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ORIGINAL REPORT

PREDICTIVE FACTORS OF FUTURE PARTICIPATION IN REHABILITATION IN THE WORKING POPULATION: THE FINNISH PUBLIC SECTOR STUDY

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Objective: **To examine factors that predict the probability of an employee being granted in-patient multidisciplinary rehabilitation to sustain worklife participation.**
Design: **A prospective cohort study.**
Subjects: **A total of 49,264 public sector employees.**
Methods: **Baseline characteristics were measured from survey responses and registers. Two types of rehabilitation were identified: *early* (for employees only at risk of their work capacity deteriorating in the near future) and *later* (for employees whose work capacity has already deteriorated substantially).**
Results: **During the mean 5.0-year follow-up, 1551 participants were granted early rehabilitation and 1293 received later rehabilitation. Early rehabilitation was predicted by a permanent job, high occupational status, good job control and job security, non-smoking and high physical activity. Both early and later rehabilitation were predicted by the use of painkillers, anxiety, and sickness absence. Later rehabilitation was also predicted by older age, poor self-rated health, and low educational level.**
Conclusion: **Early rehabilitation and, to a lesser extent, later rehabilitation were more often granted to employees with few known risk factors. This finding suggests that preventive measures to reduce the risk of disability pension amongst high-risk employees through rehabilitation are not targeted as intended.**

Key words: longitudinal study; rehabilitation; retirement; disability pension; risk factors.

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INTRODUCTION

Rehabilitation is considered an important means of sustaining worklife participation when there is a risk of deterioration in work capacity. Successful rehabilitation requires an optimal selection of rehabilitants chosen on the basis of their individual characteristics or risk profile (1). Previous investigations have found early rehabilitation to be more effective than delayed rehabilitation with respect to the prevention of work disability (2–4).

For example, in Finland early rehabilitation should be targeted towards workplaces and occupations in which workers are subjected to considerable physical, mental, or social strain that may easily lead to health problems and deterioration in work capacity. The participants should have some functional limitations and be at risk of their work capacity deteriorating in the near future. Later rehabilitation should be targeted towards employees whose work capacity has already deteriorated substantially or is at risk of substantial deterioration over the next few years because of long-term health problems. These employees are usually at risk of temporary or permanent work disability in the near future. They are also subjected to considerable physical, mental, or social strain at the workplace. The objectives of both types of rehabilitation are to sustain and gain long-term improvement in work capacity and reduce the risk of early retirement on health grounds.

While rehabilitation is expensive, little systematic information is available on the extent to which the rehabilitation actually provided has been targeted as intended by rehabilitation schemes. Previous studies have compared the characteristics of rehabilitants with those of non-rehabilitants at the beginning of a rehabilitation period (5–7) and have reported the rate of sickness absence, special medication reimbursement, older age, female gender, manual or lower grade non-manual jobs, and job permanency to be higher among the rehabilitants (7–10).

It is likely that the need for rehabilitation starts to develop and become apparent years before actual rehabilitation intervention. However, to our knowledge, no study has thus far assessed the predictive factors of the probability of being granted rehabilitation in a prospective study design. The aim of this study was to examine whether the process of selecting and accepting rehabilitants is driven by the aim of early and later rehabilitation (i.e. to target employees at risk of early retirement on health grounds). Thus we examined how baseline risk factors in different domains predicted in-patient multidisciplinary rehabilitation in forthcoming years in a large occupational cohort.

METHODS

Study population

This study is part of the Finnish Public Sector Study (FPSS), which is an ongoing prospective study among employees working in 10 towns and 21 hospitals (11). The study, established in 1997/1998, comprises all 151,618 employees with a ≥ 6 month job contract in any year from 1991/1996 to 2005 in 10 towns and 5 hospital districts in Finland. Questionnaire surveys were targeted towards the 94,494 employees who were at work in the years 1997/1998 (sub-cohort), 2000/2001, or 2004. Of these, 70,376 participants responded at least once (response rate 74%). All of the respondents have been followed with repeated surveys at 4-year intervals. In each survey, identifiable questionnaire data on psychosocial factors at work, individual factors, health, and health behaviours have been gathered. The respondents have been linked to employers' registers on all work units, job contracts, sickness absence data and workplace characteristics throughout their employment history. Data from national registers have been linked regarding special reimbursements for severe and chronic illnesses, prescriptions of medicines based on the Anatomical Therapeutic Chemical defined daily dose (ATC-DDD) classification, sickness absences and disability pension with diagnoses, granted rehabilitation with diagnoses, employment history, retirement, cancer morbidity, hospital admissions with diagnoses, and cause-specific mortality. We used the unique personal identification codes that are assigned to all citizens in Finland to link the participants to employers' records, the Register of Finnish Centre for Pensions, the Register of Statistics Finland, the Finnish Cancer Registry and registers kept by the Finnish Social Insurance Institution (SII) – the Drug Reimbursement Register, the Drug Prescription Register, the Sickness Absence Register and the Rehabilitation Register.

