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Short- and long-term changes in perceived work ability after interdisciplinary rehabilitation of chronic musculoskeletal disorders: prospective cohort study among 854 rehabilitants

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Abstract

Objective: To investigate the changes in rehabilitants' perceived work ability after rehabilitation for chronic musculoskeletal disorders with respect to the baseline characteristics.

Design: Prospective cohort study based on register and repeated survey data.

Setting: Public sector employees in ten towns and five hospital districts.

Subjects: A total of 854 employees who participated in the rehabilitation programme owing to common chronic musculoskeletal disorders between 1997 and 2009.

Interventions: Interdisciplinary, biopsychosocial, inpatient rehabilitation programme targeting people of working age with common chronic musculoskeletal disorders. The programme was executed in different rehabilitation centres across the country and funded by the Social Insurance Institution of Finland.

Main measures: Differences in perceived work ability level before and after rehabilitation. Data were derived from repeated surveys on average 2.1 years before rehabilitation, and 1.5 years (short-term follow-up) and 6.0 years (long-term follow-up) after rehabilitation.

Results: Before the rehabilitation, perceived work ability was 7.13 (SD 1.84) among the rehabilitants and 7.27 (SD 1.72) in the matched reference population. Among rehabilitants, this figure decreased by 0.82 (95% confidence interval –0.98 to –0.67) in the short-term and by 1.26 (95% confidence interval –1.45 to –1.07) in the long-term follow-up. Only slight differences in steepness of this deterioration were observed between subgroups, created based on the participants' baseline characteristics.

Conclusions: Perceived work ability of participants, in an interdisciplinary biopsychosocial rehabilitation programme for common musculoskeletal disorders, deteriorated regardless of any studied pretreatment characteristics. The improvement of work ability may be an unrealistic goal for participants in this type of rehabilitation.

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Keywords

Work ability, work disability, predictors, perceived work ability, work ability index, rehabilitation goal, prospective study

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Introduction

Preserving or improving work ability is a common goal of interdisciplinary medical rehabilitation programmes targeted at the working age population. This goal often exists even if the rehabilitation programme is not purely vocational but rather medical, targeting people with common chronic and possibly progressive musculoskeletal disorders, such as osteoarthritis or intervertebral disc degeneration. However, there is no evidence suggesting that such a goal can be attainable, and that work ability can be improved or its deterioration process interrupted, even for some time period, by using medical rehabilitation methods. Work ability is understood as a balance between work demands and a person's biopsychosocial capacity, including his health status, professional skills, values, attitudes, and motivation.¹ Poor musculoskeletal capacity has been found to be associated with decreased work ability,¹ and musculoskeletal disorders are responsible for at least one-third of all sickness absence.²

Work ability deteriorates with ageing. Evidence shows that steepness of this deterioration in general population is associated with factors such as gender, socioeconomic status, lower educational level, work-related aspects (e.g. steeper deterioration with non-permanent job contract, low job insecurity and low job control, poor support by employer, etc.), health-behaviour risks, rates of sickness absence, physical and psychological health, and medication consumption.³⁻⁶ Change of work ability owing to medical rehabilitation, as well as the influence of common predictors of work disability on this change, is not widely studied.^{2,7-10} It is suggested that vocational goals of rehabilitation may only be achieved at earlier stages of work ability deterioration. It may not be attainable at later stages, especially if the intervention scheme is constrained to medical

rehabilitation methods without including wider aspects of vocational rehabilitation.²

The objective was to investigate the changes in rehabilitants' perceived work ability following interdisciplinary inpatient rehabilitation with respect to their pretreatment individual characteristics. A reference population matched by age, gender, and occupational status was used to demonstrate simultaneous changes in perceived work ability among healthy employees. Perceived work ability was used as a main outcome for this study as it is a reliable correlate of objective incapacity for work, measured by sick leaves and early retirement.^{1,11}

Methods

This research was a part of the Finnish Public Sector Study, an ongoing prospective cohort study of employees working in 10 municipalities and 21 hospitals.¹² The study comprises all 151,618 employees with a job contract of six months or more in any year between 1991 and 2005. Data have been gathered from repeated responses to survey and linked to employers' records and national health registers. We used data from responses to survey in 1997-1998, 2000-2002, 2004-2005, and 2008-2009, including everyone who responded at least twice, the baseline response being either in 1997-1998 or 2000-2002. The potential participants were those who had participated in the studied rehabilitation after the baseline survey ($n = 1490$). We excluded all subjects who responded to baseline survey less than six months before rehabilitation ($n = 146$), those who did not response to any of follow-up surveys ($n = 473$), and those who had missing data on pretreatment level of perceived work ability ($n = 11$). The selection process is shown in Figure 1. The ethics committee of the Hospital District of Helsinki and Uusimaa approved the study.

