PREDICTORS OF PERCEIVED WORK ABILITY IN MENTALLY DEMANDING WORK

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The objective of this study was to define the work-related and individual predictors of perceived work ability in mentally demanding work. The subjects were 44 teachers and superiors with the mean age of 50 years. They were compared in age- and gender-matched pairs. Several significant work-related and individual predictors were observed for perceived work ability assessed with the Work Ability Index (WAI). The most novel finding was the incomplete recovery of the subjects with the reduced WAI from stress during sleep.

Work ability, mentally demanding work, recovery

1 Introduction

The work ability is characterized by the balance between a worker's individual resources and demands of the work. The principal resources include health, capacities, competence and values. The theoretical framework of the work ability can be described as a construction with four floors applying so called Work ability house (Fig. 1). In the framework, health and physical, psychological and social capacity are the basic first floor elements of individual work ability. The second floor of the Work ability house reflects professional competence referring to knowledge and skills. The competence has also a dimension for developing own work and acting in different work communities. Values, attitudes and motivation are in the third floor, and they regulate the balance between individual resources and work as well as between work and leisure time. The fourth floor is dedicated to work and its various environmental exposures and psycho-physiological load factors. The organization of the work, functioning of the work community and management are multi-dimensional issues and difficult to conceptualize and evaluate (Ilmarinen 2006).

The Work Ability Index (WAI) is a prevalent method to assess perceived work ability (Ilmarinen et al. 1997, Tuomi et al. 1998). The WAI is affected by several work-related and individual factors (Ilmarinen et al. 1997). Recently Hopsu et al. (2005) reported that the reduced WAI and overweight were powerful predictors for the early exit from working life in female professional cleaners during the 12-year follow-up. Physical fitness decreases due to age which is one of the most significant predictors for the WAI (Ilmarinen 2001, Robertson and Tracy 1998). In order to have good results in the promotion of work ability it is important to define all factors affecting work ability in different occupational contexts, especially, when the impact of the age can be controlled.

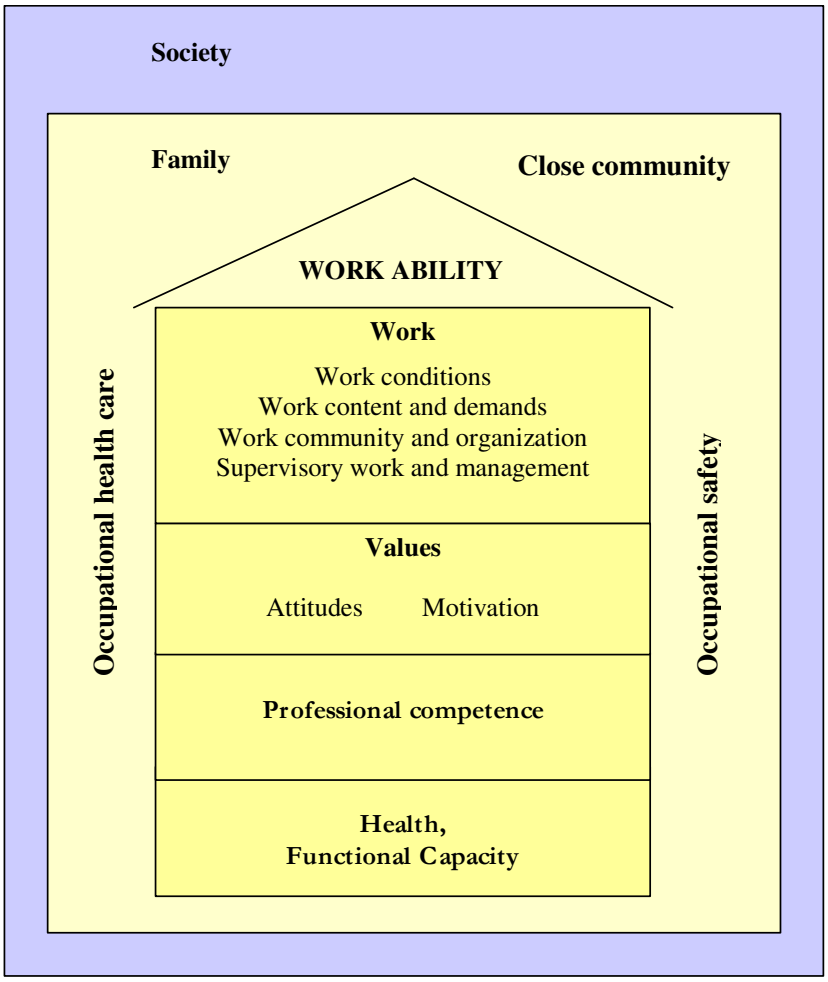

Figure 1. The Work ability house (Ilmarinen 2006).