For this study, we included the participants who responded to an identifiable survey either in 1997–1998 or 2000–2002. The questionnaires addressed retirement-related risk factors related to demographic characteristics, work, health behaviours, and health status. The first survey response was considered for those who answered both surveys, yielding a sample of 53,416 employees (response rate 70%, 81% women). We excluded 4152 employees who participated in rehabilitation provided by the SII in the survey year or the following year to ensure that the rehabilitation process had not been initiated at baseline. The study cohort comprised a total of 49,264 employees (81% women) with a mean age of 43.5 (standard deviation (SD) 9.4) years. This cohort was followed until 31 December 2005.

The study was approved by the ethics committee of the Finnish Institute of Occupational Health.

Outcome: rehabilitation

Data on granted rehabilitation were obtained from the Rehabilitation Register kept by the SII, the main provider of state-subsidized rehabilitation in Finland. Of the different types of multidisciplinary rehabilitation provided to working people by SII, the two most common types were studied: vocationally-oriented medical rehabilitation, which is a Finnish form of *early rehabilitation*, and work-capacity training programme and musculoskeletal medical rehabilitation courses as a form of *later rehabilitation*. The objectives of both types of rehabilitation are to sustain and gain long-term improvement in work capacity and to reduce the risk of early retirement on health grounds.

Selection for rehabilitation is based on a physician's referral (usually occupational physicians), and the decision to grant rehabilitation is made in social insurance offices. In 2009, the rates of rejected applications were 13.1% for early rehabilitation, 14% for work-capacity training programmes, and 6.9% for musculoskeletal medical rehabilitation courses.

Potential predictors of rehabilitation

As the aim of the rehabilitation studied by us is to support and improve the work capacity of ageing employees, we measured risk factors that have earlier been found to be associated with work disability (temporary or permanent). The demographic characteristics included age, gender, occupational grade, type of employer, region, education, and marital status. Information on these variables was extracted from the employers' records, except for education and marital status, which were taken from the survey. Survey responses were used to determine the work characteristics, such as work schedules (shift work), intention to leave work, job insecurity, job control, and life stress. Data on the type and the length of the job contract were derived from the employers' registers. Health risk behaviours were assessed from the survey responses and included current smoking, excessive alcohol consumption, obesity, and low physical activity. Health indicators were taken from the survey responses and included psychological distress, anxiety, and self-rated health. Data on physical health were obtained from the Drug Reimbursement Register. Information on the use of prescribed painkillers and antidepressants was derived from the Drug Prescription Register. Data on the beginning and end dates of all reimbursed sickness absences were obtained from the Sickness Absence Register. Information on previous rehabilitation was extracted from the Rehabilitation Register.

Definitions

Age was categorized into 3 groups (< 41, 41–50 and > 50 years). Occupational grade was categorized according to the International Standard Classification of Occupations (ISCO) into managers and professionals (ISCO major groups 1–2), technicians and associate professionals (group 3), clerks (group 4), service workers (group 5), and manual workers (groups 6–9). The type of employer was categorized as municipality or hospital district and the residential region as Southern Finland, Central Finland, or Northern Finland. Marital status was defined as married or cohabiting vs single, divorced, or widowed. Educational level was dichotomized as high school vs no high school.

The type of job contract was dichotomized as permanent or temporary and the length of the contract was categorized into 3 groups (< 1 year, 1–9 years, > 9 years). Shift work was determined by a direct question: "Do you work regular day shifts?" (yes/no). An intention to leave work identified those who would, if possible, switch to another job or give up work and those who would continue to work in their jobs. Job insecurity was assessed by 2 questions, which estimated the threat of long-term unemployment or dismissal (from 1 = very little to 5 = very much). A mean score was computed and divided into tertiles. Job control was measured by 9 items derived from the Job Content Questionnaire. A mean score was computed and divided into tertiles to indicate low, intermediate and high job control. Life stress was measured by the occurrence of severe financial difficulties during the baseline year (yes/no).