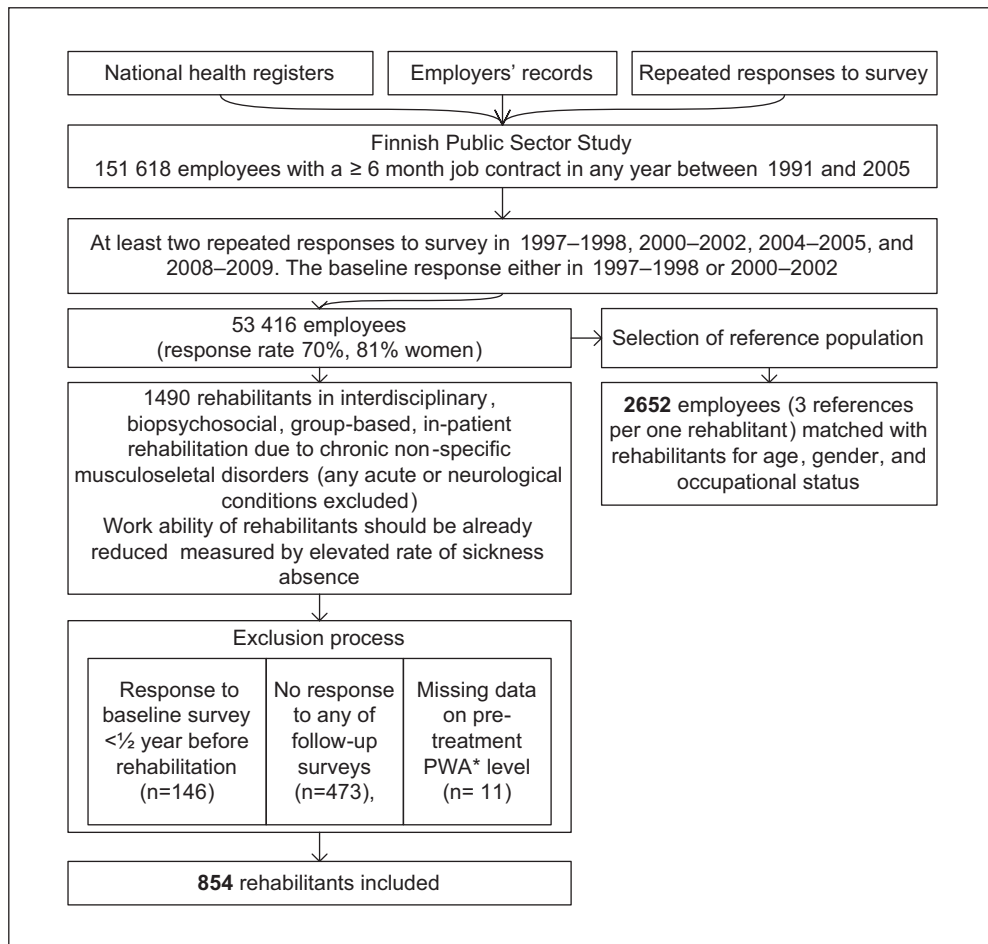


Figure 1. Selection process of study and reference populations.

*Perceived work ability.

We used the participants' personal identification codes (a unique number that all Finns receive at birth and is used for all contacts with the social welfare and healthcare systems) to retrieve data from the rehabilitation register kept by the Social Insurance Institution, one of the main providers of rehabilitation for Finns of working age. Potential rehabilitants were selected by their physicians. Applications for rehabilitation were approved by the local Social Insurance Institution offices based on the physician's referral containing appropriate confirmed diagnoses. This national register provides data on all rehabilitation granted by the

Social Insurance Institution, including the type of rehabilitation, the year of granting, and the main diagnosis for rehabilitation. Even though rehabilitation programmes are implemented in different free-standing rehabilitation facilities, the Social Insurance Institution defines their inclusion criteria and structure, the multiprofessional team composition, the modalities, and the assessment tests.

Several rehabilitation programmes sponsored by the Social Insurance Institution were considered similar enough for the purpose of this study, taking into account their inclusion criteria, structures, and methods. These programmes were: rehabilitation

courses for musculoskeletal disorders, courses for patients with fibromyalgia, and a so-called 'workplace health promotion programme'. All of them represent medical rehabilitation. While rehabilitation courses for musculoskeletal disorders and fibromyalgia are essentially medical, the workplace health promotion programme is vocationally oriented, including also some aspects of vocational rehabilitation. In case of the workplace health promotion programme, only those who had a confirmed diagnosis of chronic musculoskeletal disorders as a main reason for rehabilitation were included. In this study, included participants have been referred to rehabilitation by their physicians owing to a chronic non-specific musculoskeletal disorder (usually a degenerative disease such as osteoarthritis or intervertebral disc degeneration). People with neurologic disorders (such as stroke or traumatic brain injury), rheumatoid arthritis, acute trauma, or at the earlier postsurgery stages are not accepted for these rehabilitation programmes. According to the sponsor's inclusion criteria, the participant's work ability, measured by elevated rate of sickness absence (usually several weeks or months), should already be reduced.

