

Work-related stress symptoms of aging employees in municipal occupations

by Leena Eskelinen, PhL, Jouni Toikkanen, MSocSc, Kaija Tuomi, LSocSc, Irja Mauno, MSc, Clas-Håkan Nygård, PhD, Matti Klockars, MD, Juhani Ilmarinen, PhD¹

ESKELINEN L, TOIKKANEN J, TUOMI K, MAUNO I, NYGÅRD C-H, KLOCKARS M, ILMARINEN J. Work-related stress symptoms of aging employees in municipal occupations. *Scand J Work Environ Health* 1991;17(suppl 1):87-93. The objective of the study was to investigate the relationship between stress symptoms and work stressors among aging employees in municipal occupations. The subjects were 1799 men and 2456 women aged 48-62 years and representing 40 different occupations. Stress reactions were identified on the basis of long-term cardiorespiratory, musculoskeletal, and psychological symptoms. Work stressors were described by means of physical and mental work demands. Two factors describing the possibilities for regulating one's own work load were used as indicators for the adjustment of work according to individual capacities. The effect of work stressors on cardiovascular, musculoskeletal, and psychological symptoms was studied in separate analyses, controlling for the relevant disease group. Both chronic diseases and work stressors were related to the occurrence of symptoms. However, stress identified on the basis of symptoms was not only a phenomenon determined by health status. Work stressors and possibilities for regulating one's own work load were systematically related to symptom level.

Key terms: aging, chronic diseases, municipal workers, stress symptoms, work stressors.

In general, reactions to mental and physical stress are widely used to evaluate the relationship between individuals and their work. The advantage of the approach is that stress reactions may be early indicators of possible misadjustment. They can represent a decline in work performance and motivation, or they might be early signs of reduced work ability (1, 2). However, the use of perceived symptoms as indicators of work-induced stress is problematic because of their nonspecific character. In addition to qualitative and quantitative work overload, the other main source of general symptoms may be various chronic diseases (3, 4). The multiple etiology of symptoms has often been disregarded in psychological studies on work, and symptoms have been interpreted directly as an indicator of work stress.

The objective of this study was to clarify the work-relatedness of stress symptoms of elderly employees. Because of the age of the respondents many chronic diseases were common among the subjects (5). Therefore it was of particular importance that the effects of these diseases on perceived stress be controlled for.

In this study stress was understood as a misadjustment between work stressors (eg, physically heavy work) and individual features (eg, health status). In addition, a person was expected to be able to cope better with the harmful effects of his or her work stressors if he or she was able to influence the used work methods and workplace.

¹ Institute of Occupational Health, Helsinki, Finland.

Reprint requests to: Ms L Eskelinen, Department of Psychology, Institute of Occupational Health, Topeliuksenkatu 41 A a, SF-00250 Helsinki, Finland.

Subjects and methods

Subjects

The subjects consisted of workers who responded to the questionnaire of a comprehensive investigation on work, health status, and the grounds for determining the retirement ages of municipal workers and who had been in their current jobs in the follow-up period of 1981-1985 (6). Altogether 1799 male and 2456 female municipal workers in 40 different occupations were included. Occupations with physical, mental, and mixed physical and mental work demands were represented in the material. When the data of this study were gathered in 1985, the mean age of the respondents was 54 (range 48-62) years.

Because of the age of the subjects many chronic diseases were common among them. The prevalence of musculoskeletal diseases was high; 52.5 % of the subjects reported a musculoskeletal disease diagnosed by a physician because degenerative diseases were included. The second largest disease group [20.7 % of the subjects (N=882)] was cardiovascular diseases. Hypertension was the most common cardiovascular diagnosis, whereas such diseases as cardiac infarction and angina pectoris were rather rare. In addition, 14.2 % of the subjects (N=605) reported a cardiorespiratory disease, 9.6 % of the subjects (N=407) had a disease of the digestive system, and 5.5 % of the subjects (N=232) suffered from mental disorders.