Current smoking was defined as no/yes. The participants reported their average weekly consumption of beer, wine and spirits in portions. The portions were converted into grams of pure alcohol, and > 210 g of pure alcohol per week was considered a cut-off for excess alcohol consumption (no/yes). Derived from self-reported weight and height, the body mass index (BMI; kg/m^2) was dichotomized to indicate obesity (BMI ≥ 30). The participants assessed the quantity of their physical activity equivalent to walking, brisk walking, jogging, or running. Low physical activity was defined as ≤ 2 Metabolic Equivalent Task (MET) h per day (no/yes).

Psychological distress (no/yes) was evaluated from the 12-item version of the General Health Questionnaire (GHQ), using 3/4 as a cut-off point. Anxiety was assessed with the 6-item Trait Anxiety Inventory. A mean score was computed and divided into tertiles to indicate low, intermediate and high anxiety. Self-rated health status was classified as sub-optimal (average or worse) or optimal (good or very good health). Previous rehabilitation was defined as rehabilitation provided by the SII within the 3 years immediately prior to the baseline survey year. Baseline physical health included the presence of a chronic disease (no/yes), as indicated by special reimbursement for the medical treatment of hypertension, cardiac failure, ischaemic heart disease, diabetes, asthma or other chronic obstructive lung disease, and rheumatoid arthritis derived from the Drug Reimbursement Register. From the Drug Prescription Register, we determined the use

of prescribed painkillers and antidepressants. During the survey year, the participants who purchased more than 30 DDDs of analgesics ATC classification code N02 and M01A) were coded as painkiller users; and those who purchased more than 30 DDDs of antidepressants (ATC code N06A) were coded as antidepressant users. Data on the beginning and end dates of all reimbursed sickness absences were used to distinguish the participants who had < 60 absence days from those who had 0 or 1–60 absence days during the last 3 years.

Statistical analysis

Follow-up began on 1 January immediately after the year of the survey response and ended at the beginning of rehabilitation, retirement (early retirement on health grounds or statutory retirement), death, or 31 December 2005, whichever came first. We used Cox proportional hazard models to study the associations between the potential predictors and the subsequent beginning of rehabilitation. The results were reported as hazard ratios (HR) and their 95% confidence intervals (95% CI). The first set of our analyses examined the associations in four different groups of predictors (demographics, work or life stress, health behaviours and health-related variables) adjusted for demographics. We then entered all of the significant predictors of rehabilitation found in step 1 into a single model to examine their independent associations with rehabilitation.

All of the statistical analyses were performed using SAS© 9.2 software (SAS Institute, Inc., Cary, North Carolina, USA).

RESULTS

Of the total of 49,264 employees, 2844 (5.8%) were granted rehabilitation during the mean follow-up of 5.0 years (SD 1.7, range 1.0–8.0). Of the rehabilitants, 1551 started early rehabilitation (86.8% women, mean age 44.0 years) and 1293 participated in later rehabilitation (89.8% women, mean age 48.0 years).

Both early and later rehabilitation were more likely to be granted to women than to men. Early rehabilitation was more likely to be granted to employees aged 41–50 years and with the highest occupational status, while later rehabilitation was associated with an older age and lower educational level (Table I). These associations remained significant after adjustment for all of the statistically significant variables related to demographics, work and life stress (Table II), health behaviours (Table III), and health (Table IV).

Fixed-term employees and those with a short tenure had a lower probability of being granted any rehabilitation than did permanent employees. Low job control and high job insecurity were associated with a 20–30% lower likelihood of early rehabilitation and were not independently associated with later rehabilitation (Table II).

