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# Work ability and later-life health: A 28-year longitudinal study among Finnish municipal workers

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## Abstract

*We examined longitudinally the associations between the work ability of middle-aged employees and their health over the retirement years. The study sample came from a follow-up questionnaire to Finnish municipal workers. General linear models with repeated measures were used to assess the effects of the Work Ability Index and other variables on health. The results showed that the Work Ability Index was a strong predictor of later-life health. If work ability was excellent, the odds of good health were over 3 times higher than for a person with poor work ability. Maintenance of good work ability throughout the occupationally active years has a strong impact on later-life health.*

**Key terms:** work ability index, longitudinal study, health

## Introduction

Work ability, measured by the Work Ability Index (WAI) has proved to be a reliable predictor of morbidity, early retirement, and disability in studies concerning ageing workers (1-3). Good work ability also predicts well-being and functional status far beyond the retirement transition (4). There is also some evidence that work ability may predict mortality (5-6). Even though there is evidence that work ability is associated with a person's own evaluations of his/her health (7-8) more studies are still needed to obtain information from the long-term effects of work ability on later-life health and well-being. The main objective of this study was to examine longitudinally the associations between work ability in midlife among occupationally active employees and their health in their retirement years.

The specific study questions were:

1. Does the level of Work Ability Index (WAI) with the categories excellent, good, moderate, and poor have an impact on self-assessed health and morbidity 28 years later?
2. Is WAI associated with health even if other factors are taken into account?

## Material and methods

### *The study sample*

The study sample came from a follow-up questionnaire study of Finnish municipal workers which was conducted at the Finnish Institute of Occupational Health from 1981 to 2009 (6). In 1981, a questionnaire was mailed to 7,344 municipal workers in different areas of Finland. The respondents were born between 1923 and 1937 and the mean age was 50.5. A total of 6,257 persons responded to the first questionnaire (the response rate was 85.2%). In 2009, a total of 3,093 persons responded

to the final questionnaire (the response rate was 74% of the surviving participants who responded to the first questionnaire). In 2009, the vital status and dates of death were added to the data. By then, 2,079 respondents had died.

### *Study variables*

The measure of perceived health was constructed from two questionnaire items: “Compared to your friends of the same age, is your health much better, slightly better, the same, slightly worse, or much worse?” and “To what extent do diseases hamper your everyday life: not at all, relatively little, to some extent, rather much, or very much?” The responses to these questions were combined into four groups (good, moderate, poor, and very poor health). The construction of these groups has been reported elsewhere (9-10). The independent variables were work ability, measured by the Work Ability Index (WAI), categorized into excellent, good, moderate, and poor (11), physical function (coping with mainly physically demanding daily activities, for instance heavy cleaning work, lifting and carrying heavy weights, climbing three flights of stairs without needing to rest, walking about 2 km without a rest, running a short distance without a rest, sitting still for about 2 h, squatting down on one’s heels and getting up, bending over, bending down, lifting hands above the head, detailed movements of the arms and fingers), and lifestyle, including health behavior (i.e. alcohol consumption, smoking, physical exercise) and involvement in various activities (reading, studying, attending clubs and associations, and needlework, handicrafts). For physical function and activity items, summary scores were created. Gender, marital status (unmarried, married, unmarried but co-habiting, separated, divorced, widow/widower), socio-economic group (blue-collar, lower-level white-collar, upper-level white-collar workers), age, and gender were also included in all analyses.

### *Statistical analysis*

The associations between health, physical function, lifestyle, and other background variables were assessed by general linear models with re-

peated measurements. These likelihood based methods are valid under missing at random assumption when missing data might depend on observed data (12). With this method it was possible to use all available data from each time point and there was no need to be restricted to the follow-up data only. Statistical analyses were performed with the SAS statistical package (13).

## Results

At the baseline, there were some differences between the study participants and those who had died during the 28-year follow-up or those who did not respond to all questionnaires (Table 1). Compared to non-respondents, the study participants belonged more often to the upper white-collar group; they were also younger, more active and had better physical function. About 60 per cent of the deceased were men or used to work in blue-collar occupations. In addition, work ability was better among the participants; the proportion of excellent work ability was 20% compared to 11% among non-respondents and 14% among the deceased.

