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The Effects of a Change in Work Organization Upon the Work Environment and Musculoskeletal Symptoms Among Letter Carriers

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An organizational change among 82 postal workers was studied with the aim of evaluating the effects on the work environment, work ability, and musculoskeletal complaints. The study was undertaken in 2 suburbs of Stockholm, Sweden. Psychological work demands were estimated to be reduced at the 1-year follow-up but physical work demands had changed very little. In an observation study in a subgroup of older workers, the risk of overexertion at work and musculoskeletal complaints was reduced. In spite of that, most of the older participants (≥ 35 years) had unchanged or increased musculoskeletal symptoms. This shows the need for early preventive measures.

prospective study evaluation ergonomics psychosocial
musculoskeletal symptoms inquiry observation

1. INTRODUCTION

To deliver mail is a physically demanding work in which there has been recorded a physical load that from time to time exceeds current recommendations (Knave et al., 1991; Oja, Louhevaara, & Korhonen, 1977). In the study by Oja et al. (1977), the demands were higher among women than among men and higher in mail delivery in the suburbs than in downtown areas. Among mail handling staff high prevalence of muscular symptoms from the upper extremities and the knees have been reported (Knave et al., 1991; Wahlstedt, 1990; Wahlstedt, Nygård, Kemmlert, Torgén, & Björkstén, 1993).

The traditional way of changing work conditions to reduce the risk of developing musculoskeletal disorders is through making ergonomic improvements at the worksite. Another possible intervention is to reduce exposure by changes in work organization. There are, however, few studies done evaluating the health effects of organizational changes. Difficulties of controlling such a field study are contributing to this lack. More emphasis on studying the effects of changes in dynamic workplaces has, therefore, been suggested by Silverstein (1992). The present study is partly performed using this principle.

The object of this study was to follow and evaluate a change of work organization in a postal district with respect to its effects on the work environment and musculoskeletal symptoms among mail handling staff working with letter sorting and delivery of mail. The effects among older persons were of special interest.

The Background of the Study

The mail delivery terminal Spånga/Kista, in a suburb of Stockholm, Sweden, started in 1975. During the following years population, companies, and mail delivery districts increased. In 1988 planning of dividing the terminal started. This was possible in 1990 when the Post Office could rent premises in nearby Kista directly connected to an existing postal parcels sorting terminal and the change of organization could be prepared (Wahlstedt & Björkstén, 1993). In April 1991 the two mail delivery terminals in Spånga (Rinkeby) and Kista started in their new organizations. The transfer of part of the activity from Spånga to Kista was due to a desire to achieve a better work environment, improve staff well-being, reduce sick-leave, and staff turnover. All letter carriers were given an opportunity to choose

between working traditionally in Spånga or in the new organization in Kista. In Kista it was agreed on introducing six teams of letter carriers serving 35 mail delivery districts (5–6 districts for every team). The team members were jointly responsible for the work of the team in contrast to the earlier organization in which each letter carrier had a specific mail sorting district. Some work tasks were new (e.g., statistics, redirections, notifications of changes of addresses, registrations, holiday planning, and scheduling). In Spånga only smaller changes were planned and the eight teams were traditionally organized. In Spånga a minor repair of the old premises was performed.

The evaluation was performed by inquiries and objective analyses before, and 1 year after, the changes of work organization were introduced.

2. METHODS

An inquiry, that will be described here, was used to assess physical exposure, psychosocial factors, and musculoskeletal symptoms.

Two objective methods (AET and PLIBEL) were used to evaluate work demands (Rohmert & Landau, 1983) and work hazards (Kemmlert, 1995). Work demands were analysed without concern for the individual's different work technique, whereas work hazards were analysed with respect to the individual's possibilities of meeting work demands. Both methods consist of an orienting interview and an assessment of working conditions. The descriptions of the work environment and work organization in this study are based on data from the observations.

2.1. The Inquiry

The inquiry comprised questions related to the following areas.

Background. For example, gender, number of children, marital status, hours of work; 15 items.

Life style. For example, smoking, leisure time activities, meal habits; 9 items.