The studied programmes represent inpatient, interdisciplinary, biopsychosocial rehabilitation, which target the improvement or preservation of health status and work ability of the working age participants with musculoskeletal disorders. The studied programmes were group-based (6–10 rehabilitants per group) containing two to four inpatient periods with supervised activity four to six hours per day (15–33 days in total), and the entire duration of one to two years. The modalities included physical training and psychological education. The participants were encouraged to adopt a healthier lifestyle, and it was anticipated that they will achieve greater aerobic capacity, muscle strength, and endurance, as well as better self-management of stress. Between the inpatient periods, the participants were expected to follow an individual exercise plan at home, which usually consisted of self-reliant physical activities and psychological exercises. The multiprofessional team involved in the programme consisted of a physician, a physiotherapist, a psychologist, and a vocational

rehabilitation specialist. In addition, a nurse, a social worker, an occupational therapist, an occupational physiotherapist, and a nutritionist were often involved. The content of these relatively complex rehabilitation programmes has previously been described in more detail by Suoyrjö et al.^{13–15}

The assessment of perceived work ability was based on three repeated responses to a standard single-item question concerning 'current work ability compared with the lifetime best'. As has been described earlier, the scale is ranging from 0 ('completely unable to work') to 10 ('work ability at its best').¹⁶ Derived from the Work Ability Index, this 11-point scale has been found to be reliable and also comparable with the validity of the full Work Ability Index.^{11,17,18}

Pretreatment characteristics obtained from employers registers were age, gender, occupational grade, and length of job contract. From national health registers we obtained information on type of attended rehabilitation, rate of sick leaves, use of antidepressants and analgesics, and comorbidity. As the workplace health promotion programme contained some elements of vocational rehabilitation, the type of rehabilitation was analysed as one of the pretreatment variables. Characteristics obtained from responses to survey were: educational level, marital status, work schedule (shift work), intention to leave work, job insecurity, job control, smoking, alcohol consumption, body mass index, leisure-time physical activity, level of psychological distress, anxiety level, and perceived health (for detailed definitions of these variables, see Saltychev et al.¹⁹ The reference population was used to illuminate simultaneous levels of, and changes in, perceived work ability among a healthy employee population. For each rehabilitant, we selected three employees from those who responded to survey but were not selected to rehabilitation. The rehabilitants and references were matched for age, gender, and occupational status.

Statistical analysis

We applied repeated-measures regression analysis with the generalized estimating equations method

Table 1. Some descriptive characteristics of the study population (N=854).

Characteristics	Mean and standard deviation (SD)	Range
Mean age in years	51 (5.9)	27 to 63
Average time in years from baseline survey till the beginning of the intervention	2.1 (1.17)	0.5 to 7.3
Average time in years from the beginning of the intervention till the first follow-up survey (short-term follow-up)	1.5 (1.01)	0.003 to 3.97
Average time in years from the beginning of the intervention till the second follow-up survey (long-term follow-up)	5.8 (1.09)	4.01 to 8.82
Mean perceived work ability score before the intervention	7.13 (1.84)	0 to 10

for studying the changes in the perceived work ability scores and reported results as mean values, mean differences, and their 95% confidence interval (CI). Group \times year interaction was analysed to ensure the significance of observed changes in perceived work ability scores inside each subgroup of the rehabilitants. Significance of interaction was reported as p -value with ≤ 0.05 being considered as statistically significant. All analyses were performed using SAS[®] 9.2 software (SAS Institute, Cary, North Carolina, USA).

Results

Of the 151,618 employees available in the Finnish Public Sector Study, the participants' selection process yielded a sample of 53,416 employees (response rate 70%, 81% women). The exclusion process resulted in a study population of 854 participants. The selection process is shown in Figure 1. The main characteristics of the study population are shown in Table 1. Only 19% ($N = 139$ in the short-term and $N = 126$ in the long-term follow-up) of the participants reported mild improvement of their perceived work ability. Change in perceived work ability was similar ($p = 0.45$) in both subtypes of studied rehabilitation – essentially medical rehabilitation and vocationally oriented medical rehabilitation.