Methods

Stress reactions were identified by means of symptoms presented in the questionnaire. Long-term cardio-

Table 1. Physical and mental stress factors at work.

Stress factor	Dichotomization of the stress factor
<i>Physical stress factors</i>	
Heaviness of work To what extent does your work involve physically heavy work of the whole body?	Light work: not at all or seldom Heavy work: at least relatively much
Repetitive movements To what extent does your work involve repetitive movements?	Variable work: little or to some extent Repetitive work: often or very often
Poor work postures To what extent does your work involve stooped, twisted, or otherwise inconvenient work postures?	Variable work postures: little or to some extent Inconvenient work postures: often or very often
<i>Mental stress factors</i>	
Confused work roles To what extent does your work involve confusion of work roles and responsibility?	Clear work role: not at all or little Confused work role: to some extent or much
Pressure to work fast To what extent does your work involve a need to work fast and tight time schedules?	Unhurried work: little or to some extent Need to work fast: much

Table 2. Possibilities for regulating one's own work.

Factor	Dichotomization of the factor
Possibilities for influencing one's own work ^a To what extent do you have possibilities for affecting your work environment? To what extent do you have possibilities for participating in the planning of your work?	Much influence: sufficiently Little influence: little or to some extent
Paced work To what extent is your work paced?	Free work tempo: not at all or little Paced work: at least to some extent

^a Dichotomized on the basis of the median value of the sum variable.

Table 3. Study groups in the analysis of cardiorespiratory, musculoskeletal, and psychological symptoms.

Analysis	Study groups	
	Men	Women
Cardiorespiratory symptoms ^a		
Subjects without cardiovascular disease	1175	1607
Subjects with cardiovascular disease	338	341
Musculoskeletal symptoms ^a		
Subjects without musculoskeletal disease	790	984
Subjects with musculoskeletal disease	723	964
Psychological symptoms ^b		
Subjects without mental disorder	1365	1815

^a Subjects suffering from cardiorespiratory diseases and mental disorders excluded.

^b Subjects suffering from cardiorespiratory diseases, diseases of the digestive system, and mental disorders excluded.

respiratory, musculoskeletal, and psychological symptoms formed the three indicators of stress. The content and construction of the scales have been described elsewhere (3, 7).

The scales were constructed so that the range of each scale was 0–10 (0 being the minimum and 10 the max-

imum value of each item). However, the numeric values (sum scores) of the three scales were relative and therefore not comparable in respect to the intensity of the symptoms. In order to correct the skewness of the scale for cardiorespiratory symptoms, a logarithmic transformation was made.

The work stressors described both the physical and mental stressors of work (table 1). They were chosen from among a larger number of stress factors identified on the same questionnaire (5, 8) because of their known importance as stressors in earlier studies and because they were relevant to the type of stress reactions studied (9–14).

The possibilities for regulating one's own work described the flexibility the work provided for its adjustment according to individual capacities and abilities. The possibilities for regulating one's own work was operationalized with the help of two factors (ie, possibilities for influencing one's own work and the prevalence of paced work) (table 2).

The individual factors covered age, gender, and health status. A two-year age grouping covering the variation from 48–49 to 60–62 years was used. All

the analyses were made for the men and women separately. Health status was described on the basis of the five disease groups that have already been described.

The analysis was divided into two phases. In the first phase the separate effects of age, gender, and health status on three types of stress symptoms were investigated. On the basis of these results the second phase of the analysis was directed towards an investigation of the impact of work stressors separately on cardiorespiratory, musculoskeletal, and psychological symptoms.

