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REVIEW ARTICLE

REHABILITATION AND WORK ABILITY: A SYSTEMATIC LITERATURE REVIEW

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Objective: **To evaluate the effects of rehabilitation on sickness absenteeism, return to work and disability pensions among persons of working age.**

Method: **Original articles published during 1970–2005 indexed in Medline and PsycINFO databases were studied systematically. The main search terms were rehabilitation, sick leave and disability pension. Out of 576 references, 41 potentially eligible publications were retrieved; other sources producing 21 articles. Forty-five studies were included in the analysis.**

Results: **There is moderate evidence that return-to-work programmes decrease long sick leaves (risk ratio (RR) 0.46, range 0.25–1.10) and multimodal rehabilitation decreases the risk of disability pension (RR 0.64, range 0.52–1.14), counselling, exercise, multimodal medical rehabilitation or return-to-work programmes having no effect on return to work. Based on mainly weak evidence, early rehabilitation seems to reduce both absenteeism and disability pension.**

Conclusion: **Any type of rehabilitation may have an effect at an early stage of decreased work ability, being ineffective later on if applied as the only mode of rehabilitation. Where chronic disability is already present, multimodal medical rehabilitation needs to be combined with vocational rehabilitation in order to reduce absenteeism and disability pensions. It is essential that the workplace is integrated into rehabilitation.**

Key words: rehabilitation, work ability, sick leave, disability pension.

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INTRODUCTION

Rehabilitation can be defined as measures required for coping with functional consequences of a disease, defect or trauma. The aim of rehabilitation is to improve work ability and functional capacity. Rehabilitation can be divided into medical, vocational or social rehabilitation. Medical rehabilitation aims at developing the functional and psychological abilities of the individual and, if necessary, his or her compensatory mechanisms, to enable him or her to attain self-dependence and lead an active life (1). Vocational rehabilitation aims, for example, at promoting employment opportunities for disabled persons in the open labour market (2). If a disease or a defect due to trauma affects functional capacity, the need for rehabilitation should be assessed. Rehabilitation can focus on health, functional or work ability or employment.

The need for rehabilitation and its importance in society have strengthened during the last decades. Forty-five percent of the Finnish population of working age and 40% of those still working have some kind of chronic disease or traumatic defect, and the subjective need for rehabilitation is significant (3). Fifteen percent of men and 22% of women had a need for vocational rehabilitation, whereas 21% of men and 24% of women had a need for some other type of rehabilitation (3).

The number of those retired in 2006 receiving old age pension (n=27,733) was the same as that of those retired on disability pensions (n=27,215) (4). The main disease categories were mental disorders (33%) and musculoskeletal diseases (32%), the most common diagnoses being depression (F32) and intervertebral disc disorder (M51). On the other hand, absenteeism lasting less than one year is most often due to musculoskeletal diseases (34%) and less frequently to mental disorders (25%) (5).

The challenge of rehabilitation in our society is to maintain employees' work ability at a level sufficient to continue working in spite of diseases or disabilities. The age profile in Finland (6), rapid changes in work-life and stress at work, as well as long-lasting unemployment set demands for rehabilitation.

This study was a part of a larger project in which the scientific evidence on the associations between psychosocial factors at work and rehabilitation, job well-being and work ability was evaluated. This meta-analysis focuses on the effects of medical and vocational rehabilitation as well as early rehabilitation on sick leave and disability pension among people of working age.

METHODS

Literature search

Two literature databases were searched from 1970 to 2005: Medline in June–July 2005 and PsycINFO in November 2005. The search terms were rehabilitation, sick leave, disability pension, trials and cohort studies. The aim was to find all relevant original studies published in international journals. Meta-analyses and systematic reviews on rehabilitation were also examined to ensure that no important studies were missed.

