

Relationship between the self-assessment and clinical assessment of health status and work ability

by Leena Eskelinen, PhL,¹ Antti Kohvakka, MD,^{1,2} Tuula Merisalo, PT,^{1,3} Heikki Hurri, MD,⁴ Gustav Wägar, MD^{1,5}

ESKELINEN L, KOHVAKKA A, MERISALO T, HURRI H, WÄGAR G. Relationship between the self-assessment and clinical assessment of health status and work ability. *Scand J Work Environ Health* 1991;17(suppl 1):40—7. Clinical assessments of health status and work ability were compared with subjective assessments reported on a questionnaire. The clinical examinations included cardiorespiratory, musculoskeletal, and psychological measurements. The subjective work ability comprised an index based on estimations of work ability in relation to diseases, job demands, and psychological resources. For the clinical examinations 89 male and 85 female workers aged 44—58 years were selected according to health and subjective work ability as reported on the questionnaire. Half of the group was healthy and half suffered from either coronary artery disease (men) or low-back pain (women), and the subjective estimations of work ability varied from good to poor. The results indicated that the questionnaire responses on health and work ability related well with the clinically assessed factors at the group level. Some divergence was detected at the individual level, but it could usually be explained on the basis of the available data.

Key terms: coronary artery disease, low-back pain, mental performance, musculoskeletal capacity, questionnaire method.

This investigation on the health status and work ability of elderly municipal employees was based on questionnaire data (1). One advantage of the questionnaire method was the possibility of gathering detailed information among a large group of respondents.

At the individual level the medical diagnosis and final evaluation of work ability are based on clinical examinations although the process usually starts due to subjectively experienced symptoms or disability for work. Different factors tend to affect subjective and expert evaluations, and consequently the relationship between subjectively reported and clinically assessed status is not unambiguous. On one hand it has been reported that, for example, chest pain symptoms are indicated in a questionnaire more frequently than the clinical diagnosis of coronary artery disease is made (2). On the other hand epidemiologic studies have also shown a tendency to appraise the health status as somewhat better than the medical examination indicates (3, 4). However, the subjective evaluation of work ability has been found to be close to a clinical group evaluation based on medical and psychological data (5, 6).

In this study the relationship between the self-assessed and clinically assessed health and work ability of elderly employees was of particular interest. A

source of bias in the questionnaire data could have been the respondents' awareness of the purpose of the study — retirement criteria had been partly constructed on the basis of the questionnaire data — and subsequent overreporting of diseases and work disability.

Subjects and methods

Subjects

For the clinical examinations the subjects were selected on the basis of their health status and their subjective work ability, as reported on the questionnaire (1). The purpose for using these selection criteria was to include different combinations of health status and work ability in the material (ie, ill persons who perceived their work ability as good and healthy persons who perceived their work ability as satisfactory or poor).

The study groups consisted of 89 men and 85 women. All of the subjects were between 44 and 58 years of age. The mean age of the men was 53 years, and that of the women was 52 years.

The subjects were selected so that half were healthy (43 men and 39 women) and half suffered either from coronary artery disease (46 men) or from low-back pain (46 women). The disease groups of coronary artery disease and low-back pain were chosen because they are common causes of work disability in Finland. Among municipal occupations coronary artery disease was the most common among the men in auxiliary and installation work, and low-back pain was the most common among the women in auxiliary work (1, 7).

The men and women selected into the groups of coronary artery disease and low-back pain, respective-

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ly, had to have indicated on the questionnaire that the disease had been diagnosed by a physician. Those men suffering also from bronchial asthma were excluded because this ailment can markedly affect cardiorespiratory capacity when it occurs simultaneously with coronary artery disease. From the group with low-back pain those women who had rheumatoid arthritis of a joint were excluded. The healthy men and women did not have a medically diagnosed disease, disability, or impairment. However, the group of healthy subjects included both subjectively completely healthy persons and persons who, according to their own opinion, suffered from an illness which had not been medically diagnosed.

Besides the disease, the other main selection criterion for the clinical examinations was the subjects' own estimation of their current work ability in comparison with their lifetime best. One-half of the healthy and one-half of the unhealthy subjects perceived their work ability as good and the other half as satisfactory or poor. Points of 7 through 10 (10 = best work ability during one's lifetime) on the questionnaire represented good work ability, and points of 0 to 6 (0 = total disability for work) delineated satisfactory or poor work ability.

