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PSYCHOSOCIAL FACTORS AT WORK:

Recognition and control

Report of the Joint ILO/WHO Committee
on Occupational Health
Ninth Session
Geneva, 18-24 September 1984



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PREFACE

In accordance with a decision of the Governing Body of the International Labour Office, in agreement with the WHO, the Ninth Session of the Joint ILO/WHO Committee on Occupational Health took place from 18 to 24 September 1984 at ILO headquarters in Geneva.

The item on the agenda was the "Identification and Control of Adverse Psychosocial Factors at Work".

Mr. Georges Spyropoulos, Chief, Working Conditions and Environment Department of the ILO, opened the meeting on behalf of the Directors-General of the World Health Organisation and the International Labour Office. He pointed out that the meeting represented a new example of the efforts undertaken by the ILO and WHO to act together to improve the complementarity of their programmes to protect workers' health. It was acknowledged that the importance of the psychosocial environment of workplaces was increasing. It was generally agreed that economic growth, economic progress, increased productivity and social stability depended not only on the different means of production available, but also on working and living conditions and the health and well-being of workers and their families. This realisation led to the development of a global preventive action, taking account not only of physical and chemical hazards, but also of the various psychosocial factors inherent in enterprises, which could have a considerable influence on the physical and mental well-being of workers. The ILO's International Programme for the Improvement of Working Conditions and Environment (PIACT) also stressed the importance of closer collaboration between the groups principally concerned in this field: employers and workers. As a result of accelerating technological change, the debate on the relation between technical progress and health and well-being at work had recently become extremely animated. It was essential that this debate should be conducted more calmly and with a clearer sense of reality.

Dr. Alexander Cohen was elected Chairman, and Prof. Lennart Levi, Vice-Chairman. Dr. N. Pardon and Dr. R. Kalimo were elected Reporters.

Dr. M. El Batawi, Chief of the Occupational Health Unit of the World Health Organisation, recalled that the World Health Assembly had discussed the topic of psychosocial factors and health over several years, starting in 1974, and had adopted several resolutions requesting the Director-General to develop a global multidisciplinary programme of work, to apply existing knowledge in order to improve psychosocial health and health care, and to develop methods in collaboration with countries so that psychosocial information could be made available to health

planners and new knowledge could be acquired on which health action can be based. The Occupational Health Programme of the WHO had undertaken several studies of the psychosocial implications of industrialisation in developing countries, as well as a state-of-the-art review on psychosocial factors in health. To cite only some of the recent examples: the WHO had reviewed the psychosocial health status of migrant workers in various parts of the world; in 1982, the WHO examined the role of psychosocial factors in relation to injury prevention; in 1983, a preparatory meeting on the identification and control of psychosocial factors at work was organised by the WHO in order to prepare a document to be used by the Joint ILO/WHO Committee on Occupational Health.

Mr. G. Kliesch, Chief of the Occupational Health and Safety Branch of the ILO, stressed that, since its formation, the Office had been concerned with the psychosocial environment. He cited, amongst other activities, the first session of the Joint ILO/WHO Committee on Occupational Health (1950) which, in defining the objectives of occupational health, emphasised the need to place and maintain workers in jobs corresponding to their physiological and psychological capacities. The Joint ILO/WHO European Conference on the Industrial Medical Officer's Contribution to the Psychosocial Environment in Industry (London, 1959) considered that the psychosocial climate of a group depended not only on its structure and living conditions but on an entire range of sociological, demographic, economic and social problems. He also recalled that concern for psychosocial factors at work was reflected in Making work more human, the Report of the Director-General to the International Labour Conference in 1975; in the resolution on working conditions and environment adopted in 1976; in the instruments on occupational safety and health and the working environment adopted in 1981; and in the proposed conclusions with a view to a Convention and to a Recommendation on occupational health services adopted in 1984. The question of psychosocial factors was also the subject of studies and activities carried out within the framework of PIACT.

This report is intended to examine the subject of psychosocial factors at work and their consequences, emphasising health issues. It describes the nature of such factors as related to health and the methods of identifying psychosocial factors. It also examines the means of preventing, reducing or eliminating the psychosocial problems that arise in places of work. It proposes a series of measures which could be taken at the enterprise level, national and international levels, with a view to giving greater importance to the psychosocial aspects of programmes for the improvement of working conditions and environment and the promotion of the health and well-being of workers.