A study was included in the analysis if it was original and the study population was of working age. The studies that were conducted in other than a true working environment, such as in classes or courses

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Table I. *Criteria for strength of evidence on intervention*

Strength of evidence	Study design	Minimum study quality	Minimum results quality	Minimum results applicability	Number of studies	Homogeneity Index*
Good	RCT, CRCT, RCCT	Good	Good	Moderate	3	6/8 (2/3)
Moderate	RCT, CRCT, RCCT CT, CO, NCC	Moderate Good	Moderate Good	Moderate	2	5/8 (2/3)
Weak	RCT, CRCT, RCCT CT, CO, NCC CC	Weak Moderate Good	Weak Moderate Good	Weak	1	4/8 (1/2)
Very weak	CS	Weak	Weak	Weak	1	3/8 (1/2)

*First fraction expresses the number of factors (e.g. population, outcome, follow-up time) that need to be homogenous between studies. The latter fraction expresses the number of studies that need to be similar, in order for the factor in question to be considered homogenous.
RCT: randomized controlled trial; CRCT: cluster-randomized controlled trial; RCCT: randomized controlled crossover trial; CT: clinical trial; CO: cohort study; NCC: nested case-control study; CC: case-control study; CS: cross-sectional study.

or among students, were excluded. In addition, those studies that did not provide information about study design and results in sufficient detail were excluded. Dissertations were excluded for practical reasons; international dissertations are generally difficult to obtain.

The abstracts were scrutinized, and articles that could potentially be included were acquired. Search terms, search strategy, the selection and use of publications were documented systematically. Detailed information was collected from each study included in the analysis.

Table IIA. *Study characteristics: trials*

Study, year	Type of rehabilitation	Outcome	Start of recruitment	Follow-up, years	Treated n/N	Controls n/N	Crude RD per 1000 person-years	Crude RR
Randomized controlled trials								
Bengtsson 1983 (48)	Exercise	Sick leave >6 months	1973	0.5	16/46	16/42	–66	0.91
Alaranta et al. 1986 (7)	Multimodal	Disability pension	nr	1	8/106	7/106	9	1.14
Burgess et al. 1987 (50)	Return to work	Sick leave >6 months	nr	1.1	19/77	17/76	21	1.10
Dennis et al. 1988 (51)	Counselling	Return to work	1983	0.5	92/99	88/102	133	1.08
Greenwood et al. 1990 (55)	Counselling	Sick leave >6 months	1985	1.5	nr/121	nr/163	12	1.06
Kellett et al. 1991 (57)	Exercise[c]	Sick leave >1 month	nr	1.5	nr/37	nr/48	–60	0.63†
Pilote et al. 1992 (62)	Counselling	Return to work	1987	0.5	82/94	87/91	–167	0.91
Alaranta et al. 1994 (8)	Multimodal	Disability pension	1988	1	4/152	7/141	–23	0.53
Berglund et al. 1994 (9)	Multimodal	Return to work	nr	1	80/90	76/91	54	1.06
Bjorndal 1994 (10)	Counselling	Return to work	1990	2.4	64/122	852/1636	2	1.01
Engblom et al. 1994 (52)	Multimodal	Disability pension	1986	1	25/66	29/59	–113	0.77
Froelicher et al. 1994 (54)	Multimodal	Return to work	1977	1	51/52	56/62	78	1.09
Lindh et al. 1997 (11)	Multimodal	Return to work	nr	1	nr/151	nr/134	–19	0.97
Loisel et al. 1997 (58)	Multimodal	Return to work	1991	1	nr/31	nr/26	nr	1.59†
Torstensen et al. 1998 (14)	Exercise	Return to work	nr	1	87/136	40/70	68	1.12
Fanello et al. 1999 (53)	Education[c]	Physical well-being	1995	2	15/87	25/70	–92	0.48
Hofman-Bang et al. 1999 (56)	Multimodal	Return to work	1993	1	34/46	28/41	56	1.08
Hazard et al. 2000 (15)	Education	Sick leave	1996	0.5	14/217	12/202	12	1.10
Molde Hagen et al. 2000 (16)	Exercise	Return to work	nr	1	162/237	124/220	119	1.21†
Jensen et al. 2001 (17)	Multimodal	Disability pension	1995	1.5	19/117	15/48	–100	0.52
Marhold et al. 2001 (18)	Return to work	Sick leave >6 months	nr	0.5	nr/36	nr/36	–545	0.72†
Verbeek et al. 2002 (20)	Return to work	Sick leave >6 months	nr	1	nr/61	nr/59	–169	0.30
Nystuen & Hagen 2003 (23)	Psychological	Sick leave >6 months	2001	1.25	nr/113	nr/100	67	1.14
de Boer et al. 2004 (27)	Vocationale	Disability pension	1997	2	9/53	13/47	–53	0.61
Cluster-randomized controlled trials								
van der Klink et al. 2003 (24)	Return to work	Sick leave >6 months	1995	1	nr/109	nr/83	–87	0.25
Clinical trials								
Perkiö-Mäkelä & Riihimäki 1997 (61)	Ergonomics[c]	Physical well-being	1989	0.04	nr/31	nr/33	–13	1.00
Arnetz et al. 2003 (21)	Return to work	Sick leave >6 months	nr	1	0/65	65/73	–898‡	0.01‡
Landy et al. 2003 (22)	Education[c]	Physical well-being	2002	0.25	136/164[a]	119/164[b]	415*	1.14*