The studies of cardiorespiratory, musculoskeletal, and psychological symptoms differed from each other

in respect to the work stressors included (tables 5—7 in the Results section). In addition, so that the independent effect of work stressors on the symptoms could be determined, the effect of other possible explaining factors (chronic diseases in particular) was taken into account. Diseases were used in the classification of the subjects according to their relation to the symptoms investigated. The subjects were divided into two groups on the basis of health status with respect to cardiovascular diseases, musculoskeletal diseases, and mental disorders, one group being healthy and the other ill (table 3). In addition, subjects suffering from certain other diseases were excluded from the investigation because of the similarity between the stress symptoms

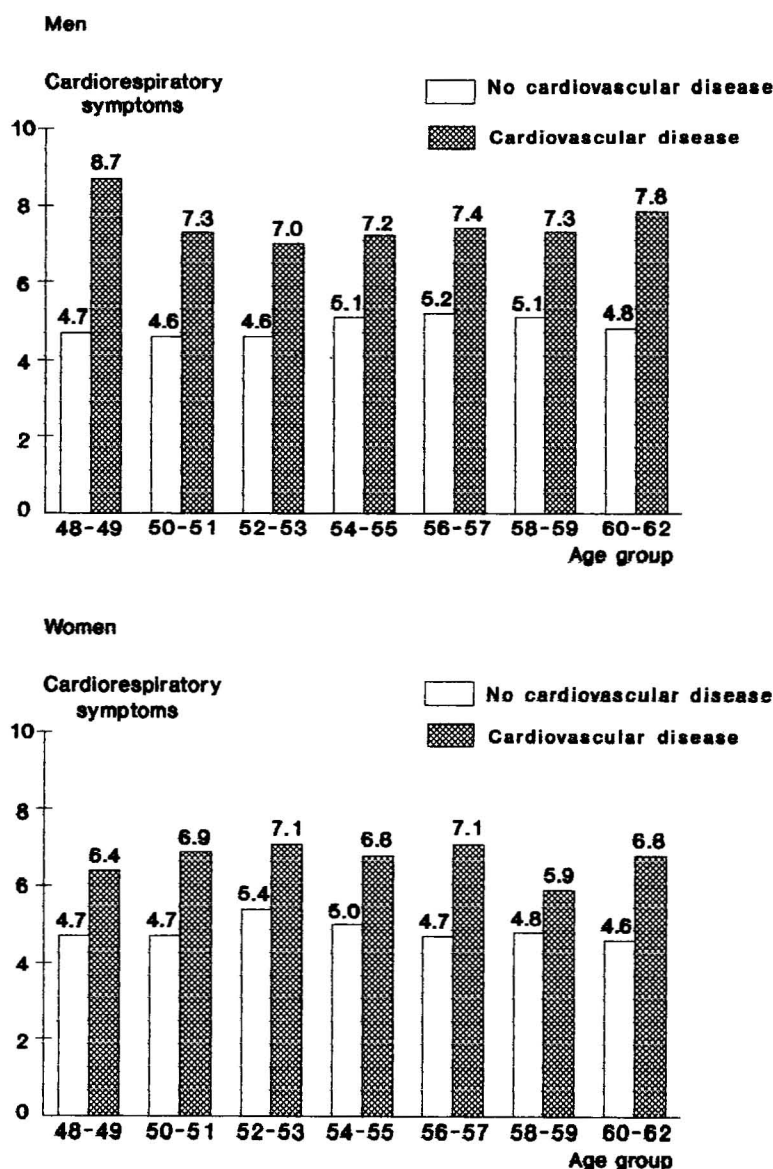


Figure 1. Cardiorespiratory symptoms according to age (in years) and the occurrence of cardiovascular disease. (symptom scale: 0 = minimum, 10 = maximum value of the sum score)

studied and the symptoms associated with these diseases. Therefore, for the analysis of cardiorespiratory and musculoskeletal symptoms subjects with cardiorespiratory diseases and mental disorders were excluded. For the analysis of mental symptoms subjects suffering from diseases of the digestive system were excluded as well. All the analyses were made for the men and women separately. The multiple analysis of variance was used for the statistical analysis.