The groups were selected to be as homogeneous as possible with respect to work content. The main occupational groups of men were janitors, electricians, carpenters, and different kinds of mechanics. They belonged to the profile group of either installation or auxiliary work. By occupation the women were kitchen helpers, hospital aides, or cleaners, and they belonged to the auxiliary work group. The work of all the subjects of this study primarily demanded physical activity (7).

We investigated the relationship between self-assessed and clinically assessed health and work ability by comparing the following factors at both the individual and group level: (i) occurrence of low-back pain and coronary artery disease on the basis of a questionnaire and on the basis of a clinical examination and (ii) subjective work ability reported on a questionnaire and functional capacity assessed by medical and psychological methods. The clinical examinations were carried out about 6 to 12 months after the return of the questionnaire.

For the comparison of work ability and functional capacity the subjects were divided into the following three groups: good, satisfactory, and reduced work ability or functional capacity. It was determined whether or not the same subjects were classified into the same group both on the basis of the questionnaire and on the basis of the clinical data.

Work ability index

The work ability index was a comprehensive indicator constructed on the basis of the responses to the questionnaire. It included subjective estimations of

work ability in relation to diseases, job demands, and psychological resources and also information about illnesses and work absenteeism. The content of the index has been described in detail elsewhere (1). Three categories of work ability were defined. About 25 % of the subjects with the lowest and about 25 % of the subjects with the highest scores were placed in each of the two extreme groups of good and reduced work ability, respectively, and the 50 % with scores in between were categorized as having a satisfactory work ability (table 1).

Medical examinations

Men. The men were given an exercise stress test on a bicycle ergometer. During the test electrocardiographic recordings were made every minute. The work load was increased after the heart rate reached steady state. The load was increased by 25 or 50 W every fourth minute. The test was continued until the subjective maximum was reached unless earlier cessation was necessary because of arrhythmia (8).

Blood pressure was measured both before and after the exercise, and during the exercise it was recorded at the end of each 4-min interval.

Lung function was examined with a spirometer of the Bernstein type.

The compensation degree of the heart was checked also from a chest radiograph of the heart.

With the help of the maximum load reached in the exercise stress test, the relation between the subject's physical work capacity and his work demands was evaluated (9, 10). Those men with a result above 100 W on the stress test were regarded as having good work ability. A performance capacity of 75 W corresponded to satisfactory work ability, and a value of less than 50 W meant reduced work ability.

Those subjects who had had a cardiac infarction or who were diagnosed in the clinical examination, or had been previously diagnosed, as suffering from coronary artery disease on the basis of an exercise stress test or a typical course of the disease were placed in the coronary artery disease group.

Women. For the women the medical examination included a medical history, clinical status, and an examination for back disorders. The examination for back

Table 1. Scores of the men and women on the work ability index.

Work ability index	Score ^a	
	Men (N = 89)	Women (N = 85)
Good	40—49	41—49
Satisfactory	30—39	27—40
Reduced	7—29	7—26

^a A sum score of seven items describing subjective work ability on the questionnaire; range for index = 7—49.

Table 2. Index of musculoskeletal capacity.

Item	Range ^a for item	Content
Overweight (body mass index = weight × height ⁻²)	0–3	0 = <27 kg · m ⁻² 1 = 27–29 kg · m ⁻² 2 = 30–32 kg · m ⁻² 3 = >32 kg · m ⁻²
Mobility of the back (bendings)	0–3	0 = not restricted 1 = restricted sideways 2 = restricted forwards 3 = restricted in all directions
Abdominal muscular strength (sit-ups)	0, 2	0 good = ≥ 5 times 30 s ⁻¹ 2 poor = <5 times 30 s ⁻¹
Back muscular strength (back-ups)	0, 2	0 good = one time 2 poor = less than one time
Mobility of the shoulders (lifting arms straight up)	0–2	0 = normal 1 = one shoulder restricted 2 = both shoulders restricted
Hand-grip strength	0–1	0 = >50 kPa 1 = <50 kPa
Straight-leg raising (passive)	0–2	0 = normal 1 = one leg restricted 2 = both legs restricted
Mobility of hip and low-back joints (Patrick's t-test)	0–2	0 = no pain 2 = both sides painful
Walking	0, 4	0 = normal 4 = clearly impaired
Walking on toes	0, 1	0 = good, 1 = poor
Crouching	0, 3	0 = good, 3 = poor

^a Range for index = 0–25; 0–2 = good, 3–9 = satisfactory, and 10–25 = impaired musculoskeletal capacity.