Work postures and work movements. The 33 items that were used earlier by Marklund et al. (1992) described physical demands during an ordinary working week. This part of the questionnaire was earlier factor

analysed and reliability tested by Wahlstedt and Björkstén (1993) resulting in a number of indices subsequently used in the analyses. The indices were uncomfortable working positions sitting, uncomfortable working positions standing, working in twisted and bent positions, uncomfortable working positions with arms, repetitive work with arms, repetitive work with legs (cycling), and heavy lifting. Cronbach alpha levels for the indices were in the range .78 to .84. (It was not tested for repetitive work with legs, which had only 2 items).

Psychosocial work factors: psychological work demands, decision latitude, and social support. The questionnaire with 27 items was founded in Karasek and Theorell's demands-control model (Karasek, Russel, & Theorell, 1982; Karasek & Theorell, 1990) supplemented with questions on social support (Johnson, 1986; Theorell, Harms-Ringdahl, Ahlberg-Hultén, & Westin, 1991; Theorell et al., 1988). The items measure intensity and not duration. This part of the questionnaire was earlier factor analysed and reliability tested (Wahlstedt & Edling, 1994) and indices were formed, which were used in the subsequent analyses of the present study. The indices were psychological work demands, decision latitude (skill discretion and authority over decisions), contact with superiors, and contact with team-mates. Cronbach alpha levels for the indices ranged from .67 to .84.

Musculoskeletal complaints. The Nordic questionnaire, introduced by Kourinka et al. (1987) was used to assess 12-month prevalence; 27 items.

Mode of application of the inquiry. The workers gathered in groups at the worksite and answered the questionnaire during regular working hours. Workers on leave had the questionnaire mailed to their home addresses.

2.2. Work Demands (AET)

AET is a method for work analysis described by Rohmert and Landau (1983). It consists of 216 variables concerning work content, work equipment, work organization, remuneration, and physical and psychosocial demands on the individual. It is used to describe general work content and demands and not individual work load. The method has been used in several work groups where work profiles have been used to compare different occupations regarding physical and psychosocial aspects but also from ergonomic and occupational risk aspects (Ilmarinen, Suurnäkki, Nygård, & Landau, 1991; Landau, 1989; Nygård, Suurnäkki, Landau, & Ilmarinen, 1987).

2.3. Analysis of Work Hazards (PLIBEL)

PLIBEL was used to identify work hazards that in earlier studies have been demonstrated as harmful for the individual. The analysis was dichotomous (*no risk, risk*). The examiner used a form with questions concerning ergonomic work hazards (Kemmlert, 1995). Modifying factors, for example, influence on work tasks, urgency, and presence of certain physical factors were considered. In the summarized judgment individual prerequisites for the work tasks were also considered.

2.4. Study Groups

Baseline data were gathered at the old terminal in Spånga (A) during February-March 1991 and follow-up data in Spånga (A) and the new terminal in Kista (B) during April-May 1992.

Before the change of organization there were 168 persons on the duty chart for terminal A (Figure 1). Of these 40 were excluded; 19 had left work before baseline data were gathered, 21 were assistant letter carriers with duty only every second Saturday. Eighteen persons did not answer the baseline questionnaire and were excluded. Eleven persons on prolonged sick-leaves were excluded. Thus the target group of the inquiry consisted of 99 persons. Before the follow-up 11 had left work and 6 persons did not answer the follow-up questionnaire. In all, 82 persons participated in the study in both baseline and follow-up inquiries (83% of the target group). The group was divided into younger (<35 years) and older persons (≥ 35 years). The border between younger and older workers was set at 35 years as the working staff was quite young.

All participants volunteered in the study after group information. The examined persons worked with letter sorting or mail delivery (Table 1). The number of superiors was increased in the new team organization.

In the studied group two thirds stayed at terminal A and one third moved to terminal B (Table 2). Of those who did not answer the follow-up questionnaire, 3 worked in each of the terminals. The median age for the whole study group was 31 years, among those who stayed the median age was 32 years and in the group that moved the median age was 28 years (Table 2).