CONTENTS

	<u>Page</u>
Preface	v
1. Introduction	1
2. The concept of psychosocial factors at work	3
3. Psychosocial factors at work	5
3.1 Introduction	5
3.2 Physical work environment	5
3.3 Factors intrinsic to the job	6
3.4 Work time arrangement	7
3.5 Management and operating practices in the enterprise	8
3.6 Technological changes	9
3.7 Other factors	11
Bibliography	12
4. Consequences of psychosocial factors at work	15
4.1 Physiological consequences	15
4.2 Psychological consequences	17
4.3 Behavioural consequences	18
4.4 Persistent health consequences	21
4.5 Examples of vulnerability factors	24
Bibliography	27
5. Assessment of psychosocial factors at work, and their effects	33
5.1 Introduction	33
5.2 Measurement of job satisfaction	34
5.3 Measurement of psychological and psychosomatic symptoms	34
5.4 Measurement of subjective well-being	35
5.5 Psychophysiological measurements and indicators ..	36
5.6 Assessing work characteristics	40
5.7 Observation methods	44
5.8 Assessing factors related to vulnerability	49
5.9 Occupational safety and health data collection ...	51
Bibliography	52
5197d/v.5	vii

	<u>Page</u>
6. Synopsis of psychosocial factors: indicators, methods and targets for development	55
7. Action at the establishment level	61
7.1 Problem recognition	61
7.2 Interventions	66
8. Action at the national level	69
8.1 Basic principles	69
8.2 National policy	69
8.3 Possible activities	70
9. Action at the international level	73
10. Remarks	77
LIST OF PARTICIPANTS	79

REPORT OF THE JOINT ILO-WHO COMMITTEE ON
OCCUPATIONAL HEALTH

Ninth Session, Geneva, 18-24 September 1984

1. INTRODUCTION

A vast quantity of literature has demonstrated that psychosocial factors at work contribute to a wide range of workers' health disorders. A large amount of evidence has accumulated on the relationship between non-specific psychological, behavioural and somatic syndromes and stressful or unrewarding job conditions. Positive psychosocial factors can act as health-maintaining and health-enhancing agents. The most common approach in dealing with the linkages between the psychosocial work environment and workers' health has been the application of the stress concept.

In developing and industrialised societies, both work and living environments can be major sources of adverse psychosocial factors which result in stressful experiences. The relative importance of psychosocial factors in causing stress-related diseases may vary widely in individuals and in different population groups. Adverse occupational psychosocial factors, however, have become increasingly significant. They have been defined as those psychological and social characteristics of the work environment which pose a threat to the individual.¹ A review of studies on occupational stressors and related psychological, physiological and behavioural disorders reveals that serious problems are found in roughly 5-10 per cent of the working population, being higher among the older age groups.

Current trends in the promotion of occupational health and safety take into account not only the physical, chemical and biological hazards in the work environment but also various psychosocial factors inherent in the enterprise which may have considerable influence on the physical and mental well-being of the worker. The working environment is increasingly being regarded as a set of interdependent factors making up a complex whole which acts on people at work.

The stressful psychosocial factors in the working environment are many and varied. They include physical aspects, some aspects of the organisation and system of work, and the quality of human relations in the enterprise. All these factors interact and affect the psychological climate in the enterprise and the physical and mental health of workers.

The psychosocial climate of an enterprise is linked not only to the structure and living conditions of the working community but also to a whole range of demographic, economic and social problems. It is generally recognised that economic growth, technical progress, expanding productivity and social stability depend not only on the means of production but also on working and living conditions and on the level of health and well-being of workers and their families.

Attention should be drawn to the economic difficulties and poverty prevailing in most developing countries. The low family income of many workers makes it difficult for them to satisfy their basic needs. While the great majority of the poor live in rural areas, many are found in the cities as well. They often work in small-scale enterprises or in the informal sector. Poverty causes and makes workers vulnerable to psychosocial stress. This vulnerability is increased by poor housing conditions and lack of community support, as seen in slum areas. With the breakdown of the structure of the family and changes in tradition, the lives of many workers are likely to be stressful. There is also a correlation between the health of male and female workers and the size of the family.

Rapid technological changes reduce the quantity and intensity of the physical energy spent on work but increase mental burdens. This may influence workers' attitudes and behaviour, an area in which psychosocial elements seem to be a deciding factor. It is today recognised that, owing to the increased pace of technological change, some forms of occupational exposure in combination with other factors (such as the sensitivity of the individual, his way of life and the general conditions of his environment) generate or favour the appearance of illnesses connected with work or the aggravation of existing disorders such as chronic diseases of the locomotor, respiratory and cardiovascular systems, and behavioural disorders.