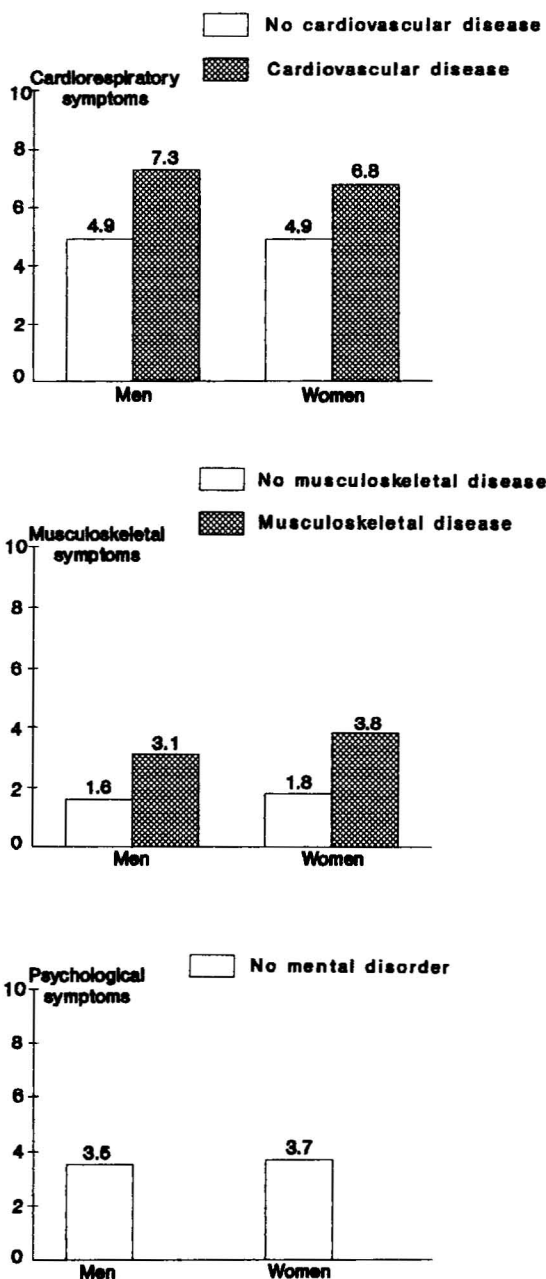


Figure 2. Cardiorespiratory, musculoskeletal, and psychological symptoms of the men and women separately. (symptom scale: 0 = minimum, 10 = maximum value of the sum score)

Results

Age, gender and stress symptoms

Age did not have a clear effect on the symptom level (ie, symptoms were not found to be more common as age increased). As an example the prevalence of cardiorespiratory symptoms has been presented in figure 1 for the different age groups.

There were no marked differences in the prevalence of symptoms between the two genders. However, the cardiorespiratory symptoms were slightly more frequent among the men suffering from cardiovascular diseases than among the women with the same diseases. On the contrary, musculoskeletal symptoms tended to be more common among the women with musculoskeletal diseases than among the men with these diseases (figure 2).

Health status and stress symptoms

The chronic diseases studied (ie, cardiovascular, musculoskeletal, and respiratory diseases and diseases of the digestive system and mental disorders) had a marked association with the stress symptoms (table 4). The chronic diseases were, in every respect, related to a higher number of symptoms. As expected, the differences were pronounced when the symptoms of the healthy and ill persons were compared. However, the associations turned out to be very nonspecific as well. Various diseases markedly increased the reactions to both physical and mental stress.

Work stressors and stress symptoms

Cardiorespiratory symptoms. The effect of physical work stressors and possibilities for influencing one's own work were studied in four separate analyses (ie, for men with cardiovascular disease, for men without cardiovascular disease, for women with cardiovascular disease, and for women without cardiovascular disease) (table 3). A summary of the factors with an impact on reported symptoms is given in table 5. The association of physical work stressors was the most marked for women without cardiovascular disease. Heavy work, paced work, and little influence on one's own work were significantly connected with the symptoms. In all four analyses physically heavy work had a significant effect on cardiorespiratory symptoms.