2 Objectives

The objective of this study was to define the work-related and individual predictors of perceived work ability in mentally demanding work based on the comparison of age- and gender-matched pairs of the teachers and superiors.

3 Methods

The subjects were 44 teachers and superiors (18 men and 26 women). Their mean age was 50 (range 35-63) years. The subjects were compared in pairs derived from two age- and gender- matched groups according to their WAI: group A having the excellent WAI with the mean of 45.8 (SD 1.9) points and group B having the reduced WAI with the mean of 34.7 (SD 2.0) points.

3.1 Questionnaires

Perceived work ability was assessed with the WAI which covered the following seven items: 1. Subjective estimation of current work ability compared with lifetime best (0-10 points), 2. Subjective work ability in relation to both physical and mental demands of work (2-10 points), 3. Number of diagnosed diseases (1-7 points), 4. Subjective

estimation of work impairment due to diseases (1-6 points), 5. Sickness absenteeism during the past year (1-5 points), 6. Own prognosis of work ability after 2 years (1, 4 or 7 points), and 7. Psychological resources (enjoying daily tasks, activity and life spirit, optimistic about the future) (1-4 points). The score of the WAI ranges from 7 to 49, and is divided into four categories as follows: poor (7-27 points), moderate (28-36 points), good (37-43 points), and excellent (44-49 points) (Tuomi et al. 1998). Subjective burn-out and work-related stress were assessed with the Bergen Burnout Indicator (BBI) and the Work-related Stress Questionnaire (WSQ), respectively (Näätänen et al. 2003, Elo et al. 1992). Work motivation, professional competence, organizing of the work and functionality of the work community were assessed using a questionnaire items with the scale from 0 to 10, having the endpoints of "totally disagree" and "totally agree", respectively. The medication, drinking and smoking habits were also inquired by the questionnaire.

3.2 Resting values

The resting values of cardiorespiratory system were recorded in a supine position in the laboratory. Heart rate (HR) was recorded using the Suunto Smart Belt equipment (www.suunto.com). Diastolic blood pressure (DBP) and systolic blood pressure (SBP) were measured with the Omron M4 automatic device (www.europe.omron.com).

3.3 Physical capacity

The flexibility of the lumbar spine was assessed with the modified Schober test (Gill et al. 1988). The body balance was tested with the functional balance test (Punakallio et al. 1997). Muscle strength of the trunk flexors was measured with the repetitive sit-up test (Pollock and Willmore 1990). The assessments of the anthropometrics and body composition preceded the tests. The measurements were carried out in the laboratory. The aerobic capacity was assessed with the 2-km walking test (Laukkanen et al. 2000) on an indoor track of 400 m.

3.4 Heart rate and heart rate variability

HR and heart rate variability (HRV) were recorded with the Suunto Smart Belt equipment. The 24-hour recording period consisted of a work shift, leisure time and sleep. The subjects were instructed to work in their habitual manner and to maintain their normal leisure activities. The data were analysed using the Wellness Software developed by Firstbeat Technologies Ltd. (www.firstbeattechnologies.com).

3.5 Statistical methods

Descriptive statistics included the calculation of frequencies, means, standard deviations and ranges. The group differences were tested with the $\chi 2$ test or the t-test with paired samples. The level of significance was set at $p < 0.05$.

4 Results

The perceived BBI and WSQ scores of the group A with the excellent WAI were significantly lower than those of the group B with the reduced WAI ($p=0.013$ and $p=0.003$, respectively). In the group A, 23% of the subjects used medication regularly whereas the corresponding value was 64 % for the group B ($p=0.001$). There were no significant differences between the groups in the smoking and drinking habits (Table 1).

Table 1. The questionnaire based results of the study: Bergen Burnout Indicator (BBI), Work-related Stress Questionnaire (WSQ), medication and drinking and smoking habits.

	Group A (n= 22)		Group B (n= 21–22)		
	n	%	n	%	p [a]
BBI					**0.013**
No burnout symptoms	19	86	6	27	
Mild burnout symptoms	0	0	6	27	
Fair burnout symptoms	2	9	8	36	
Severe burnout symptoms	1	5	2	9	
WSQ					**0.003**
No stress	3	14	1	5	
Fairly little stress	10	46	4	18	
Somewhat stress	6	27	5	23	
Fairly much stress	2	9	7	32	
Very much stress	1	5	5	23	
Medication					**0.001**
No medication	17	77	7	32	
Regular medication	5	23	14	64	
Drinking					0.184
No drinking	1	5	0	0	
Weekly	7	32	12	56	
Occasionally	14	64	9	41	
Smoking					0.513
No smoking	20	91	19	86	
Daily	0	0	1	5	
Occasionally	2	9	1	5	

[a] χ^2 -test

The group A had a better motivation to work (p=0.014) and they were more satisfied with organization (p=0.036) compared to the group B. There was also a strong trend that the group A perceived to have a better professional competence (p=0.060) than that of the group B. There were no significant differences between the groups in the functionality of the work community (Table 2).