The policy of preventing all factors prejudicial to workers' health is directed towards the promotion of better knowledge of the essential requirements for a healthy working environment, adaptation of work to the capacity and needs of each worker and in relation to his state of physical and mental health, and the creation and maintenance of a working environment which encourages an optimal state of physical and mental health in relation to work.

Note

¹ R.D. Caplan et al.: Job demands and worker health. Main effects and occupational differences (Washington, United States Department of Health, Education and Welfare, 1975) (HEW Publication No. 75-160, NIOSH).

2. THE CONCEPT OF PSYCHOSOCIAL FACTORS AT WORK

The concept of psychosocial factors at work is difficult to grasp, since it represents worker perceptions and experience, and reflects many considerations. Some of these considerations relate to the individual worker, while others relate to the conditions of work and the work environment. Still others refer to social and economic influences, which are outside the workplace but which have repercussions within it. Research, study and examination of psychosocial factors over the years have attempted to characterise these different components in more explicit terms, as well as to explain the nature of their interactions and effects, emphasising health among other outcomes. Fundamental individual factors include the worker's capacities and limitations relative to job demands, and the fulfilment of needs and expectations. Working conditions and the work environment include the task itself, physical conditions at the jobsite, worker/co-worker/supervisor relations, and management practices. Factors external to the workplace but relevant to psychosocial concerns at work include familial or private-life concerns, cultural elements, nutrition, ease of transport, and housing.

Psychosocial factors at work as viewed in this manner must be defined broadly enough to account for these influences and their effects. With regard to the effects, studies of the psychosocial aspects of work and job conditions have been conducted mainly in the context of stress evaluations, with adverse effects such as emotional disturbances, behavioural problems and ill-health being noted. Hence, psychosocial factors at work have largely been seen in a negative way. However, psychosocial factors also need to be seen as having favourable or positive influences on health and other aspects of life. Recognition of positive psychosocial factors at work merits increased attention.