Obesity was not associated with early rehabilitation, but was associated with later rehabilitation when controlled for demographics. This association was attenuated after simultaneous control for all of the significant baseline predictors. Smokers were 20–22% less likely to receive any rehabilitation than non-smokers. This association was robust in all of the adjustments. A corresponding finding was observed for physical inactivity,

Table I. *Demographic characteristics as predictors of subsequent rehabilitation. Hazard ratios (HR) and 95% confidence intervals (95% CI) derived from Cox proportional hazard models*

		Early rehabilitation		Later rehabilitation	
	n (%)	Model 1[a] HR (95% CI)	Model 2[b] HR (95% CI)	Model 1[a] HR (95% CI)	Model 2[b] HR (95% CI)
Gender					
Women	39,719 (81)	1.57 (1.33–1.83)	1.51 (1.29–1.77)	1.72 (1.45–2.03)	1.56 (1.31–1.87)
Men	9,545 (19)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Age group, years					
≤40	18,314 (37)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
41–50	17,168 (35)	2.62 (2.33–2.95)	2.39 (2.11–2.70)	4.64 (3.86–5.57)	3.76 (3.07–4.62)
≥51	13,782 (28)	0.73 (0.61–0.88)	0.69 (0.57–0.84)	5.17 (4.27–6.27)	3.66 (2.93–4.57)
ISCO grade					–
1–2 (managers)	13,855 (28)	1.00 (ref)	1.00 (ref)	1.00 (ref)	
3	12,887 (27)	0.72 (0.62–0.83)	0.78 (0.67–0.91)	0.99 (0.82–1.19)	
4	3,511 (7)	0.51 (0.40–0.65)	0.58 (0.45–0.75)	0.92 (0.71–1.18)	
5	10,647 (22)	0.67 (0.57–0.80)	0.79 (0.68–0.93)	1.14 (0.93–1.39)	
6–9 (manual)	7,728 (16)	0.57 (0.47–0.71)	0.75 (0.62–0.92)	1.22 (0.99–1.51)	
Type of employer					
Municipality	31,744 (64)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Hospital district	17,520 (36)	1.20 (1.07–1.35)	1.02 (0.90–1.17)	0.83 (0.73–0.95)	0.97 (0.81–1.16)
Residential region					
Southern Finland	25,569 (52)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Central Finland	16,775 (34)	1.23 (1.10–1.37)	1.61 (1.42–1.83)	2.04 (1.80–2.32)	2.76 (2.35–3.25)
Northern Finland	6,920 (14)	1.08 (0.92–1.28)	1.00 (0.84–1.19)	2.91 (2.51–3.37)	2.92 (2.43–3.52)
Marital status			–		–
Married/cohabiting	37,057 (76)	1.06 (0.94–1.20)		1.05 (0.92–1.20)	
Single	11,634 (24)	1.00 (ref)		1.00 (ref)	
High educational level			–		
No	24,624 (51)	1.13 (0.99–1.29)		1.61 (1.37–1.89)	1.45 (1.25–1.68)
Yes	23,816 (49)	1.00 (ref)		1.00 (ref)	1.00 (ref)

[a]Adjusted for demographics variables.

[b]Adjusted for statistically significant variables related to demographics, work or life stress, health behaviours, or health.

ISCO: International Standard Classification of Occupations.

Table II. *Work stress or life stress as predictors of subsequent rehabilitation. Hazard ratios (HR) and 95% confidence intervals (95% CI) derived from Cox proportional hazard models*