Before the rehabilitation, the participants' mean perceived work ability was 7.13 (SD 1.84). This figure decreased by -0.82 (95% CI -0.98 to -0.67) in the short-term and by -1.26 (95% CI -1.45 to -1.07) in the long-term follow-up. The perceived work ability level declined in each pretreatment

variable subgroup (Table 2). Only slight differences in the steepness of this deterioration were observed between subgroups based on the participants' baseline characteristics. In some subgroups, the lower baseline perceived work ability level was associated with its steeper deterioration during the nine-year period (Table 3). For example, as can be seen in Table 2, perceived work ability deteriorated steeper among manual workers, who experienced worse work ability before rehabilitation than among managers. Similar findings of a steeper deterioration of perceived work ability were also observed among participants with a low educational level, fixed-term job contract, high rates of sickness absence, and participants who used painkillers and antidepressants. High levels of anxiety and psychological distress, as well as suboptimal perceived general health were associated with less steep deterioration of perceived work ability compared with those who reported better general and mental health.

Fibromyalgia patients (diagnosis code M79 according to International Classification of Diseases, version 10) represented 5% ($N = 44$) of the study population. Their baseline perceived work ability score was slightly lower than the corresponding mean score of the rest of the studied subjects: 6.64 (SD 1.92) vs. 7.16 (SD 1.83), respectively. However, as shown in Table 2, there were no significant differences in the steepness of perceived work ability deterioration when fibromyalgia patients were compared with rehabilitants with other diagnoses (group \times year interaction $p = 0.14$).

Table 2. Level of perceived work ability in relation to the participants' pretreatment individual characteristics, and change of this level during the short-term (1.5 [up to 4] years) and the long-term (5.8 [up to 9] years) follow-up.

Studied individual characteristics of the participants	Perceived work ability at baseline (N = 854)			Change in perceived work ability after the intervention			
	N (%)	Mean	SD	Short-term follow-up (N = 728)		Long-term follow-up (N = 676)	
				Mean difference	95% CI	Mean difference	95% CI
Gender							
Women	747 (87)	7.19	1.83	-0.87	-1.04 to -0.70	-1.29	-1.50 to -1.09
Men	107 (13)	6.69	1.83	-0.48	-0.93 to -0.03	-1.03	-1.52 to -0.55
Age group							
< 46 years	143 (17)	7.40	1.72	-0.67	-1.05 to -0.28	-1.09	-1.55 to -0.63
46–55 years	504 (59)	7.10	1.92	-0.97	-1.18 to -0.75	-1.39	-1.64 to -1.13
> 55 years	207 (24)	7.02	1.69	-0.56	-0.84 to -0.27	-1.09	-1.42 to -0.77
Type of rehabilitation							
Medical rehabilitation	469	7.32	1.76	-0.91	-1.13 to -0.70	-1.31	-1.56 to -1.06
Work health promotion	395	6.90	1.91	-0.71	-0.95 to -0.47	-1.20	-1.48 to -0.92
ISCO grade**							
1–2	147 (17)	7.27	1.81	-0.50	-0.88 to -0.12	-0.58	-0.94 to -0.22
3–5	456 (54)	7.29	1.78	-0.96	-1.17 to -0.75	-1.26	-1.50 to -1.01
6–9	244 (29)	6.76	1.94	-0.74	-1.05 to -0.44	-1.75	-2.14 to -1.36
Marital status							
Single	201 (24)	7.12	1.88	-0.91	-1.26 to -0.56	-1.30	-1.70 to -0.91
Married/cohabiting	647 (76)	7.14	1.83	-0.80	-0.97 to -0.62	-1.25	-1.46 to -1.03
High educational level**							
No	603 (72)	7.06	1.83	-0.88	-1.06 to -0.69	-1.50	-1.72 to -1.27
Yes	239 (28)	7.36	1.82	-0.73	-1.03 to -0.43	-0.75	-1.08 to -0.42
Job contract*							
Permanent	799 (94)	7.08	1.87	-0.77	-0.93 to -0.61	-1.20	-1.39 to -1.01
Fixed-term	47 (6)	8.02	1.09	-1.54	-2.36 to -0.72	-2.13	-2.77 to -1.48
Length of job contract							
0–1 years	149 (17)	6.93	1.92	-0.83	-1.26 to -0.41	-1.35	-1.84 to -0.86
2–9 years	547 (64)	7.20	1.74	-0.83	-1.02 to -0.64	-1.19	-1.41 to -0.97
10 years or over	158 (19)	7.08	2.09	-0.80	-1.19 to -0.42	-1.42	-1.89 to -0.95
Shift work							
No	517 (62)	7.19	1.81	-0.81	-1.01 to -0.61	-1.28	-1.52 to -1.05
Yes	319 (38)	7.05	1.87	-0.90	-1.16 to -0.63	-1.22	-1.54 to -0.90

Table 2. (Continued)

