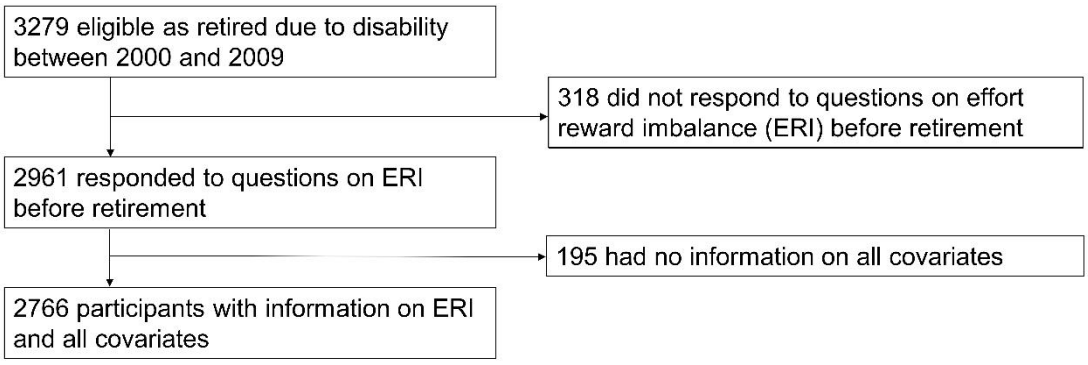

Figure 1. Flow chart of the sample selection.

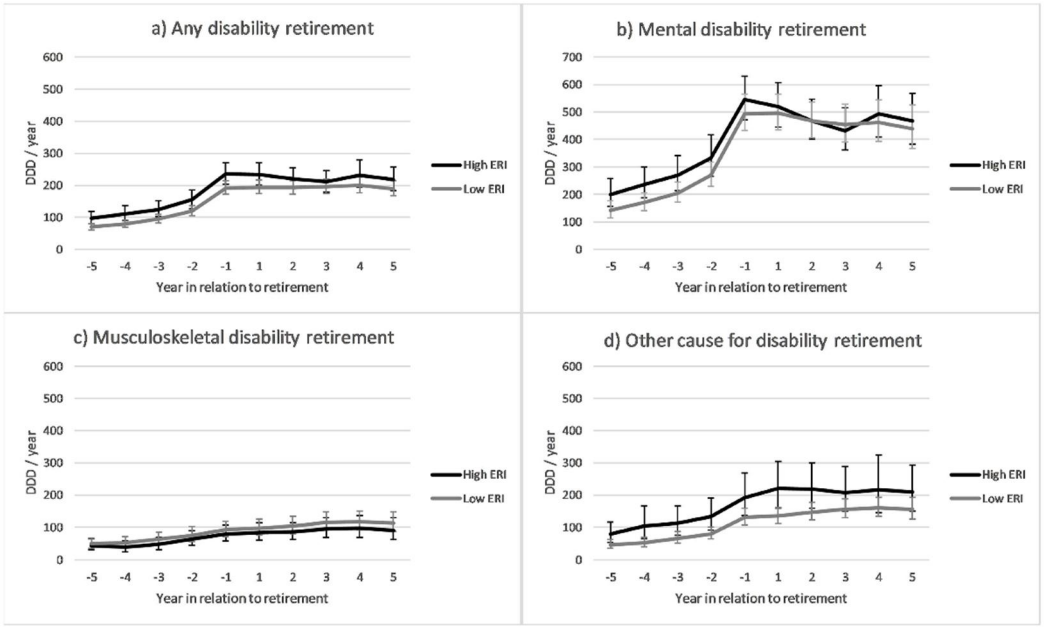

Figure 2. Age at retirement- and sex-adjusted level of defined daily doses (DDD) for psychotropic medications by level of effort-reward imbalance (ERI) in relation to year of disability retirement due to a) any cause of disability, b) mental disorders, c) musculoskeletal disease, and d) other causes.