Note: Each study might have reported several outcomes.
*No control group: the comparison between the values in the beginning and the end of the study.
†Adjusted value.
‡In order to calculate RD and RR, 0.5 added to each cell of 2×2 table.
n/N: number of cases in the group; RD: rate difference; RR: risk ratio; [a]: at the end of the study; [b]: at the beginning of the study; [c]: classified as early rehabilitation in this review; nr: not reported.

Table IIB. *Study characteristics, quality and strength: trials*

Study	Country	Setting	Control	Mean age* years [range]	Sex	Study quality	Results quality	Results applicability	Study strength
Randomized controlled trials									
Bengtsson (48)	USA	Healthcare	Yes	56	FM	Good	Moderate	Moderate	Moderate
Alaranta et al. (7)	Finland	Healthcare	Yes	40	FM	Good	Moderate	Moderate	Moderate
Burgess et al. (50)	USA	Healthcare	Yes	51	FM	Good	Moderate	Moderate	Moderate
Dennis et al. (51)	USA	Healthcare	Yes	[nr–60]	M	Good	Moderate	Moderate	Moderate
Greenwood et al. (55)	USA	Work	Yes	39	FM	Good	Moderate	Moderate	Moderate
Kellett et al. (57)	Sweden	Work	Yes	42	FM	Good	Moderate	Moderate	Moderate
Pilote et al.62)	USA	Healthcare	Yes	51	FM	Good	Moderate	Moderate	Moderate
Alaranta et al. (8)	Finland	Healthcare	Yes	[30–47]	FM	Good	Moderate	Moderate	Moderate
Berglund et al.(9)	Sweden	Healthcare	Yes	[nr–65]	FM	Good	Moderate	Moderate	Moderate
Bjorndal et al. (10)	Norway	Population	Yes	44	FM	Good	Moderate	Good	Moderate
Engblom et al. (52)	Finland	Healthcare	Yes	52	M	Good	Moderate	Moderate	Moderate
Froelicher et al. (54)	USA	Healthcare	Yes	56	FM	Good	Moderate	Moderate	Moderate
Lindh et al. (11)	Sweden	Population	Yes	[20–55]	FM	Good	Good	Good	Strong
Loisel et al. (58)	Canada	Work	Yes	41	FM	Good	Poor	Moderate	Weak
Torstensen et al. (14)	Norway	Population	Yes	[20–65]	FM	Good	Moderate	Good	Moderate
Fanello et al. (53)	France	Work	Yes	38	nr	Good	Moderate	Moderate	Moderate
Hofman-Bang et al. (56)	Sweden	Healthcare	Yes	53	FM	Good	Moderate	Moderate	Moderate
Hazard et al. (15)	Canada	Population	Yes	38	FM	Good	Moderate	Moderate	Moderate
Molde Hagen et al. (16)	Norway	Population	Yes	[18–60]	FM	Good	Moderate	Good	Moderate
Jensen et al. (17)	Sweden	Population	Yes	[18–60]	FM	Good	Moderate	Good	Moderate
Marhold et al. (18)	Sweden	Population	Yes	[25–60]	F	Good	Moderate	Moderate	Moderate
Verbeek et al. (20)	Netherlands	Work	Yes	nr	FM	Good	Moderate	Good	Moderate
Nystuen & Hagen (23)	Norway	Population	Yes	40	FM	Good	Poor	Good	Weak
de Boer et al. (27)	Netherlands	Work	Yes	[50–nr]	FM	Good	Moderate	Moderate	Moderate
Cluster-randomized controlled trials									
van der Klink et al. (24)	Netherlands	Work	Yes	nr	FM	Good	Moderate	Good	Moderate
Clinical trials									
Perkiö-Mäkelä & Riihimäki (61)	Finland	Healthcare	Yes	37	M	Poor	Moderate	Moderate	Very weak
Arnetz et al. (21)	Sweden	Population	Yes	42	FM	Good	Poor	Good	Very weak
Landy et al. (22)	USA	Work	No	nr	FM	Moderate	Poor	Moderate	Very weak