Table 3. Index of the mental performance level.

Item	Range ^a for item	Content
Word groups	0–2	Verbal ability
Digit Span	0–2	Immediate memory, concentration
Associate Learning	0–2	Verbal memory, learning
Benton Visual Retention Test	0–2	Visual memory
Letter cancellation	0–2	Visual speed, accuracy
Finger tapping	0–2	Simple motor speed
Reaction time	0–2	Sensory and motor speed, vigilance

^a Range for index = 0–14; 0–5 = good, 6–8 = average, and 9–14 = impaired mental performance level.

disorders was carried out according to a structured procedure. In addition to back disorders, other diseases were checked for also. In the estimation of work ability general principles concerning the estimation of work ability in the case of back disorders and musculoskeletal diseases were applied (11–13).

The subjects were classified into the groups of good, satisfactory, and reduced work ability according to the following criteria. A woman was classified into the group of reduced work ability if several methods had been applied to cure her, the possibilities of surgical cure had been used or at least had been clarified, or the disease had been harmful for several months and the prognosis was not positive. One further precondition was that the back disorder showed clear symptoms at the time of the examination. A woman was given an estimation of good work ability if she nei-

ther had symptoms nor experienced impairment. The criteria for satisfactory work ability were the most difficult to determine. In practice, those women who were excluded from the other two groups were classified as having satisfactory work ability.

The examination of the women's musculoskeletal capacity was carried out by a physiotherapist. It included several tests which had also been used and further developed in several study projects (14–16). The index for musculoskeletal capacity comprised 11 factors on which the subjects were rated (table 2). On the basis of the index score the subjects were divided into three groups so that 25 % were placed in each of the extreme groups (good and impaired functional capacity) and 50 % were classified into the middle group of satisfactory functional capacity.

Mental performance level

The mental performance level of all 174 subjects was determined on the basis of psychological tests measuring different cognitive functions. The tests have been used for measuring the mental performance and work ability of elderly persons and for the clinical evaluation of work ability at the individual level (17–20). The sum variable describing mental performance was a combination of seven test variables. Each had the same weight in the index. The subjects were divided into three groups so that 25 % belonged to the group with good and 25 % to the group with impaired mental performance, and the rest were classified as average (table 3).

Results

Health status

Among the men the diagnosis of coronary artery disease was not confirmed for six (13 %) out of 46 cases (table 4). Instead of coronary artery disease these persons suffered from other diseases such as bronchial asthma. Two new cases of coronary artery disease were detected among the men who appraised themselves as healthy on the questionnaire. In addition other previously undiagnosed diseases were detected for six subjects.

Of the 42 subjects suffering from coronary artery disease on the basis of the clinical examination, 23 (55 %) had had a cardiac infarction. Seventy-seven percent had had an infarction once, and the rest had suffered an infarction twice. The use of medicine for coronary artery disease did not essentially change between that listed on the questionnaire and that deemed necessary in the medical examination.

Fifteen women who considered themselves healthy on the questionnaire were found to have a back disorder or other musculoskeletal disease (table 5). Nine women had indicated on the questionnaire that they had a back disorder, but this statement could not be confirmed in the medical examination. No true dis-

agreement was found between the status indicated by the women themselves on the questionnaire and that perceived later in the clinical examination.

Work ability

Men. Twenty-nine men (33 %) (figure 1) were classified into the same group according to the exercise stress test and the work ability index. Work ability, as determined by the exercise stress test, was clearly better for 10 subjects (11 %) and slightly better for 44 subjects (49 %) than the subjects' perceived work ability. However, one subject clearly had a poorer work ability and five subjects (6 %) had a slightly poorer work ability in the clinical examination than that reported on the questionnaire.

The clinical assessment of mental performance level and the work ability index corresponded for 39 men (44 %) (figure 2). The clinically determined mental performance level of five subjects was clearly poorer, and that of 20 men slightly poorer, than the experienced work ability. Correspondingly the subjective work ability was clearly poorer for two men and slightly poorer for 23 men than their clinically determined mental performance level.