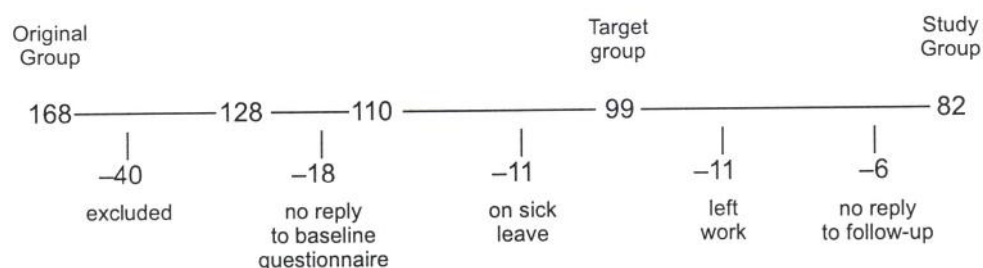


Figure 1. Study group.

TABLE 1. Occupations in the Study Group at the Baseline and at the Follow-Up ($n = 82$)

Year	Letter Carriers	Superiors	Letter Sorters	Managers	Total Group
Baseline	64	8	9	1	82
Follow-up					
Stayed	35	11	7	2	55
Moved	19	5	2	1	27

TABLE 2. Employees Staying at Terminal A and Employees Moving to Terminal B, Distributed by Gender. The Proportion of Older Workers (≥ 35 Years) of the Study Group is Indicated ($n = 82$)

Employees	Total Group	Men	Women	Age Median	≥ 35 Years
Stayed	55	34	21	32 years	42%
Moved	27	16	11	28 years	25%

At the baseline the workers in the study group had worked in their current occupations for 3 years (median). Those who stayed at terminal A had in general longer work experience than those who moved to terminal B (median 4 years compared to 2 years). All letter carriers worked full-time at the start of the project but at the follow-up 1 letter carrier worked half-time. Of the letter sorters 3 persons worked part-time both at the baseline and the follow-up. The superiors and managers were all working full-time.

Two letter sorters (a man and a woman) and 4 letter carriers participated in the observation studies. Of the letter carriers, the women used a bike and the men used cars while delivering mail. All studied persons in the observation

studies were older than 40 years of age and had long experience of the current tasks. The selection of the study group was made by the management, which estimated them to be representative for the respective work group.

2.5. Statistical Analysis

To compare physical exposure, musculoskeletal complaints, psychosocial and organizational factors before and after the change of organization, Wilcoxon's Matched-Pairs Signed-Ranks Test was used. To assess prognostic factors for improvement of symptoms a stepwise discriminant analysis was performed. The independent variables were the psychosocial work factors indices, physical load indices, gender, and age. Only those employees who reported symptoms from neck, shoulders, and thoracic regions ($n = 50$) at the baseline were included in the analysis. Stepwise forward logistic regression analysis was used to analyse associations between changes of exposure and changes of symptoms (Norušis, 1992). In this analysis changes in each exposure factor comprised the independent variables. These were categorized (*better, unchanged, worse*) and were treated as dummy variables. Gender and age were included. The dependent variables were changes in symptoms from neck, shoulders, thoracic, and lumbar regions. A significance level of $p < .05$ was accepted.

The AET analyses resulted in ordinal scale data. Indices were constructed according to earlier used principles (Landau, 1989). They were put together in work profiles. In PLIBEL each individual was examined before and 1 year after the change of organization and the occurrence of a difference in ergonomic conditions was analysed qualitatively.