*Mean age at start of study.
nr: not reported; F: female; M: male.

Definitions

For the purposes of this study, rehabilitative measures that were targeted on employees with subjective symptoms concerning health but no diagnosed disease or disorder were classified as "early rehabilitation", compared with "rehabilitation" that was aimed at employees with chronic diseases. Early rehabilitation in this sense has not been used in the international literature but is potentially an important concept in the context of work ability and job well-being, especially if prevention is thought to be more cost-effective than rehabilitation.

Evaluation of strength of evidence

Six factors affected the strength of evidence: study design, quality of studies, quality of results, applicability of results, number of studies and homogeneity of studies (Table I). Each study was assessed for the 4 first mentioned properties. The study quality was based on the study population (e.g. the population of a certain area, or all consecutive patients in a clinic), and the definition and measurement of predictor and outcome. The quality of results, on the other hand, was based on the sample size, control group, number of drop-outs and those missing from analyses, randomization, treatment allocation, follow-up time, and whether potential confounding factors were accounted for. The applicability of results was affected by study country, setting (e.g. population, work environment, healthcare), sex distribution, mean age and coverage (i.e. response rate, how many from the eligible base population participated in the study). The homogeneity of studies was assessed comparing the following 11 factors between studies: study country, setting, sex distribution, mean age, the measurement of predictor and outcome, follow-up time, the risk or distribution of outcome in the control group, effect measure (risk difference, risk ratio (RR), odds ratio, difference in means, correlation coefficient), effect (benefit, no effect, harm) and the continuity of the effects between studies.

Studies were required to meet the predefined criteria at each level of strength of evidence. The evaluation was hierarchical, i.e. only those studies were taken into consideration that fulfilled the criteria for the best possible level. The cut-off points for each criterion were based on the current practice, specialist opinion or common sense.

Statistical analyses

The rate difference per 1000 person-years and RR were considered the most optimal effect measures. The medians and ranges of the effect sizes are reported. A summary statistic for risk ratios were calculated using the inverse variance method. If there were no cases in either intervention or control group, 0.5 was added to each cell of the 2×2 table in order to calculate rate difference and RR.

RESULTS

Literature search

Out of 576 references obtained from Medline and PsycINFO, 41 potentially eligible publications were retrieved. Twenty-four studies were included in the analysis (7–30). Seventeen studies were excluded due to insufficient data (31–40), ineligible outcome (41–44) or study population (45–47). Eighteen eligible studies were found through manual search of the reference lists of the

relevant reviews and the acquired original studies (48–65) and 3 publications through other searches (on capacity and work ability) during the whole project (66–68). Additionally, 10 studies would have been included if they had contained sufficient information (69–78). In all, 45 studies were included in the meta-analysis.