Studied individual characteristics of the participants	Perceived work ability at baseline (N = 854)		Change in perceived work ability after the intervention				
	N (%)	Mean	SD	Short-term follow-up (N = 728)		Long-term follow-up (N = 676)	
				Mean difference	95% CI	Mean difference	95% CI
Intention to leave work							
Continue the job	344 (41)	7.65	1.53	-0.86	-1.08 to -0.64	-1.37	-1.65 to -1.09
Switch jobs	220 (26)	7.16	1.74	-0.93	-1.27 to -0.60	-1.27	-1.64 to -0.91
Give up the job	267 (32)	6.46	2.01	-0.75	-1.05 to -0.45	-1.16	-1.52 to -0.81
Job insecurity							
Low	302 (36)	7.39	1.79	-0.92	-1.19 to -0.66	-1.36	-1.66 to -1.07
Intermediate	342 (40)	7.14	1.74	-0.74	-0.98 to -0.49	-1.20	-1.49 to -0.91
High	203 (24)	6.75	1.97	-0.94	-1.18 to -0.50	-1.24	-1.67 to -0.82
Job control							
Low	286 (34)	6.71	2.06	-0.68	-0.98 to -0.39	-1.18	-1.52 to -0.85
Intermediate	300 (35)	7.20	1.66	-0.81	-1.07 to -0.56	-1.17	-1.48 to -0.85
High	262 (31)	7.53	1.63	-1.01	-1.29 to -0.74	-1.49	-1.81 to -1.17
Obesity ^a							
No	699 (83)	7.21	1.79	-0.84	-1.01 to -0.66	-1.26	-1.46 to -1.05
Yes	142 (17)	6.73	2.02	-0.78	-1.19 to -0.37	-1.29	-1.75 to -0.82
Physical inactivity							
No	607 (72)	7.23	1.79	-0.85	-1.04 to -0.66	-1.26	-1.48 to -1.05
Yes	239 (28)	6.87	1.94	-0.76	-1.05 to -0.47	-1.29	-1.66 to -0.91
Smoking							
No	701 (85)	7.20	1.75	-0.81	-0.97 to -0.64	-1.22	-1.42 to -1.02
Yes	124 (15)	6.83	2.28	-1.03	-1.54 to -0.51	-1.58	-2.14 to -1.01
Alcohol consumption							
0-210 g/week	799 (94)	7.13	1.86	-0.83	-1.00 to -0.67	-1.24	-1.43 to -1.04
> 210 g/week	51 (6)	7.08	1.56	-0.60	-1.21 to 0.003	-1.54	-2.36 to -0.71
Sickness absence*							
No	244 (29)	7.53	1.63	-0.54	-0.78 to -0.30	-0.94	-1.21 to -0.67
1-59 days/3 years	278 (33)	7.28	1.67	-0.82	-1.08 to -0.56	-1.08	-1.39 to -0.77
60 or more days/3 years	332 (39)	6.71	2.03	-1.13	-1.42 to -0.83	-1.73	-2.08 to -1.39

(Continued)

Table 2. (Continued)

	Perceived work ability at baseline (N = 854)			Change in perceived work ability after the intervention			
	N (%)	Mean	SD	Short-term follow-up (N = 728)		Long-term follow-up (N = 676)	
				Mean difference	95% CI	Mean difference	95% CI
Chronic severe medical condition							
No	673 (79)	7.26	1.79	-0.81	-0.99 to -0.63	-1.29	-1.50 to -1.08
Yes	181 (21)	6.66	1.94	-0.89	-1.21 to -0.56	-1.14	-1.54 to -0.73
Use of antidepressants							
No	629 (82)	7.27	1.82	-0.81	-0.98 to -0.63	-1.19	-1.40 to -0.98
Yes	136 (18)	6.84	1.79	-1.00	-1.44 to -0.55	-1.68	-2.23 to -1.14
Use of painkillers**							
No	324 (42)	7.51	1.65	-0.59	-0.81 to -0.37	-1.02	-1.31 to -0.74
Yes	441 (58)	6.97	1.91	-1.06	-1.29 to -0.83	-1.44	-1.71 to -1.16
Anxiety*							
Low	271 (33)	7.75	1.64	-1.06	-1.33 to -0.80	-1.69	-2.01 to -1.36
Intermediate	271 (33)	7.11	1.78	-0.86	-1.14 to -0.58	-1.17	-1.47 to -0.87
High	290 (35)	6.63	1.87	-0.62	-0.90 to -0.34	-0.99	-1.33 to -0.66
Suboptimal perceived health**							
No	388 (46)	8.24	1.05	-1.21	-1.42 to -1.00	-1.52	-1.78 to -1.26
Yes	461 (54)	6.20	1.85	-0.53	-0.76 to -0.30	-1.00	-1.27 to -0.74
Psychological distress*							
No	526 (62)	7.52	1.61	-1.03	-1.21 to -0.84	-1.52	-1.75 to -1.30
Yes	322 (38)	6.53	1.94	-0.53	-0.81 to -0.25	-0.90	-1.21 to -0.58
Diagnosis of fibromyalgia							
Yes	44 (5)	6.64	1.92	-0.94	-1.83 to -0.06	-2.08	-3.00 to -1.17
No	810 (95)	7.16	1.83	-0.82	-0.98 to -0.66	-1.21	-1.40 to -1.02

SD, standard deviation; CI, confidence interval; ISCO, International Standard Classification of Occupations.