		Early rehabilitation		Later rehabilitation	
	n (%)	Model 1[a] HR (95% CI)	Model 2[b] HR (95% CI)	Model 1[a] HR (95% CI)	Model 2[b] HR (95% CI)
Job contract					
Permanent	39,016 (81)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Fixed–term	9,350 (19)	0.44 (0.37–0.53)	0.51 (0.42–0.63)	0.51 (0.40–0.63)	0.65 (0.49–0.87)
Length of job contract, years					
≥10	6,114 (12)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
1–9	32,277 (66)	0.95 (0.81–1.11)	1.15 (0.97–1.35)	0.77 (0.65–0.91)	0.89 (0.74–1.07)
<1	10,873 (22)	0.57 (0.47–0.71)	0.98 (0.78–1.23)	0.48 (0.38–0.60)	0.64 (0.48–0.84)
Shift work			–		–
No	31,409 (65)	1.00 (ref)		1.00 (ref)	
Yes	17,140 (35)	0.94 (0.84–1.06)		1.06 (0.94–1.20)	
Intention to leave work					
Continue the job	24,271 (51)	1.00 (ref)	–	1.00 (ref)	1.00 (ref)
Switch jobs	12,633 (27)	1.11 (0.98–1.25)		1.20 (1.04–1.39)	0.99 (0.84–1.16)
Give up the job	10,658 (22)	1.00 (0.87–1.16)		1.14 (1.00–1.31)	0.84 (0.72–0.98)
Financial difficulties			–		
No	37,976 (93)	1.00 (ref)		1.00 (ref)	1.00 (ref)
Yes	2,862 (7)	1.09 (0.89–1.33)		1.26 (1.01–1.57)	1.00 (0.79–1.27)
Job insecurity					
Low	19,165 (39)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Intermediate	18,717 (38)	0.92 (0.82–1.03)	0.92 (0.82–1.04)	1.06 (0.93–1.21)	1.06 (0.91–1.22)
High	10,848 (22)	0.71 (0.61–0.82)	0.79 (0.67–0.92)	1.17 (1.01–1.36)	1.09 (0.92–1.30)
Job control					
Low	15,333 (31)	0.79 (0.69–0.92)	0.81 (0.70–0.94)	1.19 (1.02–1.39)	0.98 (0.83–1.16)
Intermediate	16,204 (33)	0.96 (0.85–1.08)	0.95 (0.84–1.08)	1.13 (0.97–1.31)	0.99 (0.85–1.17)
High	17,321 (35)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)

[a]Adjusted for demographics variables.
[b]Adjusted for statistically significant variables related to demographics, work or life stress, health behaviours, or health.

in that early rehabilitation was 15% less likely to be granted to physically inactive participants than to others. Although later rehabilitation was more often granted to physically inactive employees, this association was completely attenuated in the fully adjusted model. High alcohol consumption was not associated with subsequent rehabilitation (Table III).

Sickness absence, use of painkillers and trait anxiety were independently associated with both types of rehabilitation. Both a moderate and a high number of sickness absence days doubled the likelihood of later rehabilitation, but the association with early rehabilitation was weaker and was observed only amongst those with a moderate number of sickness absence days. Use of painkillers predicted an approximately 22% higher likelihood of early rehabilitation and a more than 44% higher likelihood of later rehabilitation. The employees belonging to the highest tertile in anxiety were over 40% more

Table III. *Health risk behaviours as predictors of subsequent rehabilitation. Hazard ratios (HR) and 95% confidence intervals (95% CI) derived from Cox proportional hazard models*

		Early rehabilitation		Later rehabilitation	
	n (%)	Model 1[a] HR (95% CI)	Model 2[b] HR (95% CI)	Model 1[a] HR (95% CI)	Model 2[b] HR (95% CI)
Obesity, BMI >30			–		
No	43,186 (90)	1.00 (ref)		1.00 (ref)	1.00 (ref)
Yes	4,964 (10)	0.94 (0.79–1.14)		1.36 (1.17–1.59)	1.16 (0.98–1.39)
Smoking					
No	38,986 (82)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Yes	8,588 (18)	0.78 (0.68–0.91)	0.77 (0.66–0.89)	0.80 (0.68–0.94)	0.73 (0.62–0.87)
Alcohol consumption, g/week			–		–
0–210	44,775 (92)	1.00 (ref)		1.00 (ref)	
>210	3,887 (8)	1.02 (0.84–1.24)		0.97 (0.78–1.22)	
Physical inactivity					
No	36,967 (76)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Yes	11,409 (24)	0.85 (0.75–0.97)	0.85 (0.75–0.97)	1.14 (1.00–1.29)	0.99 (0.85–1.14)

[a]Adjusted for demographics variables.
[b]Adjusted for statistically significant variables related to demographics, work or life stress, health behaviours or health.
BMI: body mass index.

