Promotion of work ability, the quality of work and retirement

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In this study, the validity of a model designed to promote the work ability of aging workers was examined. The target areas of work ability promotion were searched for the characteristics that explain work ability the best. In addition, the way work ability relates to the quality of work and retirement was examined. The subjects (n = 1101) participated in the follow-up study on aging Finnish workers in 1992 and 1997. The results consistently supported the model for promoting work ability. All four areas of focus—(i) work demands and the environment; (ii) work organization and the work community; (iii) the promotion of workers' health and functional capacity; and (iv) the promotion of professional competence—proved to be strongly associated with work ability. Good work ability was associated with a high quality of work and the enjoyment of staying in one's job. It also predicted active and meaningful retirement.

Key words: Aging; demands of work; lifestyle; work ability index.

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Introduction

The promotion of work ability includes activities that promote the work ability of workers and workplaces. Its target areas are work demands and the environment, work organization and the work community, workers' health and functional capacity, and workers' professional competence. Promoting work ability has, in recent years, been considered an affirmative means with which to decrease work disability and premature retirement [1,2]. The results of the first national barometer of the maintenance of work ability [3] proved that activities used to promote work ability were common and popular in Finnish workplaces. One important reason for their popularity was that the promotion of work ability was also believed to be economically beneficial to the workplaces.

Factors affecting work ability were extensively examined in follow-up studies of aging workers in 1981–1985 and 1981–1992 [4–6] within the framework of a Finnish action programme [7]. During the 11 year follow-up, the work ability of aging workers was most effectively improved if the promotion focused on a decrease in repetitive movements, on improving the supervisors' attitudes and on increasing physical exercise [8]. These studies resulted in a concept to promote work ability (Figure 1) and a list of examples of activities to promote work ability [9]. According to the concept of promoting work ability during aging [1], it is not only possible to obtain good work ability and health, but also a high quality of work and production, a high quality of life and well-being, and an active and meaningful retirement. An important conclusion of the programme was that health promotion should shift its focus from protection against illness to promotion of health and work ability [2,7,10]. Because of the aging process, the physical capacity of men and women begins to deteriorate soon after entry into adulthood. Mental capacity needs support primarily because of the fast and constant change in content, tools and intercourse at work as a result of the development of information technology, globalization and networks. As old customs, structures and values change in the current 'information age', supporting the entire work community becomes more important because it may strengthen a person's commitment to the work organization and his or her will to cooperate with workmates [11].

In this study, we examined the validity of the new concept of promoting work ability (Figure 1) by a later follow-up study on aging workers. Our study questions were:

1. What features of work demands and the environment, the work organization and work community, the promotion of health and functional capacity, and the

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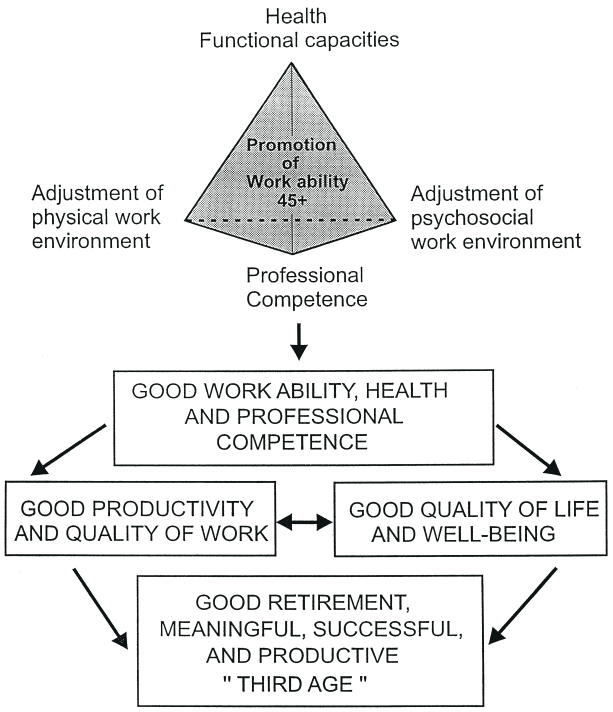
Figure 1. Concept for promoting the work ability of aging men and women [1].



promotion of professional competence explain work ability the best?