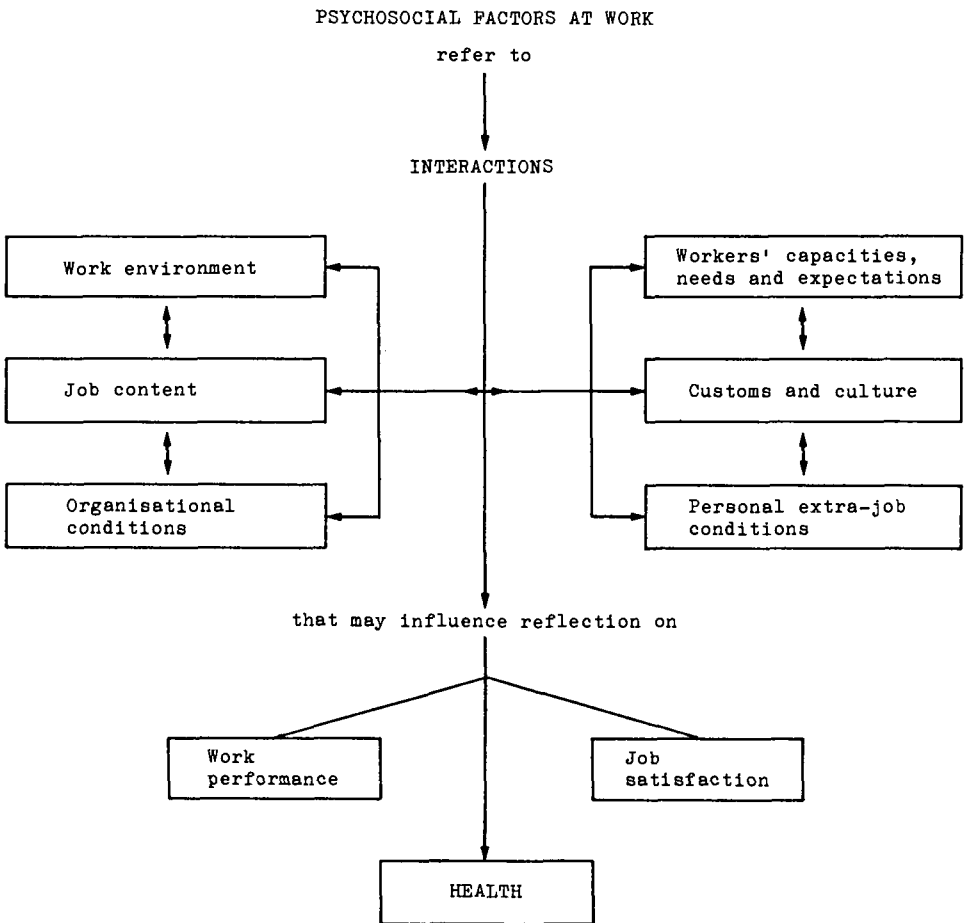
Definition

Psychosocial factors at work refer to interactions between and among work environment, job content, organisational conditions and workers' capacities, needs, culture, personal extra-job considerations that may, through perceptions and experience, influence health, work performance and job satisfaction.

This definition is portrayed in figure 1 below. The diagram shows the work environment and human factors that are in a dynamic interaction. Work environment, job tasks and

organisational factors are representative of occupational concerns. Workers' reactions depend on factors such as their abilities, needs, expectations, culture and private life. These human factors may change over time reflecting adaptation among other influences. A negative interaction between occupational conditions and human factors may lead to emotional disturbances, behavioural problems, and biochemical and neurohormonal changes, presenting added risks of mental and physical illness. Adverse effects on job satisfaction and work performance can also be expected. An optimum balance between human factors and occupational conditions would suggest a psychosocial situation at work having a positive influence, particularly as it relates to health.

Figure 1. Psychosocial factors at work



3. PSYCHOSOCIAL FACTORS AT WORK

3.1 Introduction

Research in many countries during the last two decades has produced a large amount of data on psychosocial working conditions. While a number of recent reports are available on this subject, only a few examples with negative effects are reviewed here.

Individuals interact with their working conditions in a manner which is determined by working conditions and by human capacities and needs. Crucial job factors in this interaction include the task, the physical and social work environment, managerial practices and employment conditions. Human assets and limitations which determine the success of the interaction are based on general psychological and biological factors, as well as on individual characteristics and social contexts. When working conditions and human factors are in balance, work creates a feeling of mastery and self-confidence; increases motivation, working capacity and satisfaction; and improves health. An imbalance between environmental opportunities and demands, and between individual needs, abilities and expectations, elicits a different reaction. When needs are not being met, or when abilities are over- or undertaxed, man reacts with altered cognitive, emotional, behavioural and physiological responses. The outcomes largely depend on the abilities of the individual to cope with difficult life situations and to control the early manifestations of its consequences. Thus, when exposed to the same stressful situation within reasonable limits, one individual may cope successfully and remain healthy, while another may experience health problems.

In the working environment, a number of negative, potentially health-related psychosocial factors have been identified in numerous studies. These include the underutilisation of abilities, work overload, lack of control, role conflict, inequity of pay, lack of job security, problems in relationships at work, shift work and physical danger.

3.2 Physical work environment

In surveys concerning the working conditions of various occupational groups, workers' complaints often emphasise noise and temperature. Additionally, vibration and chemical exposures were frequently reported as the most harmful perceived stressors. In a survey of blue-collar workers in Finland, 52

cent of the respondents rated noise and 47 per cent rated thermal conditions as moderated by harmful hazards (Koskela et al., 1973).

Numerous studies confirm that physical health is adversely affected by a dehumanising combination of physical and mental hazards in the work environment (Cox, 1980). These include, for example, noisy factories where repetitive work is done in paced assembly lines with a minimum amount of social interaction between the workers.

Certain occupations have been identified as being high risk in terms of physical danger, e.g. police officers, mineworkers, soldiers, prison personnel and firefighters (Davidson and Veno, 1980; Kalimo, 1980; Kasl, 1973). However, stress induced by potential risks in these professions is often substantially reduced if the employee feels adequately trained and equipped to cope with emergency situations.

In many parts of the world a majority of the workforce is employed in agriculture and small enterprises where the physical workload is heavy, hygienic conditions are poor, and exposure to accidents and disease cause a constant threat to health.

3.3 Factors intrinsic to the job

Work overload is characterised as being either quantitative (i.e. having too much to do) or qualitative (i.e. work being too difficult). Various types of behavioural malfunctions and perceived symptoms have been associated with job overload (Cooper and Marshall, 1976, 1979; Kasl, 1973). There is a relationship between quantitative overload and cigarette smoking. Kroes et al. (1974) found that job overload was associated with such stress-related symptoms as lowered self-esteem, low work motivation and escapist drinking.