3. RESULTS

3.1. Performed Changes

3.1.1. Comparison between the old (A) and the new (B) terminal

The aim of the changes was to create a new and modern organization at the new terminal (B). At the old terminal (A) no changes were planned

(Wahlstedt & Björkstén, 1993). However, some of the changes that were introduced at the new terminal were also performed in the old one, which made the differences between them at the follow-up smaller than expected. The most important differences were that the superiors at terminal B got a greater responsibility than the superiors who stayed at terminal A. The teams also differed. At terminal B all letter carriers had joint responsibility for the mail sorting districts of the team, but at terminal A, they still had responsibility only for their own mail sorting district. The joint responsibility of the teams at terminal B also concerned some new work tasks. Those were for example delivering letter bundles, PO box sorting and also handling of parcels and insured mail. At terminal B, 2 persons were included in each team to cover up for shorter periods of staff reduction. They were generally working in one specific team but could be transferred to another when needed. At terminal B, time was allowed for planning. The team coherence at terminal B was also stimulated by a team bonus system. At terminal B the premises were rebuilt and every team got a letter sorting room of their own with windows. At terminal A only minor repairs were done. At terminal A mail delivery was performed either by bike or car both before and after the organizational change. At terminal B all letter carriers used bikes.

3.1.2. Reported physical and psychosocial circumstances

As compared to baseline data, only smaller, non significant changes were reported regarding physical exposure among those who stayed in A and those who moved to B.

Psychological work demands were reported to be reduced at both terminals at the follow-up (Table 3). At the follow-up those who moved to B reported improvements in social support and those who stayed in A reported improved authority over decisions. The differences were significant.

Both younger and older workers reported reduced psychological work demands at the follow-up. The older persons (≥ 35 years) reported improved social support and authority over decisions at the follow-up. The differences were significant.

Those who had chosen to move to B reported at the baseline a lower skill discretion than those who had chosen to stay in A ($p < .05$). This was the only psychosocial difference between the two groups at the baseline.

TABLE 3. Reported Psychosocial Factors at the Old (A) and the New (B) Terminals at the Baseline and at the Follow-Up ($n = 82$). Possible Values for Each Index Are Indicated in Parentheses

Index (Possible Values)	Stayed in A $n = 55$		Moved to B $n = 27$		Study Group $n = 82$	
	Baseline	Follow-Up	Baseline	Follow-Up	Baseline	Follow-Up
Social support ^a (16-64)	29.1	27.3	28.2	25.8 ¹	28.8	26.8 ²
Contact with superiors ^a (5-20)	7.7	7.7	6.8	7.4	7.4	7.6
Contact with team-mates ^a (4-16)	6.2	6.5	6.2	5.7	6.2	6.2
Psychological work demands ^b (5-20)	12.9	11.6 ³	13.2	11.6 ⁴	13.0	11.6 ⁵
Skill discretion ^b (4-16)	10.0	9.8	9.2	9.9	9.8	9.9
Authority over decisions ^b (2-8)	5.3	5.8 ⁶	5.8	5.7	5.5	5.8

Notes. 1— $p = .04$, 2— $p = .02$, 3— $p = .001$, 4— $p = .006$, 5— $p = .000$, 6— $p = .03$; a—higher values indicate lower social support; b—higher values indicate more demands, skill discretion, and authority over decisions.

3.1.3. Musculoskeletal symptoms

The group that moved to terminal B reported a significant reduction of symptoms from shoulders and thoracic regions (Table 4). In both the

TABLE 4. Twelve-Month Prevalence of Musculoskeletal Symptoms at the Old (A) and the New (B) Terminals at the Baseline and at the Follow-Up. Prevalence Was Calculated in Percentage of Delivered Answers Excluding Dropouts

Region	Stayed in A $n = 55$		Moved to B $n = 27$		Study Group $n = 82$	
	Baseline	Follow-Up	Baseline	Follow-Up	Baseline	Follow-Up
Neck	40	26	46	44	42	32
Shoulders	51	37	52	28 ¹	51	34 ²
Thoracic	29	21	33	8 ³	30	17 ⁴
Lumbar	43	30	42	36	43	32

Notes. 1— $p = .02$, 2— $p = .009$, 3— $p = .02$, 4— $p = .02$.

moving and the staying groups there were in addition trends towards reduced musculoskeletal symptoms. The younger persons (<35 years) reported at the baseline very high prevalence of symptoms from neck, shoulders, thoracic, and lumbar regions. At the follow-up, the younger, but not the older group, reported significantly reduced symptoms from shoulders, thoracic, and lumbar regions (Table 5).