According to the results of the exercise stress test 10 men (12 %) whose work ability was reduced according to the questionnaire (figure 1) had enough physical capacity to manage in their work. Eight of them had coronary artery disease, and two of them some

other disease. For three men the discrepancy between the clinical and questionnaire results was explained by the time difference between the collection of the two sets of data. At the time of the questionnaire they were suffering from a cardiac infarction but had recovered

Table 4. Correspondence between the questionnaire data and the clinical examination with respect to the health status of the men.

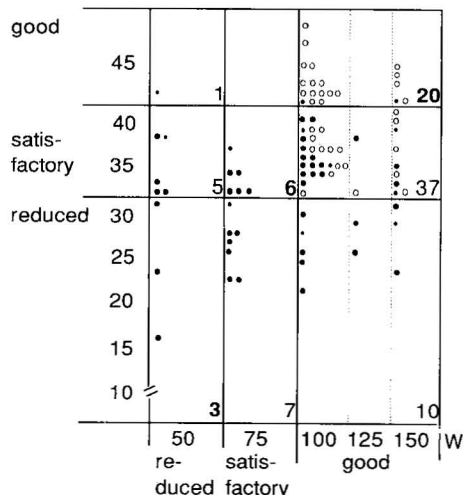
Questionnaire	Clinical diagnosis			Total
	Healthy	Coronary artery disease	Other disease	
Healthy	35	2	6	43
Coronary artery disease	—	40	6	46
Total	35	42	12	89

Table 5. Correspondence between the questionnaire data and the clinical examination with respect to the health status of the women.

Questionnaire	Clinical diagnosis			Total
	Healthy	Back disease	Other disease	
Healthy	24	9	6	39
Back disease	9	35	2	46
Total	33	44	8	85

- healthy, N=35
- coronary artery disease, N=42
- * other disease, N=12

Work ability index

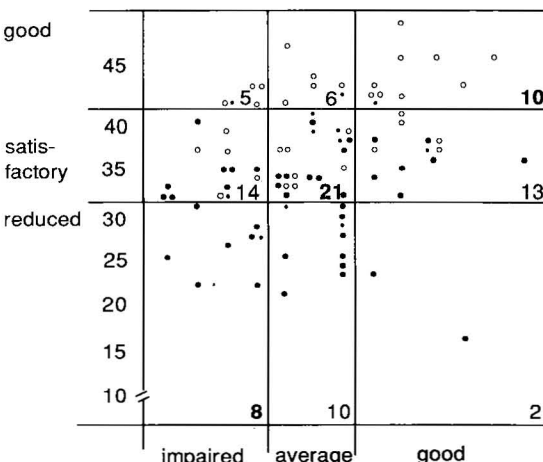


Cardiorespiratory capacity (exercise stress test)

Figure 1. Correspondence between the work ability index of the men and their clinically determined cardiorespiratory capacity.

- healthy, N=35
- coronary artery disease, N=42
- * other disease, N=12

Work ability index



Mental performance level

Figure 2. Correspondence between the work ability index of the men and their mental performance level as determined in the clinical examination.

and had been able to return to work by the time of the clinical examination. The health status of the five other men had not changed between the time the ques-

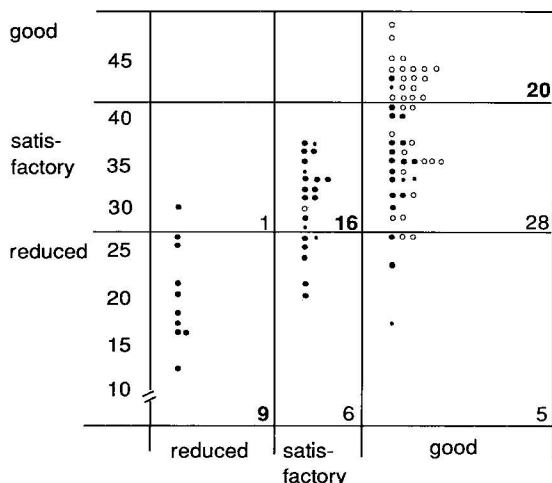
tionnaire had been completed and the time of the clinical examination. Four persons who were estimated as being capable for work on the basis of their physical performance were determined to have a reduced mental performance level.

