

Symptoms of mental and physical stress in different categories of municipal work

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

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* 1990;17(suppl 1):82-6. The aim of this study was to clarify the stability of differences in reactions to work stress in different municipal occupations. The subjects were 1799 men and 2456 women in the same occupation in 1981 and 1985. At the time of the follow-up in 1985 their age range was 48-62 years. On the basis of the work content, they were clustered into 13 profile groups. Long-term cardiorespiratory, musculoskeletal, and psychological symptoms and symptoms indicating immediate physical stress at work were used to measure stress reaction. The order of the profile groups with respect to harmful stress reactions was the same in both years. According to the first and also the follow-up questionnaire, harmful stress reactions were the most common in physical work and in some profile groups with mixed physical and mental work demands. Although these differences were the greatest for the reactions to physical stress, they were also seen for mental stress.

Key terms: aging, municipal workers, profile groups, questionnaire, reactions to work stress, symptoms.

Harmful stress refers to an imbalance between the individual and the environment. Research on stress reactions attempts to reveal symptoms which are not as severe as illnesses. However, harmful stress decreases work ability and may predispose to chronic disease (1-4).

Harmful stress reactions were introduced as one criterion for setting the retirement ages of elderly municipal workers in a comprehensive cross-sectional study carried out in 1981 (5, 6). Marked differences in the stress level were found according to the content of the work. Harmful stress was characteristic of the workers with physical work demands. Therefore, the aim of our follow-up survey in 1985 was to clarify the stability of these differences.

Subjects and methods

The subjects were drawn from the respondents of a cross-sectional questionnaire study made in 1981 (7). All of the subjects who had continued in the same occupation through the four-year follow-up period of 1981-1985 were included (1799 men and 2456 women). In 1985 their mean age was 54 (range 48-62) years.

Of the respondents to the questionnaire in 1981, 68 % had remained in the same occupation in 1985. The rest had changed to part-time work, retired due

to age or disability, died, or did not respond to the questionnaire in 1985 (8).

The subjects were clustered into the following three groups on the basis of the general work content of their jobs: physical, mixed (physical-mental), and mental work. Thereafter they were divided into 13 work profile groups (9).

The subjects' stress reactions were determined from their responses to the questions on various symptoms in the questionnaire. This indirect method of measuring stress or subjective health has been widely used in questionnaire studies (1, 2, 10).

The following indicators were used to measure the stress reactions: long-term cardiorespiratory, musculoskeletal, and psychological symptoms and symptoms indicating immediate physical stress at work. Four sum scales were formed from the responses to the questions on the individual symptoms. Table 1 provides a summary of the content of each scale. The construction of the scales has been presented in detail elsewhere (11).

The indicators of stress reaction were not exactly the same in the questionnaires of the cross-sectional and follow-up studies. In the follow-up questionnaire, some items measuring musculoskeletal symptoms and immediate physical stress at work were combined in the scales. However, the results were carefully analyzed to determine whether the scales were comparable, and the effects of the differences turned out to be minor (11).

In this study, subjective symptoms were used as indicators of harmful stress. On each scale, a person's symptoms were considered harmful if the sum scale value exceeded the score corresponding to the 75th percentile of the scale sum score of the whole material

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[ie, those who responded in both questionnaire studies (N = 5556)].

Results

Stress reactions according to work in 1985

The stress symptoms were the most marked in physical work and the least marked in mental work, with the exception of a high prevalence of musculoskeletal symptoms among the men doing mixed work (table 2). In particular, the difference between the physical and mental work was pronounced for symptoms indicating immediate physical stress at work. This was the case also with the long-term stress reactions of the women (physical work versus mental and mixed work), while a high prevalence of long-term stress reactions (mental work versus physical and mixed work) was characteristic of the men both in physical work and in mixed work.

For the men harmful stress reactions were the most marked in auxiliary, installation, transport and dump work. However, the type of stress reactions differed somewhat among these groups. In auxiliary work immediate physical stress was the most marked, in dump

Table 1. Description of the symptom scales^a and their reliability coefficients (Cronbach's α) in 1981 and 1985.

Scale	Cronbach's α	
	1981	1985
Immediate physical stress at work	0.92	0.88
Immediate strain of the cardio-respiratory system		
Strain of the upper limbs		
Strain of the lower extremities		
Back strain		
Cardiorespiratory symptoms	0.63	0.63
Pain, pressure or feeling of oppression in the chest		
Slowing down of walking because of chest pain		
Slowing down of walking because of shortness of breath		
Musculoskeletal symptoms	0.82	0.77
Pain and ache in the upper limbs		
Pain and ache in the lower extremities		
Back pain		
Psychological symptoms	0.90	0.91
Emotional reactions		
Motivational reactions		
Cognitive changes		
Sleep disturbances		

^a The scales consist of 3 (cardiorespiratory symptoms) to 18 (psychological symptoms) items.

Table 2. Harmful stress of the men and women by work content and work profile group in 1985.