Description of studies

The characteristics of studies are shown in Tables II–III. There were 24 randomized controlled trials, 1 cluster-randomized trial, 3 clinical trials and 17 cohort studies. Seven studies were from Finland, 11 from Sweden, 5 from Norway, 7 from the Netherlands, 2 from Germany, 1 from France, 1 from the UK, 2 from Canada and 9 from the USA. Eleven studies were population-based, 11 were performed in occupational settings, 22 in healthcare settings and one in an insurance setting. Most of the studies had mixed populations concerning gender, although the distribution might not have been even, especially in the studies performed in work environments; 36

Table IIIA. *Study characteristics: cohort studies*

Study	Type of rehabilitation	Outcome	Start of recruitment	Follow-up, years	Treated n/N	Controls n/N	Crude RD per 1000 person-years	Crude RR
Boulay et al. 1982 (49)	Exercise	Return to work	1978	1	51/59	51/62	42	1.05
Rauscha et al. 1988 (67)	Multimodal	Return to work	1975	5	205/285	33/56	26	1.22
Perk et al. 1990 (60)	Multimodal & vocational	Return to work	1980	1	22/37	41/64	–46	0.93
Straaton et al. 1992 (64)	Multimodal	Return to work	1985	1.64	105/137	140/319	227	1.85†
Malcolm et al. 1993 (59)	Administrative	Disability pension	1990	1	154/604	125/329	–125	0.67
Mellin et al. 1993 (66)	Multimodal	Return to work	1988	1	108/193[a]	101/194[b]	39*	1.07*
Schmidt et al. 1995 (63)	Vocational	Return to work	1984	5.5	108/184	35/179	23	1.65†
van Doorn 1995 (65)	Job satisfaction	Sick leave > 6 months	1990	1	0/73	11/15	–766‡	0.01‡
Grahn et al. 1998 (12)	Multimodal & vocational	Disability pension	1994	0.6	1/115	4/107	–48	0.23
Jensen & Bodin 1998 (13)	Multimodal & vocational	Sick leave > 1 month	nr	1.5	nr/67	nr/28	33	1.07†
Beutel et al. 1999 (68)	Vocational	Return to work	1995	0.5	46/57	137/241	477	1.42
Arokoski et al. 2002 (19)	Multimodal & vocational[c]	Job well-being	nr	1.5	nr/265[a]	nr/265[b]	84*	1.47*†
Verbeek et al. 2003 (25)	Vocational	Return to work	nr	1	18/34	48/64	412	2.00†
Bauer & Odijk 2004 (26)	Return to work	Sick leave	1997	2	nr/501[a]	nr/501[b]	–11*	0.79*
Goine et al. 2004 (28)	Return to work	Disability pension	1989	5	42/1952[a]	71/2445[b]	–1*	0.79*†
Holopainen et al. 2004 (29)	Multimodal & vocational[c]	Sick leave > 1 week	nr	5	nr/20[a]	nr/20[b]	–72*	0.07*
Nieuwenhuijsen et al. 2004 (30)	Return to work	Return to work	2001	1	nr/19	nr/66	nr	0.80†

Note: Each study might have reported several outcomes.
*No control group: the comparison between the values in the beginning and the end of the study.
†Adjusted value.
‡In order to calculate RD and RR, 0.5 added to each cell of 2×2 table.
n/N: number of cases in the group; RD: rate difference; RR: risk ratio; [a]: at the end of the study; [b]: at the beginning of the study; [c]: classified as early rehabilitation in this review; nr: not reported.