3.1.4. Background factors for those who reported reduced or unchanged musculoskeletal symptoms from the upper part of the body at the follow-up (neck, shoulders, thoracic regions)

The group that reported musculoskeletal symptoms from the upper part of the body both at the baseline and the follow-up were significantly older (mean age 32.8 years) and reported a significantly lower authority over decisions at the baseline (4.6) compared to those who reported symptoms at the baseline and at the follow-up were symptomless, whose mean age was 27.6 years and authority over decisions at the baseline, 5.8. This was found by stepwise discriminant analysis. Eighty-one percent of those with remaining symptoms belonged to the group which had a mean age of 32.8 years and had a lower authority over decision while the same proportion of those who had become symptomless belonged to the group with a mean age of 27.6 years and reported a higher authority over decisions.

TABLE 5. Twelve-Month Prevalence of Musculoskeletal Symptoms Among Younger (<35 Years) and Older Workers (≥35 Years) at the Baseline and at the Follow-Up (n=82). The Prevalence Was Calculated in Percentage of Delivered Answers Excluding Dropouts

Region	Age <35 Years n = 51		Age ≥35 Years n = 31	
	Baseline	Follow-Up	Baseline	Follow-Up
Neck	39	23	48	45
Shoulders	54	29 ¹	46	43
Thoracic	35	17 ²	21	17
Lumbar	46	27 ³	38	40

Notes. 1— $p = .003$, 2— $p = .01$, 3— $p = .04$.

3.1.5. Associations between changes of exposure and changes of musculoskeletal symptoms

A reported improvement of the contact with superiors was, in those who had reported symptoms from shoulders at the baseline, significantly associated with absence of symptoms at the follow-up, odds ratio 5.0, 95% confidence interval 3.0–8.4. No other significant associations were found in the forward stepwise logistic analysis when all exposure factors, both physical and psychosocial, were included. In a forward stepwise logistic regression analysis using only the changes in physical load, however, the experience of reduced exposure for twisted and bent work postures was associated with absence of symptoms from shoulders at the follow-up, in the group that reported symptoms from the shoulders at the baseline, odds ratio 3.5, 95% confidence interval 2.1–5.8.

3.1.6. Work profiles

The most important work tasks for the letter carriers were sorting and delivering mail (AET: transporting), sometimes by car (AET: operating, controlling; Figure 2). At the new terminal all in the studied group got new work tasks as superiors (AET: planning, organizing).

At the new terminal the physical work environment and work tools were essentially unchanged and the mail was only delivered by bike. Mental work demands were slightly increased at the new terminal (AET: complexity of decisions, necessary knowledge). Work postures were changed at the new terminal through a reduction of time spent sitting bent forward for all in the studied group and instead there was more standing in a neutral position.

Also, at the old terminal the letter carriers got some new superior's tasks (AET: planning, organizing), with somewhat increased mental work demands (AET: complexity of decisions) but beside that there were only minor changes in mental or physical work demands. For the studied letter sorters there were only minor changes in the work profile.

3.1.7. Work hazards

There were changes both at the terminals and between them. The studied letter carriers all got altered work tasks through the team system in which they were superiors. Work tasks thus became more diversified and physically less demanding. To compensate for the new administrative tasks, the mail