2. Is good work ability associated with a high quality of work and high productivity and with a high quality of life and well-being?
3. Does good work ability predict the ability to function well and to stay in good health upon retirement?

Subjects and methods

The data had been obtained from aging workers during follow-up studies [6,8,12] (Table 1), namely, from cross-sectional enquiries made in 1992 and 1997, the response rates of which were 77 and 69%, respectively, of the subjects first examined in 1981. In 1992, the subjects (n = 1101, average age 58.4 years) were full- or part-time workers; in 1997, most of them had already retired (64% because of old age and 16% because of disability).

The work ability index [6,8,9] measured in 1992 was the dependent variable in the first study question (Appendix). The independent variables of this study question were also measured in 1992. They were grouped into four areas: work demands and the environment; work organization and the work community; support for health and functional capacity; and the maintenance of professional competence (Appendix).

The independent variables in the area of work demands and the environment [5,8,12] were: muscular work; poor work postures; sitting work; use of knowledge; responsibility for people; work tools and rooms; dirtiness and risk of accident; strain of machine operating; physical climate; a restless work environment and noisy people; subjective estimation of change in work and tasks since 1985; subjective estimation of the change in work environment and tools since 1985; subjective estimation of change in the physical workload since 1985; and subjective estimation of change in mental workload since 1985. The independent variables in the area of work organization and the work community [5,8,12] were: management; role ambiguity; lack of freedom; uninspiring work; worktime system; utilization of work experience; work autonomy; democracy at work; frequency of interaction with workmates; and frequency of interaction with the supervisor. In the area of support for health and functional capacity [5,8], the independent variables were: vigorous exercise during leisure time; artistic hobbies; smoking; alcohol consumption; and degree of obesity. In the area of maintenance of professional competence [5,8,12], the independent variables were: possibilities for development and influence at work; job retraining and updating of skills during the past 10 years; and studying hobbies.

Table 1. The subjects of the 16 year follow-up study on aging workers

	Study year			
	1981	*1985*	*1992*	*1997*
Active worker	6257	4686	1101	175
Disability pension	0	544	1853	1938
Old-age pension	0	463	2595	3283
Death	0	92	394	714
Response rate (%)	85.3	90.1[a]	77.3[a]	68.8[a]

[a]Calculated from the living subjects examined in 1981.

A dependent variable in the second study question was accountability for the subjective quality of one's own work. The responses to an open question were classified into four classes: high quality of work and high productivity; high quality of work; high productivity; and other or no response. The other dependent variables were: thoughts for retirement (range 0–3, 'not at all', 'sometimes', 'continuously', 'I have already submitted my pension application'); enjoyment of staying in one's job (range 1–5, 'enjoys very much' to 'does not enjoy at all'); and satisfaction with life (range 1–5, 'very high' to 'very low'). Work ability index was the independent variable in all analyses of this study problem. These variables were measured in 1992.

A dependent variable in the third study question was subjective estimation of current work ability compared with that of one's lifetime best (the first item of the work ability index, range 0–10, with 10 signifying work ability at its best). The other dependent variables, measured

in 1997, were: perceived health compared with that of people of the same age (range 1–5, 'much better' to 'much poorer'); physical condition compared with that of people of the same age (range 1–5, 'much better' to 'much poorer'); and satisfaction with life (range 1–5, 'very high' to 'very low'). The work ability index from 1992 and also the independent variables of the first study question were used as dependent variables in these analyses.

The background factors were gender, age (range 55–63 years in 1992) and work content (physical, mental, mixed physical and mental work) [12]. There were no age differences between the gender and work content groups.