	N	Immediate physical stress at work (%)	Cardiorespiratory symptoms (%)	Musculoskeletal symptoms (%)	Psychological symptoms (%)
Men					
Physical work	803	31	26	24	26
Auxiliary work	260	37	27	23	29
Installation work	543	28	26	25	25
Mixed physical and mental work	432	20	23	29	26
Transport work	351	22	23	31	27
Dump work	16	31	44	31	31
Dental work	11	9	9	9	27
Nursing work	54	6	17	19	20
Mental work	564	2	15	10	20
Administrative work	150	0	11	6	14
Technical supervision	146	2	22	12	21
Physician's work	52	0	8	6	12
Teaching work	207	3	16	13	26
Total	1799	19	22	21	24
Women					
Physical work	849	48	28	39	33
Auxiliary work	504	46	28	39	35
Home care work	343	52	27	38	30
Mixed physical and mental work	853	24	20	25	24
Kitchen supervision	127	24	26	30	32
Dental work	65	5	15	20	26
Nursing work	660	26	19	25	22
Mental work	754	4	16	18	22
Office work	269	3	19	26	23
Administrative work	293	3	15	13	18
Physician's work	22	0	0	0	9
Teaching work	170	7	17	14	27
Total	2456	26	22	27	26

work cardiorespiratory symptoms dominated, in transport work musculoskeletal and psychological symptoms were the greatest, and in installation work the different types of stress reactions occurred with equal frequency.

Among the male teachers and dentists the reactions of mental stress were more marked than those of physical stress. In technical supervision cardiorespiratory and psychological symptoms were the most common. For men in administrative work and for male physicians harmful stress reactions were not as common as for workers in the other profile groups.

For the women, harmful stress was the most common in auxiliary and home care work and in kitchen supervision. About half of the respondents reported marked physical stress at work and at least every fourth experienced cardiorespiratory, musculoskeletal, or psychological symptoms in auxiliary and home care work. In the group of kitchen supervision 24–32 % of the respondents had marked stress reactions, the reactions of mental stress being the most marked.

In nursing work at least one-fifth of the group had marked symptoms, and this was the case with the long-term symptoms in office work, too. For women in teaching and administrative work and for female physicians the reactions of mental stress were more marked than those of physical stress. In teaching work every fourth woman reported marked mental stress.

Stability of stress reactions in the profile groups between 1981 and 1985

In general, the order of the profile groups with respect to harmful stress reactions was essentially the same in 1981 and 1985 (table 3).

According to both questionnaires, the stress reactions were the most pronounced in the men doing auxiliary, installation, transport, and dump work and in the women doing auxiliary, home care, and kitchen supervision work. In a comparison of all the work profile groups the employees in administrative work and the physicians indicated the least stress reactions.

All of the symptoms (ie, immediate physical stress at work and long-term cardiorespiratory, musculoskeletal, and psychological symptoms) accumulated in physically demanding occupations. However, this tendency was the most marked for symptoms of immediate physical stress at work. Mental stress was a problem of many profile groups with mental work demands as well (tables 2 and 3).

Changes in the occurrence of cardiorespiratory and psychological symptoms between 1981 and 1985

A direct comparison of the occurrence of cardiovascular and psychological symptoms between 1981 and 1985 was possible because the scales measuring these symptoms were exactly the same in both years. The prevalence of both cardiorespiratory and psychological symptoms was higher in 1985 than in 1981 (table

4). In the course of the follow-up, cardiorespiratory symptoms had increased the most among the men in physical work and the men in mixed work and among the women in physical work. For the men the change was the most marked in installation, transport, and dump work. For the women the increment of cardiorespiratory symptoms was the most pronounced in home care, auxiliary, office, and dental work. Cardiorespiratory symptoms were also considerably more frequent in the group involved in technical supervision in 1985.

Depending on the work content, there were 5–9 % more respondents who indicated harmful mental stress in 1985 than in 1981 (table 4). The mental stress reactions had increased the most among the women doing physical work. However, the change was even more marked in some of the profile groups (ie, in kitchen supervision and teaching).

Discussion

Stability of the group differences between 1981 and 1985

The order of the work profile groups with respect to harmful stress in 1981 was the same in the follow-up survey in 1985. Stress reactions were the most marked in physical work and in transport, dump, and kitchen supervision work. Although the differences among the physical, mixed, and mental work groups were the greatest for reactions to physical stress, the tendency was the same for mental stress.

The reactions to physical stress were the most marked for the women in physical work. Measurements of cardiorespiratory capacity showed that the physical fitness of the elderly female municipal workers was considerably poorer than that of the men in similar work (12, 13). In addition musculoskeletal disability had increased among the women in 1985, whereas it had remained unchanged among the men (14). The high level of reaction to physical stress seemed to indicate a true discrepancy between the physical capacity and the work demands of the women in physical work.

Generally speaking, mental stress was slightly less marked in the mental work groups than in the physical work groups. With the exception of heavy work, the possible sources of mental stress in physical work may be monotony and a lack of appraisal and meaning. In mental work the work demands may cause short-term stress reactions, but they may be challenges for developing one's work as well (2, 3, 15).