In a study of 100 young coronary patients, Russek and Zohman found in 1958 that 25 per cent had been working at two jobs and an additional 45 per cent had worked at jobs which required 60 or more hours per week. Although prolonged emotional strain preceded the attack in 91 per cent of the cases, similar stress was only observed in 20 per cent of the controls. In 1960, Breslow and Buell reported findings which support a relationship between hours of work and death from coronary heart disease. In an investigation of mortality rates of men in California, they observed that workers in light industry under the age of 45, who work more than 48 hours a week, have twice the risk of death from coronary heart disease as compared with similar workers working 40 hours a week or less.

Research suggests that both qualitative and quantitative overload produce different symptoms of psychological and physical strain, including job dissatisfaction, job tension, lowered self-esteem, feelings of threat and embarrassment, high cholesterol levels, increased heart rate and increased smoking.

Repetitive, routine, and understimulating work environments are typical in mass production (e.g. paced assembly lines). Some clerical tasks have been associated with various types of health complaints, physiological disturbances and ill-health (Cox, 1980).

The effects of underload are often aggravated by a lack of control over the work situation (Gardell, 1976). Underload may also be a problem related to the application of new technologies. For example, most of the operator's time in nuclear power plants is shown to be spent on monotonous rather than stimulating tasks. In certain jobs, such as policing and operating nuclear power plants, periods of boredom have to be accepted, along with the possibility that one's duties may suddenly be disrupted by an emergency situation (Davidson and Veno, 1980). This can cause a sustained arousal in the employee's physical and mental state which may have subsequent detrimental effects (Bosse et al., 1978). Furthermore, boredom and disinterest in the job may reduce the employee's ability to respond to emergency situations.

3.4 Arrangement of work time

Daily work-hours, as well as weekly, monthly, annual, and lifelong work time, to a large extent structure the way of life of the working population. The arrangement of work time is relevant to sleep-wakefulness patterns, social participation and general lifestyle. Obviously, it also has implications for health.

Shift work is known to affect biological rhythms, such as circadian variations of body temperature, metabolic rate, blood sugar levels, mental efficiency and work motivation. The effects in daily life can be seen in sleeping behaviour, eating habits, family life and social activities. Reports show that shiftworkers complain more frequently than day workers of fatigue and gastro-intestinal troubles.

A study by Cobb and Rose (1973) on air-traffic controllers showed four times the prevalence of hypertension as well as a higher incidence of diabetes and peptic ulcers than in their control group of second-class airmen. Although other job stressors were important in the causation of these stress-related health problems, a major job stressor was shift work.

Although most investigations agree that shift work becomes physically less stressful as work schedules are better organised and individual workers are helped by various means of social support, restriction of social participation is a common complaint among shiftworkers.

3.5 Management and operating practices in the enterprise

3.5.1 Workers' role

A person's role at work has been shown to be a major source of occupational stress when it involves role ambiguity (a lack of clarity about the tasks), role conflict (conflicting job demands) and conflicts stemming from organisational boundaries (Cooper and Marshall, 1976). It has been indicated that organisational stressors stemming from role ambiguity and conflict can be associated with a risk of cardiovascular disorders (Eden et al., 1973). Workers in managerial, clerical and professional occupations are especially prone to occupational stress related to role conflict.

According to a review by Kasl (1979), correlations between role conflict, ambiguity and job satisfaction are strong while correlations with mental health measures tend to be weak. Personality traits are an important determinant of how an individual reacts to role conflict.

Having the responsibility for people and their safety has the potential to be an occupational stressor. The pressure on nuclear power operators, for example, may be caused by their responsibility for the safety of the workers and the community when faced with unusual situations. Having this responsibility is a potential stressor among police and prison personnel (Kalimo, 1980). The responsibility for people's lives and safety was found to be a major occupational stressor among air-traffic controllers (Cooper et al., 1980). Also, there is evidence that stress is linked to the level of responsibility; the more responsibility, the greater the probability of risk factors or symptoms of cardiovascular disease.

3.5.2 Workers' participation

Organisational structure and climate, including such factors as office politics, lack of effective consultation, lack of participation in the decision-making process and unjustified restrictions on behaviour, make up a complex set of factors which, to a great extent, affect workers' well-being. Kroes et al. (1974) found that greater participation led to higher productivity, improved performance, lower staff turnover and lower levels of physical and mental health problems (including such stress-related behaviours as escapist drinking and heavy smoking).