*Body mass index > 30 kg/m².

**Group x year interaction *p*-value ≤ 0.05.

***Group x year interaction *p*-value ≤ 0.01.

Table 3. Mean (standard deviation) perceived work ability score at baseline and follow-up in subgroups of rehabilitants and reference population by baseline characteristics. Only subgroups where observed change of perceived work ability was statistically significant (group \times year interaction $p < 0.05$) are shown.

	Rehabilitants			Reference population		
	Baseline		Short-term	Baseline		Short-term
	N (%)	Mean (SD)	Mean (SD)	N (%)	Mean (SD)	Mean (SD)
ISCO grade						
1–2	147 (17)	7.27 (1.81)	6.76 (2.00)	461 (19)	7.39 (1.67)	7.21 (1.95)
3–5	456 (54)	7.29 (1.78)	6.33 (2.14)	1349 (54)	7.37 (1.66)	7.08 (2.04)
6–9	244 (29)	6.76 (1.94)	6.02 (2.08)	667 (27)	6.99 (1.82)	6.54 (2.20)
High educational level						
No	603 (72)	7.06 (1.83)	6.18 (2.13)	1747 (71)	7.20 (1.74)	6.79 (2.15)
Yes	239 (28)	7.36 (1.82)	6.63 (2.07)	719 (29)	7.42 (1.66)	7.37 (1.86)
Job contract						
Permanent	799 (94)	7.08 (1.87)	6.31 (2.09)	2367 (96)	7.27 (1.72)	6.96 (2.08)
Fixed-term	47 (6)	8.02 (1.09)	6.49 (2.50)	107 (4)	7.38 (1.50)	7.04 (2.08)
Sickness absence						
None	244 (29)	7.53 (1.63)	7.00 (1.77)	751 (30)	7.80 (1.35)	7.60 (1.72)
1–59 days/3 years	278 (33)	7.28 (1.67)	6.46 (1.95)	877 (35)	7.41 (1.57)	7.16 (1.84)
60 or more days/3 years	332 (39)	6.71 (2.03)	5.59 (2.32)	872 (35)	6.65 (1.95)	6.14 (2.37)
Use of painkillers						
No	324 (42)	7.51 (1.65)	6.92 (1.71)	1007 (45)	7.57 (1.53)	7.21 (2.00)
Yes	441 (58)	6.97 (1.91)	5.91 (2.28)	1215 (55)	7.02 (1.84)	6.69 (2.17)
Anxiety						
Low	271 (33)	7.75 (1.64)	6.69 (2.13)	791 (33)	7.86 (1.50)	7.46 (1.97)
Intermediate	271 (33)	7.11 (1.78)	6.26 (2.15)	815 (34)	7.45 (1.55)	6.97 (2.03)
High	290 (35)	6.63 (1.87)	6.01 (2.06)	822 (34)	6.53 (1.80)	6.46 (2.15)
Suboptimal perceived health						
No	388 (46)	8.24 (1.05)	7.03 (1.93)	1170 (47)	8.24 (1.13)	7.81 (1.66)
Yes	461 (54)	6.20 (1.85)	5.67 (2.09)	1318 (53)	6.40 (1.69)	6.16 (2.14)
Psychological distress						
No	526 (62)	7.52 (1.61)	6.50 (2.08)	1562 (63)	7.68 (1.50)	7.22 (2.00)
Yes	322 (38)	6.53 (1.94)	6.01 (2.16)	926 (37)	6.56 (1.82)	6.51 (2.14)

SD, standard deviation; ISCO, International Standard Classification of Occupations.

Table 3 shows changes in perceived work ability scores in subgroups of rehabilitants and the reference population of 2652 non-rehabilitants matched with rehabilitants by their baseline characteristics. The level of perceived work ability was higher among non-rehabilitants, but the decrease in perceived work ability was also observed in all non-rehabilitant subgroups. This decrease, however, was less steep than among the rehabilitants. In the reference population, the mean perceived work ability was 7.96 (SD 1.50) at the baseline and it declined by 0.37 (95% CI -0.44 to -0.30) in the short-term and 0.66 (95% CI -0.75 to 0.58) in the long-term follow-up.

Discussion

This longitudinal study investigated the changes in perceived work ability of 854 participants in an interdisciplinary biopsychosocial rehabilitation programme aimed at employees with chronic musculoskeletal disorders. The mean score of the participants' perceived work ability declined through the entire nine-year period regardless of their pretreatment individual characteristics. Only slight differences in the steepness of this deterioration were observed between subgroups.