Table IV. *Health problems as predictors of subsequent rehabilitation. Hazard ratios (HR) and 95% confidence intervals (95% CI) derived from Cox proportional hazard models*

		Early rehabilitation		Later rehabilitation	
	n (%)	Model 1[a] HR (95% CI)	Model 2[b] HR (95% CI)	Model 1[a] HR (95% CI)	Model 2[b] HR (95% CI)
Previous rehabilitation					–
No	47,383 (96)	1.00 (ref)	1.00 (ref)	1.00 (ref)	
Yes	1,881 (4)	0.33 (0.21–0.52)	0.27 (0.17–0.43)	1.21 (0.97–1.52)	
Sickness absence (days/3 years)					
No	33,675 (68)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
1–59	11,219 (23)	1.17 (1.04–1.32)	1.15 (1.02–1.31)	2.06 (1.82–2.34)	1.75 (1.52–2.02)
≥60	4,370 (9)	1.08 (0.89–1.32)	1.06 (0.86–1.31)	2.80 (2.41–3.27)	1.82 (1.51–2.20)
Chronic medical problems[c]			–		
No	43,903 (89)	1.00 (ref)		1.00 (ref)	1.00 (ref)
Yes	5,361 (11)	0.94 (0.78–1.13)		1.17 (1.00–1.37)	1.01 (0.85–1.21)
Use of antidepressants			–		
No	39,626 (94)	1.00 (ref)		1.00 (ref)	1.00 (ref)
Yes	2,439 (6)	1.09 (0.87–1.36)		1.82 (1.51–2.21)	1.18 (0.94–1.48)
Use of painkillers					
No	32,442 (77)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Yes	9,623 (23)	1.21 (1.07–1.36)	1.22 (1.07–1.38)	2.02 (1.79–2.28)	1.44 (1.25–1.67)
Anxiety					
Low	13,476 (28)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Intermediate	19,275 (40)	1.23 (1.08–1.40)	1.30 (1.14–1.49)	1.35 (1.15–1.57)	1.22 (1.02–1.45)
High	15,114 (32)	1.31 (1.14–1.50)	1.42 (1.23–1.64)	1.95 (1.68–2.27)	1.42 (1.17–1.72)
Poor self-rated health			–		
No	36,957 (76)	1.00 (ref)		1.00 (ref)	1.00 (ref)
Yes	11,727 (24)	1.01 (0.89–1.15)		2.30 (2.05–2.58)	1.77 (1.52–2.04)
Psychological distress			–		
No	37,137 (76)	1.00 (ref)		1.00 (ref)	1.00 (ref)
Yes	11,840 (24)	1.11 (0.99–1.25)		1.62 (1.44–1.82)	1.14 (0.98–1.33)

[a]Adjusted for demographics variables.
[b]Adjusted for statistically significant variables related to demographics, work or life stress, health behaviours or health.
[c]Hypertension, cardiac failure, ischaemic heart disease, diabetes, asthma, or other chronic obstructive lung disease, and rheumatoid arthritis.

likely to be rehabilitated than those in the lowest tertile. Poor self-rated health was associated only with later rehabilitation, increasing the probability by 77%. The use of antidepressants and psychological distress were associated only with later rehabilitation when adjusted for demographics, but not in the fully adjusted models. Chronic medical conditions were not associated with either type of rehabilitation (Table IV).

DISCUSSION

Two main results can be identified in this prospective cohort study of nearly 50,000 employees in the public sector. Firstly, employees with major risk factors for early retirement on health grounds were not more likely to be granted rehabilitation than those with no risk factors. Secondly, early rehabilitation was more likely to be associated with factors that usually predict better health and better job satisfaction, such as a permanent job, high occupational status, good job control, low job insecurity, and healthy lifestyle.

In this study, many factors previously found to be associated with high risks of health impairment and work disability were not predictive of rehabilitation aimed at sustaining worklife participation. Although a low occupational status, a low level of education and a low income are strong correlates of health problems, diseases, and premature death (12, 13), we found that participation in early rehabilitation was more likely to be granted to those with the highest occupational statuses. One reason could be the great responsibility and work load in leading positions, resulting in fatigue, depression, and anxiety (14, 15). Because of overburdening, these employees may regularly seek occupational healthcare, which can lead to referrals to rehabilitation. It is also possible that medical professionals are prone to recommend rehabilitation to people with higher rather than lower statuses.