3.5.3 Relationships at work

The nature of relationships and social support from one's colleagues, supervisors and subordinates have been related to job stress (Payne, 1980). Poor relationships with other members of

an organisation may be precipitated by role ambiguity in the organisation, which in turn may produce psychological strain in the form of low job satisfaction. On the other hand, Caplan et al. (1975) found that strong social support from peers relieved job strain and also moderated the effects of job stress on physiological functions and on smoking habits. In the case of air-traffic controllers, more meaningful social support was provided by friends and colleagues than by those in supervisory positions.

3.5.4 Implementation of changes at the workplace

Economic development and the increasing freedom of trade compel enterprises which want to survive and prosper to change the nature and means of their production. All economic sectors have to cope with this evolution which has important effects on psychosocial factors. Some frequent omissions and mistakes include the following:

- changes are not technologically and psychologically prepared for. Workers are not informed early enough, nor are they suitably trained. Delays in providing information can have a heavy psychological cost;
- new methods are not assessed with respect to their human cost, and ergonomic principles are not considered at the design stage;
- not enough supportive measures are provided when work changes (e.g. new technologies) are introduced. The shock of the new technologies for those affected should be reduced or buffered through retraining, which may, perhaps, lead to advancement in job status. For older workers, retirement plans should be arranged. Appropriate choices must be offered to workers.

3.6 Technological changes

3.6.1 Industrialisation

Industrialisation brings with it many occupational health problems, especially those involving psychosocial considerations. The greatest of these problems is that of workers who lack training and come from agrarian/rural areas (with all their values and beliefs) and who have to adapt to the new way of life. The shift from a traditional way of living in familiar surroundings, exposure to change, the windfall of a newly found fortune and the speed at which all these happen, tend to lead the workers into problems of maladjustment. Many are forced to live under unsanitary conditions, such as in the slums around the factory, and removed from their families left behind in the villages. Debts, gambling and alcoholism complicate

their lives. The suicide rate among these workers is reported to be higher and it serves as a significant indicator of this serious problem of adjustment and adaptation to change. In fact these psychosocial factors related to industrialisation are very similar to those that occurred in the early development of industrialised countries.

3.6.2 Introduction of new technologies

Psychological stress and related health problems associated with the automated work processes and the application of microelectronics are currently of great concern. Scientific investigations have been carried out on ergonomic and hygienic work conditions and improvements in automated work processes (Cakir et al., 1979) and in visual display terminal (VDT) operations (Gunnarson and Ostberg, 1977).

Reports on work with VDTs have demonstrated that the cognitive content of work is of crucial importance in building up the mental workload and stress reactions (Cakir et al., 1979). Data-entry work is repetitive and lacks variety and challenge. Employees in these tasks have reported more stress reactions and health complaints than their co-workers in jobs with more variation, including, for example, the correction of errors and dealing with clients (Cail et al., 1980; Cohen et al., 1981). Perceived complaints of mental load and stress have been confirmed in physiological indicators.

Changes in the qualification level of a job, which occur with transition into automated work, also affect workers (Cakir, 1979). When the qualification level was lowered, workers complained of monotony, even though the work was not repetitive. On the other hand, Gunnarson and Ostberg (1977) reported that 60 per cent of such VDT operators who had previously been in clerical work complained about monotony and fatigue, although their current work content was similar to that of their previous tasks.

Delays and breakdowns in the computer system are perceived by workers as being strongly disturbing. The lack of ability to anticipate such breakdowns and delays, and thus control the workload, are the main causes of the irritation and helplessness experienced when breakdowns occur. On the other hand, even when the perceived mental workload was diminished to a certain extent, the period of introducing the change was perceived as being stressful by a majority of the employees (Huuhtanen, 1983).

In spite of the problems involved in the application of computer technology in certain jobs, computerisation may bring additional challenge and variety to the most routine and repetitive traditional ways of working. For example, it was found that text-setting workers using VDTs in the printing industry were more satisfied, reported fewer complaints of long-term and daily stress and showed fewer signs of negative

workload during observation as compared with a matched group of employees carrying out the same work with a traditional method.