The data were analysed by cross-tabulations, χ^2 tests and regression analyses. The variables in the regression models were selected by backward stepwise analyses. The effects of gender, age and work content were adjusted in all the regression models. Work content and gender were used in the models as qualitative variables. The interaction effects of the explaining and confounding variables were also searched for in the regression analyses. The sum variables, which described the work, were formed by factor and reliability analyses [5,8,12].

Results

Factors explaining work ability

There were no great gender differences in work ability as measured by the work ability index. The work ability of physical workers, both among the men and the women, was significantly poorer than that of mental workers.

Of the model of work ability promotion, the variables for work demands and the environment had the best explanation rate (28%); second best were the variables of work organization and the work community (20%); third came professional competence (15%); and the lifestyle variables were last (13%) (Table 2). The explanation rate for the variation in work ability due to work content, age and gender was 6.2 percentage units. Age varied as an explaining factor by model, and it had the greatest effect on the model for work demands and the environment, as did gender.

Of the work demands, a good regressor for good work ability was the use of knowledge (Table 2). Poor work postures, restless work environment, poor physical climate, tool failure and work rooms were strongly associated with poor work ability. An increase in mental work load since the time of the preceding study (in 1985) was strongly associated with poor work ability. Improvements in the work and tasks, and also in the work environment and tools, had a positive influence on work ability. Sitting work was associated with good work ability, mainly in work that included both physical and mental demands. The work ability of the older workers was poorer than that of the younger workers.

Table 2. Features of the different health promotion categories and work ability in 1992—estimate of the beta coefficients (*b*) and respective *P* values of four multivariate regression models explaining the work ability index of people 55–62 years of age (the effects of gender, age and work content are adjusted)

Variable	*b*	*P*
Work demands and the work environment		
Muscular work	–0.22	0.067
Poor work postures	–0.44	<0.001
Sitting work and work content[a]	–	0.009
Use of knowledge	0.46	<0.001
Work tools and rooms	–0.35	0.004
Physical climate	–0.29	0.001
Restless work environment	–0.33	<0.001
Change in work and tasks	1.05	<0.000
Change in work environment and tools	0.47	0.089
Change in mental work load	–1.21	<0.001
R^2 = 0.28	*n* =1002	
Features of work organization and the work community		
Management	–0.54	<0.001
Role ambiguity and work content[a]	–	0.067
Lack of freedom	–0.31	0.001
Uninspiring work	–0.65	<0.001
Dissatisfaction with worktime system	–0.28	0.041
Utilization of work experience	0.94	0.002
Intercourse with supervisor and work content[a]	–	0.079
R^2 = 0.20	*n* = 1011	
Factors affecting health and functional capacity positively or negatively		
Physical exercise during free time	1.07	<0.001
Artistic hobbies	0.52	0.021
Artistic hobbies and work content[a]	–	0.073
Smoking	–0.57	0.296
Alcohol drinking	1.53	0.017
Fatness	–0.78	<0.001
R^2 = 0.13	*n* = 1006	
Work ability and the maintenance of professional competence		
Possibilities for development and influence at work	0.65	<0.001
Job retraining	–3.41	0.004
Job retraining and work content[a]	–	0.025
Possibilities for development and influence at work and job retraining	0.30	0.018
Studying hobbies	1.03	0.001
R^2 = 0.15	*n* = 1011	

[a]The rate parameters of the classification variables cannot be analysed by one concept.

In the model for work organization and the work community, the utilization of work experience proved to be related rather strongly to good work ability (Table 2). Uninspiring work, poor management, lack of freedom and dissatisfaction with the worktime system were the factors most related to poor work ability. Role ambiguity and frequent interaction with supervisors were associated with poor work ability mostly in mental and mixed (physical and mental) work. Poor management was also denoted in rather similar associations.

Of the factors that affect health and functional capacity positively or negatively, artistic hobbies were found to be

associated with good work ability (Table 2). There was also the same type of interaction between artistic hobbies and work content, and, especially in mixed work, artistic hobbies affected work ability positively. Physical exercise during free time was related positively, and fatness strongly negatively, to work ability. However, smoking was not related statistically significantly to work ability.