Table IIIB. *Study characteristics, quality and strength: cohort studies*

Study	Country	Setting	Control	Mean age* years [range]	Sex	Study quality	Results quality	Results applicability	Study strength
Boulay et al. (49)	USA	Healthcare	Yes	49	M	Moderate	Moderate	Moderate	Weak
Rauscha et al. (67)	Germany	Healthcare	Yes	51	FM	Moderate	Moderate	Moderate	Weak
Perk et al. (60)	Sweden	Population	Yes	[42–71]	FM	Good	Moderate	Moderate	Weak
Straaton et al. (64)	USA	Healthcare	Yes	[18–69]	FM	Good	Moderate	Moderate	Weak
Malcolm et al. (59)	UK	Work	No	nr	nr	Good	Poor	Poor	Very weak
Mellin et al. (66)	Finland	Healthcare	No	43	FM	Good	Poor	Moderate	Very weak
Schmidt et al. (63)	Netherlands	Healthcare	Yes	40	FM	Good	Good	Moderate	Moderate
van Doorn (65)	Netherlands	Insurance	Yes	nr	nr	Good	Poor	Moderate	Weak
Grahn et al. (12)	Sweden	Population	Yes	44	FM	Good	Moderate	Good	Weak
Jensen & Bodin (13)	Sweden	Healthcare	Yes	41	FM	Good	Moderate	Moderate	Weak
Beutel et al. (68)	Germany	Healthcare	Yes	40	FM	Good	Moderate	Moderate	Weak
Arokoski et al. (19)	Finland	Healthcare	No	43	FM	Moderate	Poor	Moderate	Very weak
Verbeek et al. (25)	Netherlands	Healthcare	Yes	42	FM	Moderate	Moderate	Moderate	Weak
Bauer & Odijk (26)	Norway	Work	No	40	FM	Good	Poor	Good	Very weak
Goine et al. (28)	Sweden	Work	No	36	FM	Good	Poor	Good	Very weak
Holopainen et al. (29)	Finland	Healthcare	No	37	M	Moderate	Poor	Moderate	Very weak
Nieuwenhuijsen et al. (30)	Netherlands	Healthcare	Yes	44	FM	Poor	Poor	Moderate	Very weak

*Mean age at start of study.
nr: not reported; F: female; M: male.

studies had both men and women in their study populations, 5 studies focused on males and one on females, and 3 studies did not report the gender distribution. Seven studies did not have any kind of internal control group but, instead, reported values before and after intervention. The age distribution was reported heterogeneously, but most studies, if not all, seemed to have the whole working age covered.

The quality and strength of studies are shown in Tables IIIA–B. Study quality was good in most of the studies, yet the results quality could be considered good in only 2 studies and poor in 12. The applicability of studies was good to moderate in all but one study. Thus, study strength was strong in one study, moderate in 23, weak in 11 and very weak in 10.

Effects of early rehabilitation

Evidence on early rehabilitation is scanty and the strength of it is weak at best (Table IV). Nevertheless, exercise seems to decrease sickness absences (RR 0.63, range not applicable (N/A), only one study available), and multimodal medical combined with vocational rehabilitation seems to increase both job (RR 1.47, range N/A) and physical well-being (RR 1.68, range 1.60–1.76) and decrease sick leaves (RR 0.24, range 0.07–0.85). Vocational rehabilitation may decrease the risk of disability pension (RR 0.61, range N/A). On the other hand, there is no evidence that education or ergonomics alone would be beneficial.

Effects of rehabilitation

The strength of evidence on rehabilitation is mainly weak, yet there is moderate evidence that multimodal rehabilitation decreases the risk of disability pension (RR 0.64, range 0.52–1.14) and that return-to-work programmes decrease sick leaves lasting longer than 6 months (RR 0.46, range 0.25–1.10), but that counselling, exercise, multimodal medical rehabilitation or return-to-work programmes do not have an effect on return to work at one year (Table V). On the other hand, vocational rehabilitation and multimodal medical combined with vocational rehabilitation seem to increase return to work (RR 1.53, range 1.42–2.00; RR 1.50, range 0.93–2.41, respectively). Education, exercise or psychological rehabilitation alone do not seem to have any effect on sick leaves. However, all the rehabilitation modalities for which there was any evidence; administration (RR 0.67, range N/A), psychological (RR 0.46, range N/A), multimodal with (RR 0.23, range N/A) or without vocational (RR 0.64, range 0.52–1.14), and return-to-work programmes (RR 0.79, range N/A) seemed to decrease the risk of disability pension.

DISCUSSION

It is plausible that rehabilitation methods such as education, counselling, exercise, medical therapy and ergonomics might improve an employee's work ability at an early stage of a disease even though at any later stage they became ineffective if applied as the only mode of rehabilitation. There is not enough evidence either to support or reject this hypothesis. However, it does seem that multimodal medical rehabilitation should be combined with vocational rehabilitation if the aim is to increase employees' return to work. It is evident that the workplace should be involved in the rehabilitation process; medical rehabilitation may be fruitless if the way of working and the circumstances at work do not also change.