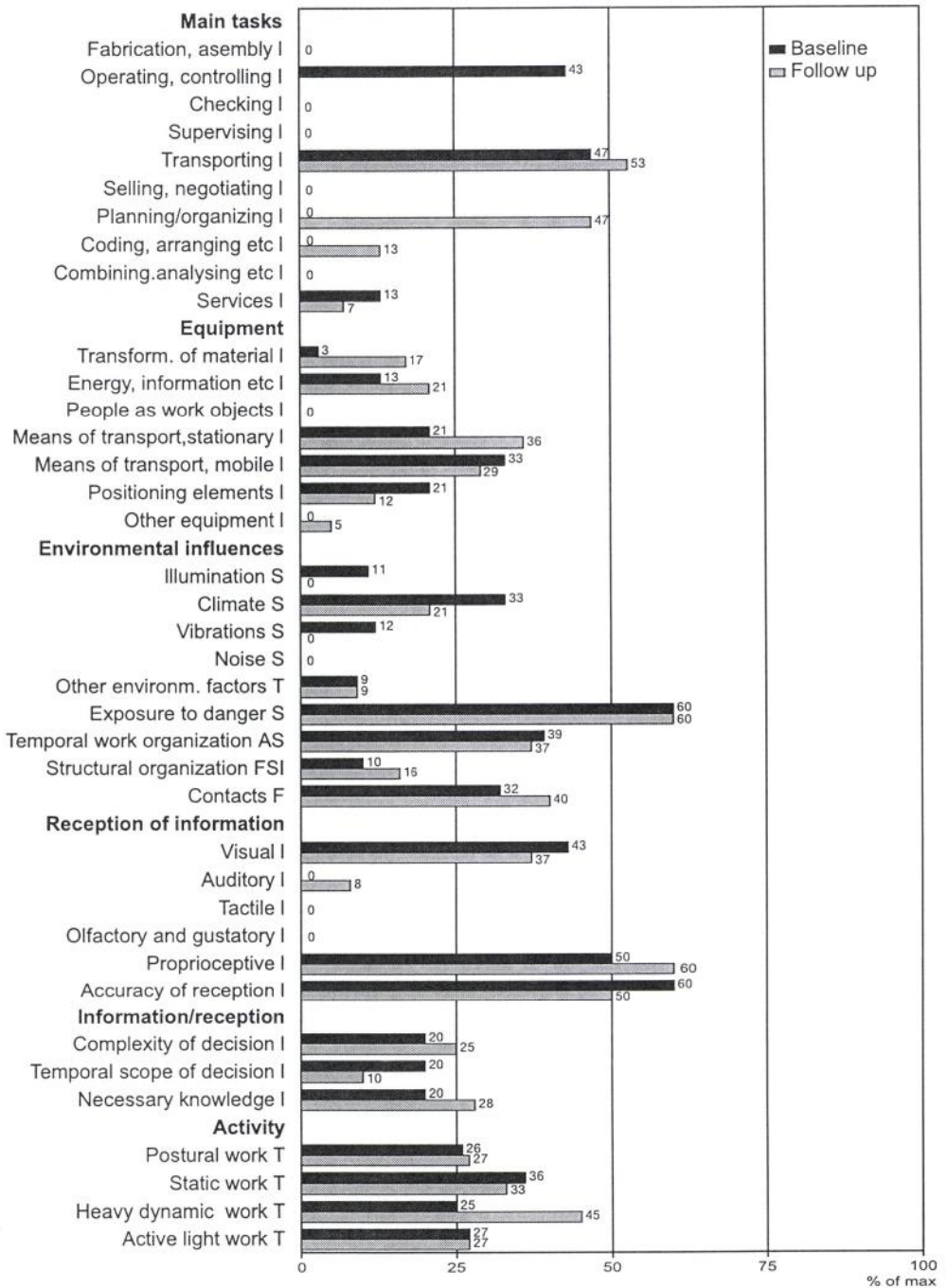


Figure 2. AET profiles for letter carriers at terminal A at the baseline compared to terminal B at the follow-up. The means of the observations of 2 letter carriers. The variables have been analysed by the codes Importance, I, Frequency, F, Time, T, Alternative, A, and by a special code, S, which was specific for each variable.

distributing districts were made smaller and thereby the exposure to heavy and repetitive work tasks was reduced. For the letter carriers, therefore, there was a reduced hazard of physical overexertion after the change of organization.

The 2 letter sorters had many heavy work tasks at the baseline. The female letter sorter got more office-like work. Hence, her work tasks became much less hazardous. Her male colleague had an unchanged heavy physical load at the follow-up.

4. DISCUSSION

The object of the study was to compare a new terminal (B), in which work organization was changed, with another terminal (A) with preserved traditional work organization. For several reasons, for example, a simultaneous thorough change of the organization in the Sweden Post, the differences between the two terminals were not as great as had been intended.