Of the factors related to professional competence, studying hobbies and possibilities for development and influence at work had a strong positive relationship to work ability (Table 2). In contrast, job retraining and updating skills were generally related to poor work ability. In physical and mixed work, however, job retraining proved to be positive for work ability. With possibilities available for development, job retraining was associated with good work ability.

Effects of work ability

Good work ability was related statistically significantly to high quality and high productivity in one's own work (Table 3). When the group with excellent work ability was compared with the group with poor work ability, high quality of work and high productivity were >1.5-fold more common among the former, the corresponding figures for high quality of work alone and high productivity alone being >1.9- and >1.3-fold, respectively. The association between excellent and good work ability and high quality of work was consistent and more common than an association between poor and moderate work ability and high quality of work.

The relationships between work ability and well-being and quality of life (see Figure 1) were examined with regard to thoughts for retirement, enjoyment of staying in one's job and life satisfaction. The work ability index was used, in turn, as an independent variable in the regression models in which the effects of work content, gender and age were controlled. The work ability index explained the few thoughts of retirement the best ($R^2 = 0.30$, $n = 1005$), with enjoyment of staying in one's job ($R^2 = 0.23$, $n = 1015$) and life satisfaction ($R^2 = 0.13$, $n = 1012$) coming next. The explanation rates for work content, gender and age varied from 2 to 3 percentage units in the regression models. According to the results, the quality of life and well-being were significantly better among those whose work ability index was good than among those whose work ability index was poor.

The predictive power of the work ability index 5 years earlier was examined with regard to subjective estimation of current work ability compared with one's lifetime best, perceived health, perceived physical condition and life satisfaction among the retired subjects in 1997. The work ability index was used, in turn, as an independent variable in regression models in which the effects of work content, gender and age were controlled. The predictive power of the work ability index was highest for subjective estimation of current work ability compared with lifetime best ($R^2 = 0.23$, $n = 619$). It was second highest for physical condition ($R^2 = 0.21$, $n = 700$), third highest for perceived health ($R^2 = 0.20$, $n = 700$) and lowest for life satisfaction ($R^2 = 0.07$, $n = 704$). The explanation rates of work content, gender and age were 3–4 percentage units in the models. Cross-tabulations (Table 4) made these effects more concrete. The ability to function and well-being upon retirement were significantly better in the groups whose work ability index had been good or excellent 5 years earlier than among those whose work ability index had been poor or moderate.

Table 3. Associations of work ability with the quality of one's own work (%) among people 55–62 years of age in 1992

Class of work ability	*n*	*HQ/HP*[a]	*HQ*	*HP*	*Other accounts*	*P*[b]
Excellent	105	15.2	28.6	21.9	34.3	<0.001
Good	269	21.5	28.2	9.7	40.5	
Moderate	466	10.7	20.8	15.5	53.0	
Poor	176	9.6	14.8	16.5	59.1	

[a]HQ, high quality of work; HP, high productivity.

[b]*P* value, based on χ^2 test.

For the interpretation of the results, the predictive power of factors associated with the work ability index in 1992 was also examined regarding the development of work ability during 1992–1997, when most of the subjects were retired. In the area of work demands and the work environment, high use of knowledge ($P = 0.005$) predicted a good, but poor work postures ($P < 0.001$) poor, physical climate ($P < 0.001$) and poor work tools and rooms ($P = 0.027$) predicted a poor, subjective estimation of current work ability among the retired subjects. In the area of work organization and the work community, high utilization of work experience ($P = 0.067$) predicted good subjective work ability, but role ambiguity predicted poor subjective work ability among the retired. In the area of health and functional capacity, physical exercise during leisure time ($P < 0.001$) and artistic hobbies ($P = 0.002$) predicted good, whereas obesity ($P < 0.001$) predicted poor, subjective work ability among the retired. In the area of maintenance of professional competence, possibilities for development and influence at work ($P < 0.001$), job retraining ($P = 0.003$) and studying hobbies ($P = 0.005$) predicted good subjective work ability among the retired subjects. Alcohol consumption and smoking did not predict the development of good or poor work ability.