It can be concluded from current literature that, where problems such as stress and inappropriate workload arise in computerised work settings, the main causes are a lack of variety and a lack of control over the job. Before computer technology is introduced, the components of each job that will be affected by the changeover, whether by the technology itself or through work organisation, must be identified. Another important target for future research is the investigation of the overall impact of new technology on occupational structures, social work environment and work role identification, and consequently on the health of the workforce.

3.7 Other factors

Unemployment and underemployment apparently relate to psychosocial factors at work. In many industrialised countries, the employment situation has deteriorated in recent years. There are indications that unemployment has similarly increased in a number of developing countries. The instability of employment affects workers' well-being. They become more ready to accept work under poor working conditions. They are often subjected to hard, long working hours, and a poor quality of work. The threat of losing the job adds to the job-related tension of workers. Poor conditions, insecure employment, large families and malnutrition (or undernourishment) often combine to put workers in a weak position to cope with their total burden.

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4. CONSEQUENCES OF PSYCHOSOCIAL FACTORS AT WORK

Several reviews have recently been made on the inter-relationships of psychosocial factors at work and their effects on health. Only a few of the large number of studies that would be of interest are discussed here. Much of the evidence presented is supportive but not yet conclusive. Although there are many epidemiological studies, few are experimental, longitudinal and interdisciplinary.

4.1 Physiological consequences

4.1.1 Adrenal hormones

Many investigations have been made into the changes in the excretion of corticosteroids and catecholamines in response to exposure to occupational stressors. Machine-paced and monotonous work, responsibility for people, and many other job factors were shown to increase adrenal hormonal excretion in various occupations such as: pilots and air-traffic controllers; locomotive engineers; firefighters; employees in technically advanced processes, computerised work, and assembly line and piece-work; opera singers and orchestral musicians during training and performance; and teachers with an intensive teaching programme. Disturbed excretion patterns have been found in shiftworkers.

In a series of experiments carried out in 1970, Fröberg et al. studied how work conditions affect endocrine reactions. In one study, invoicing clerks were studied on four consecutive days while performing their normal tasks at their workplace. On the second and fourth days the subjects worked for their modest monthly salary. On the first and third experimental days, highly progressive piece-wages were added to their salaries. On the latter days productivity rose by 114 per cent over the control level.

This increase in productivity, however, was achieved at the expense of considerable mental and physical discomfort. Half the employees felt hurried and most complained of backache, fatigue and shoulder pain. On control or normal salaried days, such complaints were virtually absent. During piece-wage days, adrenaline and noradrenaline excretion rose by 40 per cent and 27 per cent respectively, reflecting and confirming the piece-rate induced state of occupational stress.

The mechanisation of agricultural work leads to considerable changes. In a series of studies, a reduction of the rhythmic variations of noradrenaline and adrenaline was found to be due to

the plateau in the excretion throughout the hours of wakefulness. Tractor drivers exhibited a marked change in amplitude of the circadian variation of cortisol excretion, indicating a change in the regulation of hormonal rhythms (Daleva et al., 1982).

4.1.2 Central nervous system

Branton and Osborne (1979) reported that anaesthesiologists assisting in long surgical operations frequently succumb to task monotony with lapses in vigilance. As they become aware of these episodes, they experience "mini-panics" until ascertaining that nothing had gone amiss during the lapse. The mini-panics were reflected in heart-rate recordings and confirmed by them afterwards.

Continuous electroencephalography (EEG) monitoring of electronic assemblers over the entire day demonstrated a high incidence of deactivation episodes marked by the occurrence of the theta rhythm (Cheliout et al., 1979), often referred to as "micro-sleep" and potentially dangerous in attention-demanding occupations and tasks.

Occupational groups whose tasks are monotonous and whose performance failures are consequential exhibit a high incidence of psychosomatic diseases (cf. O'Hanlon, 1981). Probably the hazard to health is not that of deactivation of the central nervous system in a monotonous working environment per se but is rather the threat posed by this deactivation to meeting one's accepted task responsibility.

EEG data was recorded on the sleep of a group of medical students during the nights before and after examination. Data were also recorded on a group of amateur parachute jumpers with little training (at the beginning and at the end of a 15-day course for parachute training). Both groups showed considerable disruptions in their REM (rapid eye movement) sleep (Dincheva and Tsaneva, 1982). These changes were interpreted as an indication of task-induced or anticipatory stress.