Authors of other meta-analyses concerning the effect of rehabilitation on absenteeism and return to work have drawn similar conclusions about clinical implications (79–82). Some evidence suggests that a graded activity programme improves absenteeism outcomes in patients with subacute low back pain (79). Asthma self-management, involving self-monitoring coupled with regular medical reviews and a written action plan, improves health outcomes (80). In patients with chronic low back pain, multidisciplinary approaches including a psychological component compared with other active control conditions have a positive long-term effect on return to work

Table IV. *Early rehabilitation and work ability*

Type of rehabilitation Outcome	Strength of evidence	k/K	Nk	RR Median [range]	RR Mean (95% CI)	RD per 1000 years, median [range]	References*
Education							
Physical well-being	Weak	1/2	157	0.48!	0.48 (0.17–1.37)	–92!	53 [22]
Exercise							
Physical well-being	Weak	1/1	85	1.07	1.07 (0.36–3.17)	14	57
Sick leave > 1 week	Weak	1/1	85	0.63	0.63 (0.17–2.35)	–60	57
Multimodal & vocational							
Job well-being	Very weak	1/1	265	1.47	1.47 (0.73–2.95)	84	19
Physical well-being	Very weak	2/2	285	1.68 [1.60;1.76]	1.63 (0.87–3.06)	67 [37;98]	19, 29
Sick leave > 1 week	Very weak	2/2	285	0.24 [0.07;0.85]	0.70 (0.36–1.34)	–55 [–72;–38]	19, 29
Ergonomics							
Physical well-being	Very weak	1/1	99	1.00	1.00 (0.32–3.16)	–13	61
Vocational							
Sick leave > 1 month	Weak	1/1	71	0.91	0.91 (0.38–2.19)	–29	27
Disability pension	Weak	1/1	100	0.61	0.61 (0.18–2.07)	–53	27

*Studies with weaker strength listed in brackets.

!The result is contrary to expectations.

RR: risk ratio; RD: rate difference; k/K: number of studies providing best evidence out of all eligible studies.; Nk: total number of participants in the studies providing best evidence; 95% CI: 95% confidence interval.

Table V. *Rehabilitation and work ability*

Type of rehabilitation Outcome	Strength of evidence	k/K	Nk	RR Median [range]	RR Mean (95% CI)	RD per 1000 years, median [range]	References*
Administrative							
Return to work	Very weak	2/2	1262	1.30 [1.15;1.46]	1.25 (0.93–1.69)	164 [121;207]	59, 65
Disability pension	Very weak	1/1	933	0.67	0.67 (0.36–1.24)	–125	59
Counselling							
Return to work	Moderate	3/3	2144	1.01 [0.91;1.08]	0.99 (0.76–1.30)	2 [–167;133]	10, 51, 62
Sick leave > 6 months	Weak	1/1	284	1.06	1.06 (0.46–2.42)	12	55
Education							
Return to work	Weak	1/1	212	1.03	1.03 (0.74–1.44)	28	7
Sick leave	Weak	1/1	419	1.10	1.10 (0.33–3.69)	12	15
Sick leave > 6 months	Weak	1/1	212	0.93	0.93 (0.30–2.89)	–10	7
Psychological							
Sick leave	Weak	1/1	214	0.95	0.95 (0.42–2.12)	–22	17
Sick leave > 6 months	Weak	1/1	213	1.14	1.14 (0.60–2.16)	67	23
Disability pension	Weak	1/1	214	0.46	0.46 (0.13–1.60)	–113	17
Exercise							
Return to work	Moderate	4/5	928	1.09 [1.04;1.21]	1.10 (0.84–1.44)	90 [33;119]	14, 16, 48, 54 [49]
Sick leave > 6 months	Weak	1/1	88	0.91	0.91 (0.32–2.58)	–66	48
Multimodal							
Return to work	Moderate	5/9	855	1.08 [0.97;1.50]	1.09 (0.85–1.39)	56 [–19;188]	9, 11, 52, 54, 56 [58, 64, 66, 67]
Sick leave	Weak	1/1	214	0.89	0.89 (0.42–1.88)	–44	17
Sick leave > 6 months	Weak	1/1	125	0.83	0.83 (0.39–1.75)	–116	52
Disability pension	Moderate	4/4	795	0.64 [0.52;1.14]	0.69 (0.40–1.22)	–62 [–113;9]	7, 8, 17, 52
Multimodal & vocational							
Return to work	Weak	2/2	205	1.50 [0.93;2.41]	0.93 (0.42–2.06)	–46	58, 60
Sick leave > 1 month	Weak	2/2	303	1.00 [0.94;1.07]	0.99 (0.62–1.57)	–20 [–74;33]	12, 13
Disability pension	Weak	1/1	222	0.23	0.23 (0.03–1.83)	–48	12
Vocational							
Return to work	Weak	4/4	1215	1.53 [1.42;2.00]	1.50 (1.09–2.05)	281 [23;477]	25, 63, 64, 68
Ergonomics							
Return to work	Weak	1/1	104	1.12	nr	.	58
Return to work							
Return to work	Moderate†	3/4	465	1.00 [1.00;1.08]	1.01 (0.85–1.20)	1 [1;70]	20, 24, 50 [30]
Sick leave	Very weak	1/1	501	0.79	0.79 (0.33–1.91)	–11	26
Sick leave > 6 months	Moderate	4/5	537	0.46 [0.25;1.10]	0.64 (0.39–1.05)	–128 [–545;21]	18, 20, 24, 50 [20]
Disability pension	Very weak	1/1	1952	0.79	0.79 (0.33–1.89)	–1	28