Discussion

The results consistently supported the work ability promotion model for aging workers. All four areas of

Table 4. Proportions (%) of good functional ability at retirement in 1997 according to the classes of the work ability index, as measured in 1992

	Good functional ability at retirement in 1997[a]			
Classification of the work ability index in 1992	*Good work ability (n = 619)*	*Good health (n = 700)*	*Good physical condition (n = 700)*	*Satisfaction with life (n = 704)*
Excellent	63.3	73.3	80.0	35.0
Good	56.9	62.8	65.6	29.9
Moderate	22.5	36.6	38.8	20.5
Poor	5.7	20.0	19.6	8.5
P[b]	<0.001	<0.001	<0.001	<0.001

[a]Variables of good functional ability at retirement: current work ability compared with lifetime best (good = 8–10 points); perceived health compared with that of people of the same age (good = much or fairly better); physical condition compared with that of people of the same age (good = much or fairly better); satisfaction with life (very satisfied).

[b]*P* value, based on χ^2 test.

focus for the promotion of work ability had a notable relationship to work ability. Good work ability was associated with a high quality of work and high productivity and enjoyment of staying in one's job. Good work ability also predicted the ability to function well and remain well upon retirement.

Some new features, formerly not well known, proved to be related to work ability in each of the examined target areas. The findings that improvements in work and work tasks were related to good work ability were important in relation to work demands and the work environment. As was previously known, poor work postures, dissatisfaction with tools and rooms, a restless work environment and a poor physical climate were related to poor work ability [5]. This result may also reveal the benefits of suitable physical loads and work postures. In work ability promotion it is also important to be aware that the use of knowledge may support work ability.

For work organization and the work community, a new finding was the relationship between the utilization of work experience and good work ability. This result suits the purposes of the Finnish action programme well and it may be an important means with which to increase work commitment and continuation of working among aging workers [2,7,11]. On the other hand, the negative connections between good work ability and poor management, and between good work ability and poor work arrangements, also found earlier [8], were disturbing.

Among the factors of health and functional capacity, a new finding was the connection between artistic hobbies and good work ability, and also between artistic hobbies and the ability to function well and remain well and healthy after retirement age. This connection may stem either from the fact that art promotes creativity and innovations at work, or that art, as a counterbalance to work, may aid relaxation and produce energy. The positive relationship between alcohol and work ability may have been a result of the fact that the amounts consumed were mainly very low among the studied age class. The consumption of alcohol decreased with age and the high consumers had already been selected out of worklife. Therefore, the effects of hard drinking did not appear in these data. As is well known, the connection between alcohol and health is curvilinear [13], moderate drinking being primarily healthy. The finding that smoking was not associated with work ability may have many bases. Smoking can improve work ability over a short period because it works both as a stimulant and as a relaxant [14]. Information about smoking at one point in time classifies ex-smokers as non-smokers and may, therefore, weaken any association. That physical exercise can increase [15] and excess fatness can decrease work ability and health [14] is well known.

Possibilities for development and influence at work proved, as expected, to be essential promoters of work ability. Studying hobbies also proved to be a factor associated strongly with work ability among the older subjects. The general role of job retraining in the rehabilitation of people with already poor work ability may partly explain the negative connection between job retraining and good work ability. Therefore, the follow-up examinations showed that job retraining predicted good work ability among those whose work ability had been poor or moderate. Job retraining had the best results primarily for physical work, which had poor possibilities for development.

The dependence between the quality of one's own work and work ability consistently supported the paradigm of promoting work ability, even though the subjective assessments did not undoubtedly support the supposition that economic profitability was involved. The strong connection between a poor work ability rating and thoughts of retirement and also between good work ability ratings and enjoyment of the job, found earlier [16], also supported the model. Enjoyment of the job may also confirm a person's identification with their job and his or her

commitment to the work community in the current 'information age' [11].