By analysing the inquiry it was found that the letter carriers experienced decreased psychological work demands after the change of organization, whereas the physical work load was unchanged. The work analysis (AET) showed small changes in work demands. The main tasks of the work were changed as planned. The physical work hazards were through observation shown to be reduced in a group of older workers (PLIBEL). The answers to the inquiry showed a reduction in musculoskeletal symptoms especially among the younger letter carriers and those who moved to the new terminal.

Furthermore, the group staying at terminal A was inspired to imitate the changes introduced at the new terminal (B). This illustrates the difficulties implied in studying the effects of changes of work organization, as those are influenced by several factors that are sometimes difficult to anticipate at the start of a project.

The part of the questionnaire concerning psychosocial and organizational factors had earlier been validity tested by Theorell, Michélsen, Nordemar, and Stockholm MUSIC 1 Study Group (1993). The validity and the internal homogeneity was high for the psychological work demands index. The indices for decision latitude (skill discretion and authority over decisions) were found to be well suited for population studies with a wide range of work tasks, but less suited for studies of homogenous work groups. Authority over decisions had low reliability. Reliability for the indices psychological work demands and authority over decisions, however, was

shown to be greater in the fairly homogenous group of postal workers than for all examined work groups in the Stockholm MUSIC 1 study (Theorell et al., 1993; Wahlstedt & Edling, 1994). This supports the assumption that the indices can be used in a study on letter carriers. The reliability for the indices contact with superiors and contact with team-mates have been demonstrated to be at an acceptable level (Wahlstedt & Edling, 1994). The used indices concerning work postures and work movements all have an acceptable reliability. It has earlier been demonstrated by Karlqvist, Wiktorin, Winkel, and Stockholm MUSIC 1 Study Group (1993) that self-assessment of physical exposure can be used to identify the occurrence-nonoccurrence of physical load, but not to quantify the load. Usually, the duration of exposure is overestimated and the frequency of changes in exposure underestimated by respondent workers. This makes it difficult to conclude the true level of physical load only from the inquiry. However, both the answers to the inquiry and the objective analyses showed very little change in physical load between the examinations. In that respect the validity of the inquiry seems to be acceptable.

At an informative meeting before the changes, the administrative personnel at the Post Office had pointed out that a change of work organization was the main target of the undertaking. There were very limited attempts to change the physical conditions of the work. Individually, however, there were considerable changes due to changed work tasks, for example, work as superiors. This was found especially in the work hazard's assessments performed by PLIBEL. The AET work profiles also showed some changes in work demands. Decision making was a quality that had become more important for the new superiors. The results regarding psychological work demands obtained by AET were partly contradictory to the results from the inquiry. In AET psychological work demands were increased whereas the inquiry showed a decrease of work demands at both terminals. The difference could be explained by the fact that the AET was performed among letter carriers who became promoted and, therefore, got increases in their mental work load. An explanation to the experienced reduction in psychological work demands as reported in the inquiry could be that the decision latitude and the social support at work increased, which led to the feeling of reduced psychological demands as well. Authority over decisions was considered to be increased at terminal A but not at terminal B. This is possibly due to higher expectations among the workers at the new terminal (B) than in the old one (A) and to the experience that these were not reached. Those who stayed at the old terminal, on the other hand, had probably not expected any

greater changes. However, in reality the letter carriers at the old terminal also got widened work tasks, for example, sorting of company mail, and the superiors got responsibility for budget and recruitment of substitutes.

A remarkable finding was, that though AET was constructed to discriminate between different work tasks and not for measuring changes in work demands, some changes in the work profile of the letter carriers were noted, which verify the results of the inquiry.

The interpretation of the effects of the change of organization was made more difficult as during the follow-up period there was an increasing economic depression in Sweden. This led to a reduction in the amount of mail. The smaller amount of mail in addition to a reduction of delivery districts might have positively influenced the staff's experience of their work. This could perhaps partly explain the reduction of musculoskeletal symptoms but not that the reduction of symptoms was significantly reduced only at the terminal where the more profound organizational changes took place. Staff turnover was zero during the follow-up period, which might depend on a fear of losing the job and of facing unemployment. However, it could also partly be attributed to the experienced improvements of the work environment. High staff turnover as a result of bad working conditions has been shown by Eriksson (1991). Reversed, it seems logical that improvements of work environment may give the opposite result.