To investigate the effect of mental work stressors on cardiorespiratory symptoms, four analyses were conducted accordingly. The association between work stressors and stress factors was the most marked for the men and women without cardiovascular disease. However, the factors explaining the symptoms partially differed in these two analyses. For the men without cardiovascular disease confused work roles and little influence on one's own work were significantly related to cardiorespiratory symptoms, whereas for the women without cardiovascular disease little influence on one's

own work, paced work, and pressure to work fast significantly affected the reported symptoms.

Musculoskeletal symptoms. To study the effects of physical and mental work stressors and possibilities for influencing one's own work on the symptom level, analyses were conducted for men with musculoskeletal disease, for men without musculoskeletal disease, for women with musculoskeletal disease, and for women without musculoskeletal disease (table 3). Repetitive movements and little influence on one's own work were associated with symptoms in all four analyses (table 6). In addition, poor work postures were related to symptom level in all the analyses except that for men without musculoskeletal disease. Paced work did not affect symptom level directly, but in some analyses it appeared through other work stressors, for example, through repetitive movements and poor work postures for men without musculoskeletal disease.

The association between mental work stressors and musculoskeletal symptoms was not as marked. Few possibilities for influencing one's own work was the work stress factor that significantly affected symptom level in all the groups except that of the men with musculoskeletal disease.

Psychological symptoms. The association between physical and mental work stressors, as well as the possibilities for influencing one's own work and psychological symptoms, was studied in two analyses, separately for the men and women without mental disorders (table 3). Physically heavy work had a marked effect on symptom level in both analyses (table 7). In addition, paced work and little influence on one's own work also systematically affected perceived symptoms. With respect to mental stress factors, confused work roles proved to have a significant impact on symptoms in both analyses.

Discussion

Age, gender and stress symptoms

In the first phase of the analyses relatively small differences between age and symptom level were found. The result may partially be explained by the selection of the subjects (healthy worker effect). The subjects of our study represented only 68 % of those included in the cross-sectional study in 1981. Those with severe diseases or disability to work had left work during the four-year follow-up period. The selection was strongest in the older age groups (6). Another possible explanation might be the comparison standard which people

Table 4. Mean values of the symptom scales for the stress symptoms according to health status.^a

Type of symptom	Health status									
	Cardiovascular disease		Musculoskeletal disease		Mental disorder		Cardiorespiratory disease		Disease of the digestive system	
	No (N = 3373)	Yes (N = 882)	No (N = 2020)	Yes (N = 2235)	No (N = 4023)	Yes (N = 232)	No (N = 3650)	Yes (N = 605)	No (N = 3848)	Yes (N = 407)
Cardiorespiratory	5.2	7.3	5.0	6.3	5.6	7.2	5.4	7.3	5.5	6.9
Musculoskeletal	2.7	3.1	1.8	3.7	2.7	3.8	2.6	3.8	2.7	3.8
Psychological	3.7	4.2	3.4	4.2	3.7	5.4	3.7	4.3	3.7	4.7

^a A high value implies a high occurrence of symptoms (maximum value = 10)

Table 5. Effect of physical and mental work stressors on cardiorespiratory symptoms in four analyses according to gender and presence of cardiovascular disease.

Work stressors	Analysis			
	Men		Women	
	No cardiovascular disease (N = 1175)	Cardiovascular disease (N = 338)	No cardiovascular disease (N = 1607)	Cardiovascular disease (N = 341)
<i>Physical</i>				
Physically heavy work	***	**	**	***
Paced work	**	*	***	—
Influence on work	—	—	***	—
Influence on work x heavy work	*	—	—	—
<i>Mental</i>				
Confused work roles	***	*	—	—
Pressure to work fast	—	—	*	—
Paced work	—	*	**	—
Influence on work	**	—	***	—

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

Table 6. Effect of physical and mental work stressors on musculoskeletal symptoms in four analyses according to gender and presence of musculoskeletal disease.