In addition to the measurement of stress reactions in the present study, the functional capacity of the elderly municipal workers was measured in the laboratory in 1981 and 1985, and work stress and strain were determined in a field study in 1981 (12–14, 16). In these studies cardiorespiratory, musculoskeletal, and mental capacity was measured, and the results also

Table 3. Stability of stress reactions among the men and women in various work profile groups between 1981 and 1985. (+ + + = group with most frequent symptoms, - - - = group with least frequent symptoms)

	1981				1985			
	Immediate physical stress at work	Cardio-respiratory symptoms	Musculo-skeletal symptoms	Psycho-logical symptoms	Immediate physical stress at work	Cardio-respiratory symptoms	Musculo-skeletal symptoms	Psycho-logical symptoms
Men								
Auxiliary work	++	++	+	++	+++	++		++
Installation work	+++	+	++		+	+	++	
Transport work	+		+++	+			+++	+
Dump work		+++		+++	++	+++	+++	+++
Dental work		--				--	--	+
Nursing work								-
Administrative work	---	--	--	--	---	-	---	--
Technical supervision	-				--			
Physician's work	--	---	---	---	---	---	---	---
Teaching work			-	-				
Women								
Auxiliary work	++	++	+++	+++	++	+++	+++	+++
Home care work	+++	+	++	++	+++	++	++	+
Kitchen supervision	+	+++	+++		+	+	+	++
Dental work		--		+		--		
Nursing work	+			-	+			-
Office work	-	-			--			
Administrative work	--	-	--	--	--	--	--	--
Physician's work	---	---	---	---	---	---	---	---
Teaching work			--	-			-	

Table 4. Cardiorespiratory and psychological symptoms among the men and women according to work content and work profile group in 1981 and 1985.

	Number of workers in 1985	Cardiorespiratory symptoms			Psychological symptoms		
		1981 (%)	1985 (%)	Differ- ence (%)	1981 (%)	1985 (%)	Differ- ence (%)
Men							
Physical work	803	19	26	7	21	26	5
Auxiliary work	260	23	27	4	24	29	5
Installation work	543	17	26	9	19	25	6
Mixed physical and mental work	432	15	23	8	21	26	5
Transport work	351	15	23	8	21	27	6
Dump work	16	31	44	13	38	31	-7
Dental work	11	9	9	0	18	27	9
Nursing work	54	15	17	2	17	20	3
Mental work	564	11	15	4	13	20	7
Administrative work	150	9	11	2	9	14	5
Technical supervision	146	16	22	6	16	21	5
Physician's work	52	2	8	6	6	12	6
Teaching work	207	11	16	5	14	26	12
Total	1799	15	22	7	18	24	6
Women							
Physical work	849	22	28	6	24	33	9
Auxiliary work	504	23	28	5	26	35	9
Home care work	343	20	27	7	21	30	9
Mixed physical and mental work	853	19	20	1	16	24	8
Kitchen supervision	127	27	26	-1	18	32	14
Dental work	65	6	15	9	20	26	6
Nursing work	660	18	19	1	16	22	6
Mental work	754	14	16	2	15	22	7
Office work	269	13	19	6	17	23	6
Administrative work	293	13	15	2	13	18	5
Physician's work	22	5	0	-5	9	9	0
Teaching work	170	16	17	1	16	27	11
Total	2456	18	22	4	18	26	8

indicated that the problems were the most pronounced in physical work.

Direction of the changes

The direct comparison of the frequency of cardiorespiratory and psychological symptoms indicated an increment in almost all of the work profile groups during the follow-up period. In general, the increase in cardiorespiratory symptoms was greatest among the women in either physical or mixed work, and the increase in psychological symptoms was greatest among the women in physical work. However, the changes were still more marked in some work profile groups (ie, mental stress was considerably more frequent in 1985 than in 1981 among the teachers and kitchen supervisors).

A general age-related decline in health and work ability can only partially explain the increase that occurred in the stress reactions because the subjects had already been selected on the basis of health and work ability (8). Only subjects who held the same occupation in 1981 and 1985 were included in the present study, a change in occupation being more common among those who reported harmful stress already in 1981. It remains questionable whether or not the work of the subjects had been organized in a way which supports aging workers in the management of their work tasks. The relationships between the stress reactions and the work stressors have been reported in more detail elsewhere (17).

Evaluation of the questionnaire method

In this study, the reactions to work stress were measured with a questionnaire. The use of questionnaire methods in the study of psychological stress has a much longer tradition than such use in the study of physical stress reactions. Physical stress has mainly been studied through the measurement of physiological responses and the observation of individual strain (12, 14, 16, 18). However, the results of our study showed the suitability of the questionnaire method also for measuring reactions to physical stress.

The questionnaire method gives information and concentrates on subjectively perceived stress. When estimating stress, the subject subjectively evaluates work stressors with his or her own health status and work ability as reference points. Therefore the descriptions of stress gathered with the questionnaire contain the subject's interpretation of the stress level and its causes. However, the approach is the most useful in the search for individually applicable solutions to relieve work stress.

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