The strengths of the study were a large study population with repeated measurements over a long time period and the use of wide-ranging data collected from surveys and national registers. A limitation was that although all data was obtained before rehabilitation, we do not know if the studied predictors had changed just before the intervention. The study population consisted only of public sector employees with predomination of women, and therefore the generalizability of findings to other branches of industry may be reduced. As participants had chronic conditions, the results might be different among rehabilitants with acute or subacute health problems. Comparison of effectiveness of rehabilitation measures applied in early or late stages of work ability deterioration was out of the scope of present study.

Based on the similarity between inclusion criteria, methods, and structure of studied rehabilitation programmes, we also included rehabilitants

with main diagnosis of fibromyalgia that cannot be, in general, considered as musculoskeletal disease. However, we took into account the fact that fibromyalgia may be associated with some chronic musculoskeletal conditions (we analysed only main diagnosis of granted rehabilitation) especially among middle age people. Nevertheless, only 5% of rehabilitants had fibromyalgia, and changes in perceived work ability among them were similar to changes in the rest of study population. In this study, rehabilitants' work ability was already more deteriorated compared with non-rehabilitants owing to the selection criteria for this rehabilitation programme. Therefore, employees selected for being non-rehabilitated references should not be considered as controls. Finally, also the age of participants (over 80% were older than 45 years old) has to be taken into account when generalizing our results. In some previous studies, interdisciplinary musculoskeletal rehabilitation was more beneficial for young rehabilitants.^{7,20}

A steeper deterioration of perceived work ability was associated with such pretreatment factors as low occupational status, low educational level, higher rates of sickness absence, fixed-term job contract, and elevated consumption of prescribed pain medication (analgesics and antidepressants). All of these characteristics are known risk factors for deterioration of health and work ability.³⁻⁶ Deterioration of perceived work ability over time can not only be explained by ageing, but also by the fact that participants in our study, referred to rehabilitation, often had non-reversible chronic musculoskeletal conditions deteriorating work ability. Perceived work ability declined slower among participants with already low health status and an elevated level of psychological distress and anxiety before an intervention. On the other hand, a steeper decline was associated with higher scores of pretreatment perceived work ability. This finding can be explained by a regression to mean and no strong conclusions should, therefore, be made of this finding.

While perceived work ability is strongly correlated with objective work ability, also some differences between subjective and objective work

ability may occur. This difference may explain previously reported improvement in such objective outcome measures as rates of return to work or employment status of rehabilitants.^{7,21} Besides slightly different outcome measures, also differences in rehabilitation structure, study participants' age, and duration of follow-up may explain these contradictory results. Our findings are in line with a previous suggestion that medical rehabilitation, when not substantially combined with vocational rehabilitation, may be ineffective on achieving vocational outcomes when chronic disability already exists.²

Improved work ability may be an overoptimistic goal for medical rehabilitation when targeting middle aged people who have chronic health conditions and whose capacity for work has already begun to decline. If so, more reasonable and achievable aims should be introduced. Realistic goal-setting is important as it leads us to use appropriate and realistic outcome measures of rehabilitation's success. Should rehabilitation teams seek signs of improvement of participant's work ability, or should it primarily focus on measuring the steepness of the continuous and unstoppable process of deterioration of ageing participants' work ability?

Unrealistic rehabilitation goals may lead to inaccurate assessment of the effectiveness of rehabilitation, as well as frustration of participants and rehabilitation teams when overoptimistic goals remain unachieved. According to our results, only one in every five participants reported slightly improved perceived work ability after rehabilitation. Standardized rehabilitation goals and measures of their successful achievement should cover the majority of the participants. Interdisciplinary teams may consider a decline of steepness of deterioration of work ability as a more realistic rehabilitation goal than work ability's improvement.

Perceived work ability of participants in an interdisciplinary, biopsychosocial, musculoskeletal rehabilitation deteriorated regardless of any studied pretreatment individual characteristic. The finding suggests that improving participants' work ability may be an unrealistic goal for this type of rehabilitation.

Clinical messages

- In this prospective study of 854 rehabilitants, perceived work ability deteriorated regardless of any studied pretreatment characteristics.
- The expectation to improve or preserve work ability of participants may not be realistic for interdisciplinary rehabilitation targeting people with chronic musculoskeletal disorders.

Contributors

All authors contributed substantially to the conception and design of the study, the acquisition of the data, or the analysis and interpretation of the data, as well as to the drafting or revision of the article as regards important intellectual content. They also approved the final version for publication. JV and MK are the principal investigators of the Finnish Public Sector Study. JV acts as guarantor.

Conflict of interest

The author declares that there is no conflict of interest.