The participation rates of the follow-up studies were sufficient with respect to validity and the generalization of the results. The validity of the self-assessment of work ability was supported by the results of clinical assessment in another study [4]. In this study, the results were mainly based on cross-sectional evaluations, but for the development of a good working life, it is also important to recognize these associations. In addition, some follow-up examinations supported the validity of the results. The association between good work ability and the ability to function well at retirement could motivate employers to promote personnel's work ability. It could also motivate workers to try to maintain their work ability and to participate in programmes to promote work ability at the workplace. The work ability index proved to be a suitable measure for evaluating such promotion.

According to the results, the promotion of work ability among aging workers should make the work tasks fluent and independent, and help the worker feel competent and capable. In the area of work demands and the environment, the action should primarily be directed at improving decision-making, work postures, work tools and the workplace temperature. In the area of work organization and the work community, work experience should be utilized and work roles clarified. In the area of health and functional capacity, aging workers need advice on weight control, guidance and support on physical activities and artistic hobbies. In the area of professional competence, they also need more possibilities for development and training, both at work and during leisure time.

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Appendix. Content, range and reliability (Cronbach's α) of variables in the first study problem in 1992

Variable/items	*Range*	*Reliability*	*Variable/items*	*Range*	*Reliability*
Work ability index	7–49	0.83	Subjective estimation of change in work environment and tools since 1985	1–4	–
Subjective estimation of current work ability compared with lifetime best			Subjective estimation of change in physical workload since 1985	1–5	–
Subjective work ability in relation to both physical and mental demands of the work			Subjective estimation of change in mental workload since 1985	1–5	–
Number of current diseases diagnosed by a physician			Management	0–10	0.81
Subjective estimation of work impairment due to diseases			Cooperation between employer and employees		
Sickness absence during past year			Supervisor's attitude		
Own prognosis of work ability after years			Planning and direction		
Mental resources			Information		
Muscular work	0–10	0.73	Role ambiguity (inconsistent task and responsibility)	0–10	–
Standing in one place			Lack of freedom	0–10	0.53
Frequent walking or moving from one place to another			Paced work		
Carrying objects by hand			Tight time-schedule		
Poor work postures	0–10	0.74	Uninspiring work	0–10	0.29
Repetitive movements			Monotonous and uninteresting work		
Bent or twisted postures			Isolation and loneliness		
Sitting work (sitting in one place)	0–10	–	Worktime system	0–10	0.34
Use of knowledge	0–10	0.73	Rest breaks		
Accuracy in information processing			Work hours		
Complex decision-making			Utilization of work experience	1–4	–
Decision-making under time pressure			Work autonomy	0–3	–
Responsibility for people	0–10	0.55	Democracy at work	1–5	–
Communication with people			Frequency of interaction with workmates	0–3	–
Responsibility for others			Frequency of interaction with supervisor		0–3
Work tools and rooms	0–10	0.67	Vigorous exercise during leisure time	1–5	–
Personnel facilities			Artistic hobbies	0–3	–
Quality and quantity of tools			Smoking	0–3	–
Workrooms			Alcohol consumption	0–1	–
Dirtiness and risk of accident	0–10	0.83	Degree of fatness (weight/height^2)		–
Dirtiness			Possibilities for development and influence at work	0–10	0.86
Dust, smoke, steam, etc.			Influence the work environment		
Risk of accident			Plan own work		
Strain of machine operating	0–10	0.71	Take part in training and updating skills		
Noise			Apply own skills		
Vibration			Learn new things and study		
Lighting and glare			Receive recognition and esteem		
Physical climate	0–10	0.68	Job retraining and updating skills during the last 10 years	0–2	–
Heat, cold, changing temperature			Studying hobbies	0–3	–
Dryness, dampness					
Restless work environment and noisy people	0–10	–			
Subjective estimation of change in work and task since 1985	1–4	–			