Work stressors	Analysis			
	Men		Women	
	No musculo-skeletal disease (N = 790)	Musculo-skeletal disease (N = 723)	No musculo-skeletal disease (N = 984)	Musculo-skeletal disease (N = 964)
<i>Physical</i>				
Repetitive movements	***	***	**	***
Poor work postures	—	*	***	**
Paced work	—	—	—	—
Influence on work	*	*	*	***
Paced work × repetitive movements	**	—	—	—
Paced work × poor work postures	**	**	—	—
Influence × poor work postures	—	—	—	*
<i>Mental</i>				
Confused work roles	—	—	—	—
Pressure to work fast	—	—	—	*
Paced work	*	—	—	—
Influence on work	**	—	**	**
Paced work × pressure to work fast	—	—	—	*

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

Table 7. Effect of physical and mental work stressors on psychological symptoms in two analyses according to gender and no mental disorder.

Work stressors	No mental disorder	
	Men (N = 1365)	Women (N = 1815)
<i>Physical</i>		
Physically heavy work	***	***
Paced work	**	*
Influence on work	*	***
Influence on work × heavy work	—	*
<i>Mental</i>		
Confused work roles	***	***
Pressure to work fast	—	—
Paced work	**	***
Influence on work	***	***
Influence on work × pressure to work fast	*	—

* $P < 0.05$; ** $P < 0.01$, *** $P < 0.001$.

apply when they estimate their subjective health. That they estimate their subjective health primarily according to that of their own age rather than according to that of their own earlier health status has been repeatedly found in investigations on the health status and functional capacity of the elderly (15).

It has been generally found that women tend to report more symptoms than men. The slight gender differences found in the symptom level of this study remain therefore partially unanswered.

Health status and stress symptoms

The association between health status and symptoms was not specific in that, for example, musculoskeletal diseases appeared only as musculoskeletal symptoms.

The results indicated that stress symptoms and symptoms of various chronic diseases are similar to a great extent. The rather strong association between diseases and stress symptoms showed the importance of controlling for the effect of diseases on stress outcome when the effects of work stressors on stress reactions are being studied.

In addition to the fact that the degree of stress was different for the healthy and ill subjects, the work-relatedness of the symptoms differed. In general, the associations between the work stressors and symptoms were stronger and more systematic among the healthy subjects than among the ill subjects. One possible explanation for this result may be possible rearrangements of the work of ill persons. In addition, ill persons may consider their symptoms as primarily being caused by their disease and only secondarily as due to "outside" factors such as work stressors. Therefore, the work-relatedness of perceived symptoms seems to be more complicated to clarify and interpret for subjects suffering from chronic disease(s) than for healthy subjects.

Work stressors and stress symptoms

Such work characteristics as heavy physical work, repetitive work movements, and confused work roles were markedly (and independently from the effect of diseases) related to the perceived symptoms. Thus the symptoms were not a phenomenon determined only by such individual factors as a subject's health status.

The work stressors were found to be connected with stress symptoms in three ways. First, the work stressors were related immediately to a certain type of symptoms (ie, heavy physical work to cardiorespiratory symptoms, repetitive work to musculoskeletal symp-

toms, and confused work roles to psychological symptoms). Second, the effects of work stressors were partly nonspecific (ie, heavy physical work was related also to psychological symptoms and confused work roles also to cardiorespiratory symptoms). Third, the possibilities for regulating one's own work lowered the level of work stress mainly directly but also indirectly (ie, by decreasing the effect of other stress factors on work stress).