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References

1. van den Berg TI, Elders LA, de Zwart BC and Burdorf A. The effects of work-related and individual factors on the Work Ability Index: a systematic review. *Occup Environ Med* 2009; 66: 211–220.
2. Kuoppala J and Lamminpää A. Rehabilitation and work ability: a systematic literature review. *J Rehabil Med* 2008; 40: 796–804.
3. Adler NE and Rehkopf DH. U.S. disparities in health: descriptions, causes, and mechanisms. *Annu Rev Public Health* 2008; 29: 235–252.
4. Matthews KA, Gallo LC and Taylor SE. Are psychosocial factors mediators of socioeconomic status and health connections? *Ann NY Acad Sci* 2010; 1186: 146–173.
5. Kivimäki M, Vahtera J, Virtanen M, Elovainio M, Pentti J and Ferrie JE. Temporary employment and risk of overall and cause-specific mortality. *Am J Epidemiol* 2003; 158: 663–668.

6. Lind J, Aaltonen T, Halonen J-P and Klaukka T. Persons having completed a rehabilitation programme funded by the Social Insurance Institution of Finland in 2003. A register-based follow-up study of rehabilitation clients in 2003–2006. *Social security and health reports*. Helsinki: Social Insurance Institution of Finland, 2009.
7. Elfving B, Asell M, Ropponen A and Alexanderson K. What factors predict full or partial return to work among sickness absentees with spinal pain participating in rehabilitation? *Disabil Rehabil* 2009; 31: 1318–1327.
8. Grahn B, Ekdahl C and Borgquist L. Motivation as a predictor of changes in quality of life and working ability in multidisciplinary rehabilitation. A two-year follow-up of a prospective controlled study in patients with prolonged musculoskeletal disorders. *Disabil Rehabil* 2000; 22: 639–654.
9. Iles RA, Davidson M and Taylor NF. Psychosocial predictors of failure to return to work in non-chronic non-specific low back pain: a systematic review. *Occup Environ Med* 2008; 65: 507–517.
10. Lydell M, Grahn B, Mansson J, Baigi A and Marklund B. Predictive factors of sustained return to work for persons with musculoskeletal disorders who participated in rehabilitation. *Work* 2009; 33: 317–328.
11. Ahlstrom L, Grimby-Ekman A, Hagberg M and Dellve L. The work ability index and single-item question: associations with sick leave, symptoms, and health—a prospective study of women on long-term sick leave. *Scand J Work Environ Health* 2010; 36: 404–412.
12. Saltychev M, Laimi K, El-Metwally A, et al. Effectiveness of multidisciplinary primary prevention in decreasing the risk of work disability in a low-risk population. *Scand J Work Environ Health* 2012; 38: 27–37.
13. Suoyrjö H, Hinkka K, Kivimäki M, Klaukka T, Pentti J and Vahtera J. Allocation of rehabilitation measures provided by the Social Insurance Institution in Finland: a register linkage study. *J Rehabil Med* 2007; 39: 198–204.
14. Suoyrjö H, Hinkka K, Oksanen T, et al. Effects of multidisciplinary inpatient rehabilitation for chronic back or neck pain: a register-linkage study of sickness absences and analgesic purchases in an occupational cohort. *Occup Environ Med* 2008; 65: 179–184.
15. Suoyrjö H, Oksanen T, Hinkka K, et al. A comparison of two multidisciplinary inpatient rehabilitation programmes for fibromyalgia: a register linkage study on work disability. *J Rehabil Med* 2009; 41: 66–72.
16. Saltychev M, Laimi K, Oksanen T, Pentti J, Kivimäki M and Vahtera J. Does perceived work ability improve after a multidisciplinary preventive program in a population with no severe medical problems – the Finnish Public Sector Study. *Scand J Work Environ Health* 2013; 39(1): 57–65. DOI: 10.5271/sjweh.3298.
17. Martus P, Jakob O, Rose U, Seibt R and Freude G. A comparative analysis of the Work Ability Index. *Occup Med (Lond)* 2010; 60: 517–524.
18. Radkiewicz P and Widerszal-Bazyl M. Psychometric properties of Work Ability Index in the light of comparative survey study. *Int Congress Series* 2005: 304–309.
19. Saltychev M, Laimi K, El-Metwally A, et al. Effectiveness of multidisciplinary primary prevention in decreasing the risk of work disability in a low-risk population. *Scand J Work Environ Health* 2012; 38(1): 27–37. DOI: 10.5271/sjweh.3169
20. Buchner M, Neubauer E, Zahlten-Hinguranage A and Schiltenswolf M. Age as a predicting factor in the therapy outcome of multidisciplinary treatment of patients with chronic low back pain—a prospective longitudinal clinical study in 405 patients. *Clin Rheumatol* 2007; 26: 385–392.
21. Luk KD, Wan TW, Wong YW, et al. A multidisciplinary rehabilitation programme for patients with chronic low back pain: a prospective study. *J Orthop Surg (Hong Kong)* 2010; 18: 131–138.