Before the organizational changes the prevalence of symptoms from neck, shoulders, and thoracic regions were high compared with a large reference material of state employees (Kvist, 1991). The prevalence was especially high in the younger group (<35 years). This could possibly be explained as a healthy worker effect, for example, persons with symptoms from the musculoskeletal system would leave a work situation producing such symptoms.

After the organizational changes the staff reported musculoskeletal symptoms as reduced, especially from shoulders and thoracic regions. The reduction of prevalence was significant in the group that moved to the new terminal (B) only. The reduction of complaints seems to be associated with ergonomic conditions as those who reported reduced exposure for twisted and bent work postures had a lowered prevalence of shoulder symptoms. The association between reduced exposure for twisted and bent work postures and a lowered prevalence of shoulder symptoms disappeared when changes in psychosocial work factors were included. That makes the association uncertain. There could also have been a risk for dependent misclassification. Those reporting symptoms from shoulders could have exaggerated the reporting of exposure for working in a twisted and bent position whereas

those without symptoms could have underestimated it. It could be argued, however, that this effect, if present, should have been evident for the other physical factors as well. A better contact with superiors was associated to reduced prevalence for shoulder symptoms. Similar results have been reported by other authors (Cohen & Syme, 1985; House, 1981; Kemmlert, Dallner, Kilbom, & Gamberale, 1993).

In this study there was no association between reduced psychological work demands and reductions of musculoskeletal complaints, contrary to the findings of some other authors (Bongers, de Winter, Kompier, & Hildebrandt, 1993; Theorell et al., 1991). An explanation could be that both those who stayed and those who moved reported psychological work demands as reduced, which makes comparisons between the groups difficult. A conservative interpretation is, however, that as a reduction of psychological work demands was the most obvious change of the psychosocial work factors, it seems reasonable to suppose that the reduction was important for the simultaneous reduction of symptoms.

Musculoskeletal symptoms are often of a long duration and studies have shown that a reduction of work load does not lead to a prompt reduction of symptoms (Berg, Torell, & Järholm, 1988; Derriennic, Iwatsubo, Monfort, & Cassou, 1993; Dionne & Turcotte, 1992; Hagberg, 1991; Kemmlert et al., 1993). This is true especially if symptoms are severe and chronic. An expected effect, for example, lack of symptoms due to ergonomic changes might be smaller if the symptoms have become chronic (Berg et al., 1988; Derriennic et al., 1993; Dionne & Turcotte, 1992; Hagberg, 1991; Kemmlert, 1995; Wallace & Buckle, 1987).

In this study the decrease in prevalence of musculoskeletal symptoms was found in the younger group (<35 years), whereas most of the older letter carriers reported unchanged symptoms. This shows the importance of early introduction of preventive measures. The changes in this study might have been too small or the follow-up period too short to affect chronic symptoms.

A positive impact by the organizational changes was for the older letter carriers that they experienced an increase of social support and authority over decisions. This could be attributed the fact that it was mostly older letter carriers that became promoted but also to increased support from the work teams during the change process since there were more joint responsibilities in the teams.

The older group (≥ 35 years) reported unchanged prevalence for musculoskeletal complaints which illustrates the importance of early preventive measures.

The study also shows the difficulties in planning and performing a follow-up of changes in working life. In this case it was not possible, or planned, to influence or take part of the organizational changes. Only a smaller part of the study group chose to move to the new terminal. Another diluting factor was that changes were introduced also at the old terminal, though the intention was to use this worksite for control.

5. CONCLUSION

The conclusion of this study was that through changes of work organization it was possible to improve psychosocial work factors and reduce musculoskeletal complaints and work hazards. The change in work organization seems to have influenced younger workers more than older as regards symptom prevalence, but among older workers on the other hand significant improvements of psychosocial work factors were obtained.

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