Concluding remarks

On the basis of these results, conclusions on the approach to stress and the adjustment of work according to a subject's capacity can be drawn. Traditionally the effects of physical stressors have been investigated in physiological studies on work and those of mental stressors in psychological studies on work. The combination of these approaches seems to be fruitful because of the simultaneous effect of both types of stressors and the nonspecificity of stress reactions. Flexibility in the organization of work and in work arrangements seems to affect essentially the stress level and functional capacity of elderly persons in general and chronically ill persons in particular.

References

1. Kalimo R. Stressi ja psyykinen kuormitus työelämässä [Stress and mental load in worklife]. In: Lindström K, Kalimo R, ed. Työpsykologia, terveys ja työelämän laatu [Work psychology, health, and the quality of worklife]. Helsinki: Institute of Occupational Health, 1987: 50—72.
2. Kalimo R. Psychosocial factors and workers' health: an overview. In: Kalimo R, El-Batawi MA, Cooper CL, ed. Psychosocial factors at work and their relation to health. Geneva: World Health Organization, 1987:3—8.
3. Eskelinen L, Toikkanen J, Tuomi K, et al. Kuormituksen muutokset ikääntyvillä kunta-alan työntekijöillä [Stress reactions among aging municipal employees]. Työ ja ihminen 1988;4:377—91.
4. Honkasalo ML. Oireiden ongelma: sosiaalilääketieteellinen tutkimus oireista, niiden esiintymisestä ja merkityksistä kahta tutkimusmenetelmää käyttäen [The problem of symptoms: a sociomedical study of symptoms and their occurrence and significance with two research methods]. Helsinki: University of Helsinki, 1988. (Kansanterveystieteen julkaisuja; M 101.)
5. Tuomi K, Ilmarinen J, Eskelinen L, Järvinen E, Toikkanen J, Klockars M. Prevalence and incidence rates of diseases and work ability in different work categories of municipal occupations. Scand J Work Environ Health 1991;17(suppl 1):67—74.
6. Tuomi K, Toikkanen J, Eskelinen L, et al. Mortality, disability and changes in occupation among aging municipal employees. Scand J Work Environ Health 1991; 17(suppl 1):58—66.
7. Eskelinen L, Toikkanen J, Tuomi K, Mauno I, Nygård C-H, Ilmarinen J. Symptoms of mental and physical stress in different categories of municipal work. Scand J Work Environ Health 1991;17(suppl 1):82—6.
8. Huuhtanen P, Nygård C-H, Tuomi K, Eskelinen L, Toikkanen J. Changes in the content of Finnish municipal occupations over a four-year period. Scand J Work Environ Health 1991;17(suppl 1):48—57.
9. Cooper CL, Marshall J. Occupational sources of stress: a review of the literature relating to coronary heart disease and mental ill health. J Occup Psychol 1976;49: 11—28.
10. Dejours C. Mental disorders related to work. In: Kalimo R, El-Batawi MA, Cooper CL, ed. Psychosocial factors at work and their relation to health. Geneva: World Health Organization, 1987:64—77.
11. Ilmarinen J. Physical load on the cardiovascular system in different work tasks. Scand J Work Environ Health 1984;10:403—8.
12. Ilmarinen J, Louhevaara V, Korhonen O, Nygård C-H, Hakola T, Suvanto S. Changes in maximal cardiorespiratory capacity among aging municipal employees. Scand J Work Environ Health 1991;17:99—109.
13. Levi L. Definitions and the conceptual aspects of health in relation to work. In: Kalimo R, El-Batawi MA, Cooper CL, ed. Psychosocial factors at work and their relation to health. Geneva: World Health Organization, 1987:9—14.
14. Nygård C-H, Luopajarvi T, Ilmarinen J. Musculoskeletal capacity and its changes among aging municipal employees in different work categories. Scand J Work Environ Health 1991;17(suppl 1):110—7.
15. Jylhä M. Oman terveyden kokeminen eläkeiässä [Perception of one's own health at retirement age]. Tampere (Finland): University of Tampere, 1985. (Acta Universitatis Tampereensis; A195.)