Table 2. The results of the questionnaires about work motivation, professional competence, organisation of the work and functionality of the work community with the scale of 0-10.

	Group A (n= 22)	Group B (n= 22)	
	m ± sd (range)	m ± sd (range)	p [a]
Motivation	8.2 ± 1.0 (5.3-9.6)	7.3 ± 1.3 (4.3–9.3)	**0.014**
Professional competence	7.7 ± 1.2 (5.2-9.6)	6.5 ± 1.8 (3.0-9.5)	0.060
Organisation of the work	7.5 ± 1.3 (5.2–9.7)	6.2 ± 2.0 (2.0–8.6)	**0.036**
Functionality of the work community	7.9 ± 1.0 (5.3-9.6)	7.0 ± 1.6 (2.8-9.4)	**0.041**

[a] t-test with paired samples

There were no significant differences between the group A and B in the resting values of HR, SBP and DBP. There was a significant difference between the groups in the Body mass index (p=0.016) and the percentage of fat (p=0.014). In the variables of physical capacity a significant difference (p=0.048) between the groups was detected in the strength of the trunk flexors and the index of the walking test (p=0.048, p=0.003, respectively). The other differences were insignificant (Table 3).

Table 3. The resting values of heart rate (HR), diastolic blood pressure (DBP) and systolic blood pressure (SBP), anthropometrics (Body mass index=BMI) as well as the values characterising physical capacity (Lumbar spine mobility= L-spine mobility) in the group A with the excellent WAI and the group B with the reduced WAI.

	Group A		Group B		
	n	m ± sd (range)	n	m ± sd (range)	p [a]
HR (beats/min)	19	67 ± 12 (46 – 89)	19	74 ± 11 (57 – 94)	0.102
DBP (mmHg)	22	88 ± 13 (72 - 127)	22	87 ± 11 (69 - 106)	0.805
SBP (mmHg)	22	136 ± 21 (116 – 200)	22	137 ± 16 (110 – 166)	0.854
BMI (kg/m^2)	18	25.1 ± 3.7 (20.4–34.7)	18	28.2 ± 4.7 (22.4–37.3)	**0.016**
Percentage of fat (%)	18	25.3 ± 6.5 (15–49)	18	30.3 ± 7.9 (17–47)	**0.014**
2-km walking test (index)	15	104 ± 11 (81–120)	15	85 ± 24 (39–119)	**0.003**
Sit up (max rep.)	19	36 ± 14 (6-50)	19	28 ± 12 (4-50)	**0.048**
L-spine mobility (cm)	18	6.7 ± 0.9 (4.5–8.0)	18	7.1 ± 0.9 (5.8 -9.0)	0.155
Functional balance(s)	18	16.9 ± 4.5 (11.2 -31.6)	18	17.5 ± 6.6 (10.4–38.5)	0.767

p [a], t-test with paired samples

During sleep the group A with the excellent WAI seemed to recover from stress more completely than the group B with the reduced WAI according to their HRV (p=0.051). No significant differences were observed between the groups in stress at work or stress during leisure time.

5 Discussion

In spite of the small number of the teachers and superiors in this study, several significant both work-related and individual predictors of perceived work ability assessed with the WAI were observed. The incomplete recovery of the teachers and superiors with the reduced WAI from stress during sleep was a novel finding. The increasing demands of work emphasize the need of the adequate recovery because a worker should be productive, creative and innovative in the current 24-hour society. The long-term incomplete recovery may impair health, work ability and wellbeing. Interesting findings were also the significance of overweight and walking capability related to the reduced WAI. Recently the overweight related to the reduced WAI was indicated to be a powerful predictor for the early exit from the working life (Hopsu et al. 2005). Therefore, the significance of overweight should not be underestimated, because

it seems to affect work ability in multiple ways. The promotion of health, work ability and wellbeing should include the information on nutrition and physical activity in all phases of the work career.

The present results supported the theoretical framework of work ability i.e., the Work ability house reported by Ilmarinen (2006) although the WAI evaluates perceived individual work ability and focuses on health oriented items. Furthermore, the strict categorization of variables to work-related or individual ones is sometimes difficult regarding, for instance, to professional competence.

The workforce is ageing rapidly. In the next 15 years approximately 900 000 workers, about 40% of workforce, will exit from the working life (Ilmarinen 2006). In the near future the main challenge will be to keep older people at work. This requires much effort to promote health, work ability and wellbeing and their work-related and individual determinants. More studies on work ability and, particularly, on recovery are necessary.

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