*Studies with weaker strength listed in brackets.

†Strength borrowed from lower-quality studies.

RR: risk ratio; RD: rate difference; nr: not reported; k/K: number of studies providing best evidence out of all eligible studies; Nk: total number of participants in the studies providing best evidence; 95% CI: 95% confidence interval.

(81), and multimodal and multidisciplinary rehabilitation programmes that are in some way work-related seem to reduce the number of sick days (82).

The endpoints of interest in rehabilitation often differ depending on the point of view; healthcare, occupational health, health economy or insurance are interested in the effect on sick leaves, return to work and disability pensions, whereas the employee is more concerned about his or her well-being, health and quality of life. We see rehabilitation as a means to help employees to remain at work in spite of chronic symptoms or disease, which implies that it would be important to evaluate both kinds of endpoint at the same time. Yet, we chose to restrict to the evaluation to sick leaves, return to work and disability pensions, which were more readily defined in the studies available.

There are numerous publications on rehabilitation but surprisingly little scientifically convincing evidence. Studies concerning rehabilitation have been performed mainly in Northern Europe and the USA and results from the southern countries of Europe or America are virtually absent. Rehabilitation is a form of health technology and, as with any type of intervention, its effect should be assessed using randomized controlled trial designs. Blinding of patients and care-givers is seldom possible, yet outcome can always be assessed in a blinded fashion. Sickness absences and disability pension due to disability are not subjective endpoints as such, but, at least in the Finnish healthcare and social system, the patient's history in rehabilitation affects these endpoints. Thus, the effect of rehabilitation is more or less confounded due to this fact alone. The International Classification of Functioning, Disability and Health (ICF) as a common reference framework for functioning may contribute to improved outcome research in rehabilitation (83).

One of the cornerstones of the evaluation of evidence is the fact that the literature should be searched extensively. It is unlikely that the 2 literature databases we used in this

review cover all of the studies ever performed on these topics. However, the hierarchical nature of the method we used compensates for this weakness; it is essential that all the studies providing strongest evidence have been included. We believe that we have found at least the major part of those studies. On the other hand, weak evidence does not become stronger by adding more poor quality studies. We also have to bear in mind that the quality of a study can be high and yet the strength of evidence it provides can be weak.

According to our findings, early rehabilitation may reduce both absenteeism and disability pension. If an employee has a chronic disability that decreases his or her work ability, multimodal medical rehabilitation needs to be combined with vocational rehabilitation for the best outcome. It is essential that the workplace is integrated into rehabilitation. It is possible effectively to improve an employee's work ability by rehabilitation. We emphasize the importance of early rehabilitation, even though a great deal more research is needed to clarify the true potential of different types of rehabilitation.

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