According to the results of the clinical psychological tests and the subjectively determined work ability, seven men (8 %) were classified into different groups (figure 2). The clinically determined mental performance level of two subjects with coronary artery disease was still good, although the men themselves appraised their work ability as clearly reduced. The physician evaluated their work ability as reduced on the basis of the severity of the coronary artery disease, and this finding explained their subjective assessment of their work ability. Five subjects experienced their work ability as good although their clinically determined mental performance level was impaired when it was compared with that of the other subjects. These men were, however, close to the average both on the basis of the tests of mental performance and on the basis of the work ability index (figure 2) so that the discrepancy was not marked. Moreover, they were all healthy except one and, obviously, therefore received reasonably high scores on the work ability index.

Women. In the medical examination 45 (53 %) of the women were given a rating similar to their subjective opinion with respect to work ability (figure 3). The physician estimated the work ability of five persons

- healthy, N=33
- back disease, N=44
- other disease, N=8

Work ability index

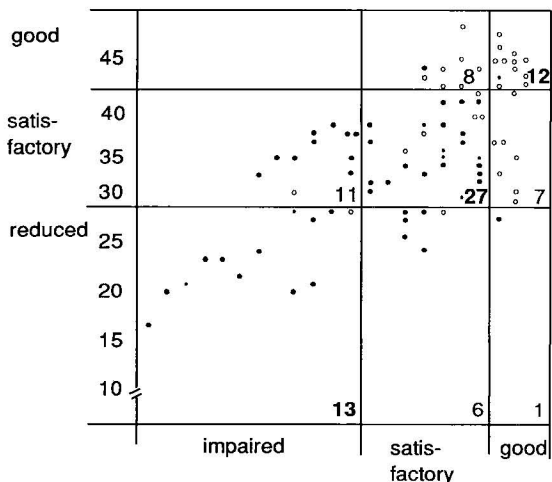


Medical estimation of the work ability

Figure 3. Correspondence between the work ability index of the women and the medical estimation of their work ability.

- healthy, N=33
- back disease, N=44
- other disease, N=8

Work ability index

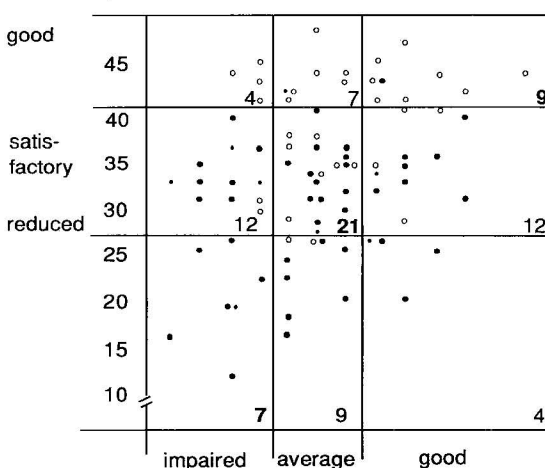


Musculoskeletal capacity

Figure 4. Correspondence between the work ability index of the women and their clinically determined musculoskeletal capacity.

- healthy, N=33
- back disease, N=44
- other disease, N=8

Work ability index



Mental performance level

Figure 5. Correspondence between the work ability index of the women and their mental performance level as determined in the clinical examination.

to be considerably better and that of 34 persons to be slightly better than the women themselves did. For one woman the physician's assessment was lower than that of her own estimation of her work ability.

The physiotherapist's assessment of musculoskeletal capacity and the subjective rating of work ability agreed for 52 subjects (61 %) (figure 4). The physiotherapist's assessment was slightly worse for 19 subjects and slightly better for 13 subjects than the experienced work ability. Only one woman reported that her work ability was reduced even though the physiotherapist considered her musculoskeletal capacity to be good. The relationship between musculoskeletal capacity and the subjective rating of work ability was good both for the women suffering from low-back pain and for the healthy women.

Thirty-seven women (44 %) received the same classification for their mental performance level as their own subjective classification of their work ability (figure 5). The clinically determined mental performance level was considerably poorer for four women and slightly poorer for 19 women than the experienced work ability. Correspondingly it was clearly higher for four women and slightly better for 21 women than the experienced work ability.

Five women (6 %) who believed that their ability to work was reduced were evaluated by the physician as being able to work (figure 3). Two of them had an impaired musculoskeletal capacity and mental performance in the clinical examination. The other three had had a reduced work ability because of lumbar symptoms at the time they answered the questionnaire, but the situation had markedly improved by the time they came to the clinical examination.