In European countries, 4–12% of the working-age population receive disability pension benefits annually (16, 17). Depressive disorders and cardiovascular diseases are the two leading contributors to disease burden across Europe (18, 19). Along with musculoskeletal diseases they also account for the most common disease groups leading to disability retirement among those of working age in most Western societies (16). The 7 most important modifiable risks responsible for over half of the disease burden across Europe are tobacco, high blood pressure, alcohol, cholesterol, overweight, poor diet, and physical inactivity (20). In addition to these risk factors, recent systematic reviews and meta-analyses suggest that work stress due to, for example, low job control or high job insecurity, is associated with an increased risk of cardiovascular diseases and mental health problems (21–23), an increased incidence of musculoskeletal disorders (24, 25), an increased rate of

sickness absence (26), and an increased risk of disability retirement (17, 27). In our study, there was no association between behaviour-related health risks (i.e. obesity, smoking, sedentary lifestyle and high alcohol intake) and future rehabilitation. However, these 4 risk factors belong to the 7 most important modifiable risks (20). Even more cause for concern comes from the following observations related to chances to obtain rehabilitation to sustain worklife participation: (*i*) lack of smoking increased the chances; (*ii*) lack of physical inactivity increased the chances; and (*iii*) lack of work stress in terms of high job control and high job insecurity increased the chances. A large body of evidence exists for effective measures to modify these risks, reducing the number of years lost due to disability (20). Obviously, the selection process fails to identify the actual population at risk. Identifying the reasons for this failure is an important question for future studies.

The significance of gender, age, and region of residence in both rehabilitation groups was expected. It has been reported that women have a higher prevalence of pain and musculoskeletal and psychiatric symptoms than men (28, 29). As a possible explanation for the greater use of rehabilitation amongst Finnish women than amongst men, previous studies have suggested a lower threshold for seeking medical help, a better motivation for rehabilitation, and even lower alcohol consumption (7). The later rehabilitation courses are partly targeted towards employees with chronic musculoskeletal diseases, i.e. older employees, and are partly aimed at ageing employees with a long employment history.

The use of painkillers was common in both groups of future rehabilitants. It is understandable for the later rehabilitation group (older people with chronic medical conditions), but the significance of use of painkillers in the early rehabilitation group cannot be explained easily. We can only assume that the lower threshold for seeking medical help and medication might be connected to a lower threshold for seeking rehabilitation. Likewise, employees with mild musculoskeletal pain may seek rehabilitation more often. There is also a possibility that employees who visit an occupational physician for a painkiller prescription would also be noticed more easily by occupational health professionals as potential rehabilitants.

Having a permanent job increased the likelihood of being granted rehabilitation. It has been suggested that the reason for this association may be the fact that having a job is often emphasized in physician's referral and in the selection for rehabilitation that takes place in social insurance offices (7). On the other hand, temporary employees are probably not fully covered by occupational health services, while such services play an important role in people seeking and being recommended for rehabilitation (7). In addition, arranging for an absence from work during rehabilitation or illness may be easier for employees with a permanent job. Temporarily employed workers have been shown to have a risk of receiving a disability pension that is similar to the risk of permanently employed people, but they more often have severe chronic health problems and increased mortality (30). Moreover, temporary employment has been found to correlate with higher job insecurity (12), which increases the likelihood of attending work while ill (31, 32).

Individual dispositions, such as anxiety proneness, may affect the likelihood of obtaining rehabilitation. In our study, employees who were prone to anxiety were more often granted rehabilitation than their co-workers who were less prone to anxiety. The probability of reporting symptoms and using health services was higher amongst persons with dispositional anxiety (33, 34). It is possible that these persons are more prone to seek help and advice, and therefore receive more attention from occupational healthcare professionals. However, they are not necessarily a high-risk population in terms of hard end-points, such as coronary heart disease (35).

The strengths of our study are its large study population with a long follow-up period and the possibility for wide-ranging data collection from surveys and national registers. However, although we obtained data a few years before rehabilitation, it was impossible to take into account all of the possible changes in the studied predictors prior to the actual intervention. Our study population consisted of employees in the Finnish public sector only, and therefore the generalizability of the findings to other branches of industry and other societies may be reduced.

In conclusion, when Western governments are launching policies to promote longer participation in worklife, rehabilitation is considered to be important in tackling the increasing rate of sickness absenteeism and early retirement. This study from Finland suggests that the selection of participants for rehabilitation is not based on the participants' risk profiles derived from current evidence on risk factors for these adverse outcomes. Many factors previously found to be associated with high risks of early retirement on health grounds were not predictive of future participation in rehabilitation in this study, leaving important risk groups outside rehabilitation. Instead, employees who were healthier, had fewer behavioural health risks and were exposed to lower levels of work-related risk factors progressed to rehabilitation. This may result in low cost-effectiveness, especially regarding early rehabilitation.

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