**Table 1.** Baseline characteristics of participants in the follow-up, deceased and other dropouts.

Baseline characteristics (range)	Participants in the follow-up (n=3093)	Deceased (n=2079)	Non-respondents (n=1085)
	% or Mean (Std)	% or Mean (Std)	% or Mean (Std)
Gender			
Men	37%	61%	35%
Women	63%	39%	65%
Socio-economic status			
Upper white-collar work	25%	16%	14%
Lower white-collar work	38%	24%	36%
Blue-collar work	37%	60%	49%
Activity level (0–5)	1.35 (1.1)	1.09 (1.0)	1.16 (1.1)
Age (45–58 years)	49.7 (3.4)	51.7 (3.6)	50.4 (3.6)
Physical function (0–33) <sup>a</sup>	26.2 (5.9)	23.4 (7.2)	25.0 (6.5)
Morbidity (0–24 diseases)	1.69 (2.0)	2.26 (2.5)	1.82 (2.2)
Health			
Good	9%	7%	7%
Average	28%	23%	25%
Poor	49%	47%	51%
Very poor	14%	23%	17%
Work Ability Index			
Excellent	20%	14%	11%
Good	39%	38%	31%
Moderate	31%	34%	37%
Poor	10%	14%	21%

<sup>a</sup> from 1985

The Work Ability Index was a strong predictor of later-life health (Table 2). When all the other independent factors were included in the analysis, the level of Work Ability Index was still a highly significant predictor of health. Besides good work ability, involvement in activities and good physical functioning further improved health at follow-up. Women reported better perceived health than men. Socio-economic status based on occupation was also a strong modifier of health. Upper white-collar work especially promoted health compared to blue-collar work.

The adjusted odds ratios in Table 3 describe the relative differences between work ability groups. For instance, if a person had excellent-

work ability in midlife the odds of having good health was 3.6 times compared to the odds of a person with poor work ability having good health during the retirement years. Even an increase from poor work ability to moderate almost doubled the odds of good health.

**Table 2.** General linear model of health 1981-2009. Estimates and 95% confidence intervals (CI). N=3093

Parameter	Estimate	StdE	95% CI		Z	Pr >  Z
<b>Time</b>						
1981	-0.45	0.04	-0.53	-0.37	-10.9	<.0001
1992	-0.29	0.04	-0.36	-0.22	-8.13	<.0001
1997	-0.12	0.03	-0.18	-0.07	-4.58	<.0001
2009	0					.
<b>Gender</b>						
Women	0.35	0.05	0.25	0.44	7.22	<.0001
Men	0					
<b>Age</b>	0.04	0.01	0.02	0.05	6.14	<.0001
<b>Socio-economic status</b>						
Upper white-collar	0.17	0.06	0.06	0.28	3.05	< .01
Lower white-collar	-0.02	0.05	-0.12	0.09	-0.30	n.s.
Blue-collar work	0					
<b>Activity</b>	0.09	0.02	0.05	0.12	4.97	<.0001
<b>Physical function</b>	0.16	0.0	0.16	0.17	41.8	<.0001
<b>Work Ability Index</b>						
Excellent	1.27	0.09	1.10	1.46	13.5	<.0001
Good	1.11	0.06	0.98	1.23	17.1	<.0001
Moderate	0.61	0.06	0.50	0.72	10.9	<.0001
Poor	0					
<b>Alcohol consumption</b>						
None	-0.34	0.04	-0.42	-0.25	-7.97	<.0001
Some	0					
<b>Smoking</b>						
Does not smoke	0.13	0.06	0.02	0.25	2.25	< .05
Smokes	0					

**Table 3.** Relative differences between Work Ability Index groups explaining good health. Odds ratios (OR) and 95% confidence intervals (CL)

Label	Estimate	SE	CL		Chi-sq	Pr
<b>Excellent vs. poor</b>	3.58	0.34	2.97	4.30	182.78	<.0001
<b>Excellent vs. moderate</b>	1.98	0.16	1.66	2.29	64.83	<.0001
<b>Excellent vs. good</b>	1.18	0.10	1.00	1.39	3.91	0.0480
<b>Good vs. poor</b>	3.08	0.20	2.67	3.44	293.12	<.0001
<b>Good vs. moderate</b>	1.65	0.08	1.50	1.82	105.20	<.0001
<b>Moderate vs. poor</b>	1.83	0.10	1.64	2.05	118.55	<.0001

## Discussion

Our study suggests that promotion of good work ability over the occupationally active years has a strong impact on later-life self-assessed health. It has also been shown that self-rated health predicts morbidity (14, 15), and consequently, if an aging employee could maintain his or her work ability over the occupationally active years it would enforce a healthier and disability-free third age. This may have strong implications for social policy as populations in most industrialized countries are aging rapidly and the economic costs of this aging are expected to rise in the future.

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