The clinically determined mental performance level and subjective work ability of eight women (9 %) were not in agreement (figure 5). Four women experienced their work ability as reduced even though their clinically determined mental performance level was good. Three of them, however, had an impaired musculoskeletal capacity, which explained the result. The clinically determined mental performance level of four persons was slightly impaired, but their work ability was good according to the work ability index. Obviously, good somatic health determined how they experienced their work ability.

Discussion

Health status

Coronary artery disease was not confirmed for 13 % of the men who suffered from that disease according to the questionnaire. Half of the coronary artery disease patients suffered from angina pectoris. However, its diagnosis is not as clearly defined as that of cardiac infarction. At best the diagnostic conclusions of different clinicians only partially congrue with respect to the same patient (2).

The fact that the discrepancy between the clinical and subjective findings was more marked among the women than among the men was mainly dependent on the nature of musculoskeletal diseases and on their diagnostic criteria. Musculoskeletal diseases are difficult to classify unambiguously (21). It is particularly difficult to distinguish between healthy persons and those with minor illnesses. With age the musculoskeletal system degenerates, and the borderline between pathological changes and physiological aging is difficult to define (22). There had been true biological variation in the symptoms during the time between the administration of the questionnaire and the medical examination, and this occurrence partially explained the differences in the results.

Among both the men and the women of the present study new diseases which affected work ability or functional capacity were diagnosed for those who appraised themselves as healthy. Some epidemiologic questionnaire studies have shown a similar tendency to appraise health at a level higher than found in a medical examination (3, 4, 23).

Work ability

A clinical examination was used to measure different aspects of the subjects' work ability and functional capacity. The combination of information based on the separate clinical methods (medical, psychological, and physiotherapist's examinations) improved the correspondence between the subjective work ability index and the results of the clinical examination. The results which were discrepant with respect to one part of the clinical examination were generally explained when the results of other examinations were taken into consideration. In other words the results of the psychological tests supplemented the medical results and vice versa.

The finding of a close relationship between the subjective estimation of work ability and the so-called objective evaluation (group evaluation based on both medical and psychological data) has also appeared earlier (5). Correspondingly, the evaluation of work ability was based on the joint effort of a group of experts from different fields at institutions specialized in the estimation of work ability (5, 6).

Evaluation of the methods

Clinical methods. Those patients with coronary artery disease who performed more poorly in the exercise stress test also had a lower score on the work ability index than the men who performed better in the stress test. For most of the subjects the score of the work ability index seemed to be primarily dependent on somatic health state and physical performance capacity. A relationship between subjective work ability and the results of an exercise stress test has also been found earlier (5).

The correspondence between the clinically determined musculoskeletal capacity and the work ability

index was the best in that 61 % of the subjects received the same classification for both. The examination of musculoskeletal capacity measured the subjects' performance in various tasks and activities and gave results closer to those of the work ability index than the other clinical methods did. The correspondence between the clinical medical examination and the work ability index was better for the women than for the men. This finding may have been due to the fact that the diagnosis of low-back pain is partly based on subjective symptoms and subjective restrictions of functional capacity.

Subjects suffering either from back disorders or from coronary artery disease had, on the average, a poorer mental performance level in the clinical examination than the healthy subjects of the same age and gender. It has been suggested that diseases may affect brain functions either directly through diseases or injuries to the central nervous system or indirectly through general somatic or mental diseases. A decline in mental performance has been found to be significantly related to chronic diseases and not to age as such among persons less than 70 years of age (24).

In cases in which there was a discrepancy between the clinically determined mental performance level and the work ability index, the score of the work ability index seemed to be explained primarily by the physical health status. It should be remembered that all of the subjects in this study belonged to occupations in which the work was more physically than mentally demanding.

Work ability index. The purpose for constructing the work ability index was to define a comprehensive indicator of work ability on the basis of questionnaire data. The index was designed to be used in comparisons between many occupational groups on the basis of data obtained with a questionnaire (1), and one of its main characteristics was that subjectively perceived work ability was related to the subjects' job demands. Therefore, the clinical examination methods measured different aspects of work and functional capacity, and it cannot be assumed that they, as such, would fully agree with the subjective evaluation. One shortcoming of a traditional clinical evaluation may be that it is poorly related to the work demands of the person in question. In addition the cross-sectional nature of the present study may have had some relation to the discrepancies between the questionnaire and clinical results. The clinical assessment of work ability and functional capacity was based on a shorter time perspective than the subjective estimation made with the work ability index.

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