4.1.3 Cardiovascular responses

The most extensively studied population with respect to the cardiovascular effects of psychosocial stress is that of American air-traffic controllers. Beginning in the early 1970s it became evident that heavy responsibility, combined with considerable periodical mental workload, irregular work-rest cycles and other occupational factors, were creating a potentially dangerous situation for the controllers' health and for the safety of airline crews and passengers (Hurst et al., 1978). Repeated blood-pressure measurements on 382 controllers during all phases of their work revealed that the change from low to high workload was accompanied by modest, if statistically significant,

elevation in both systolic and diastolic pressures. However, 36 controllers did become hypertensive, according to the Federal Aviation Authority's criteria (systolic pressure 140 mm; diastolic 90 mm) during the course of the study. In comparison with the controllers who remained normotensive, the hypertensive group exhibited not only higher average systolic and diastolic pressures during work but also much larger changes in systolic pressure in response to variations in workload. The workload, a psychosocial stress factor, was clearly a contributor to the development of hypertension in these particularly susceptible individuals. Similarly, studies by Theorell, Karasek and co-workers (1984) indicate a higher risk of hypertension and myocardial infarction respectively in subjects whose jobs are hectic, monotonous and controlled by others (e.g. machine-paced), cf. also section 4.4 below.

4.2 Psychological consequences

Psychosocial stressors at work and in working conditions are frequently long standing, whether they occur continuously or from time to time. In spite of the many ways in which people are equipped to cope with these situations, the demands put on them may exceed human resources, making them unable to cope, or, in the long run, causing new problems. The outcomes of these conditions can be seen as disturbances in psychological and behavioural functions. Among the first indicators are negative feelings such as irritation, worry, tension and depression. Cognitive disturbances (e.g. difficulties in concentration, memory and decision-making) reflecting lower performance capacity may follow. Avoidance behaviours originally aimed at coping and mastery may turn into fixed, non-purposeful obsessive behavioural disorders.

Among the most commonly measured long-term stress effects are self-reported psychosomatic complaints and psychiatric symptoms or complaints about well-being.

Broadbent and Gath (1979), who compared various groups of workers engaged in repetitive machine-paced tasks, in repetitive self-paced tasks and in non-repetitive work, found moderate but consistently positive correlations between dissatisfaction and somatic symptoms in all three groups. Workers engaged in repetitive work reported more dissatisfaction than workers in non-repetitive tasks. Pacing was correlated with anxiety and, to a lesser extent, with somatic symptoms and depression.

The association of psychosomatic complaints, lowered general life satisfaction and self-esteem, depression, working time, workload, working conditions, job content, non-participation, job uncertainty and social isolation, was studied in a sample of workers in various occupations (Kroes et al., 1974). The highest correlations were found between self-esteem and "general job content", which was defined as the possibility of using

and/or developing one's skills in the job, and variability of job content.

Monotony and understimulation is a great problem in the mass production industry and an increasing concern in modern system monitoring-and-control tasks. Reviewing the evidence, O'Hanlon (1981) concludes that boredom in monotonous occupations is associated with attention, perception, cognitive and motor impairments that can degrade performance efficiency and is related to ill-health and absenteeism. Although severe, chronic boredom is experienced by only a minority of workers in even the most monotonous situations (estimates rarely exceed 30 per cent), the degree of experienced boredom turns out to be a strong determinant of job dissatisfaction. Understimulation can have facilitatory effects on adrenaline production comparable to that of overstimulation in situations where voluntary effort to maintain work performance is relatively high. On the psychological level, however, there seems to be a differentiation (Udris, 1981): qualitative overstimulation or overload is associated more with dissatisfaction, tension and low self-esteem, whereas qualitative understimulation is associated more with depression, irritation and psychosomatic complaints, in addition to dissatisfaction.

Being "burned out" has become a popular expression for describing the consequences of exposures to stressful conditions of employees in professions involving a high degree of contact with other people. Hartman and Perlman (1982) defined three components of being "burned out": (a) emotional and/or physical exhaustion; (b) lowered job productivity, and (c) over-depersonalisation. Features added by other authors include low morale and negative attitudes towards patients, clients or other persons with whom subjects had to deal, as well as cynical attitudes, absenteeism, turnover and drug abuse.

4.3 Behavioural consequences

4.3.1 Work performance

Employers are concerned about how occupational stress manifests variations in the job performance of the employee. The most widely accepted model describes performance efficiency as an "inverted U" function of stress (Welford, 1973). This means that people perform optimally when under a moderate level of stress and less efficiently when stress is either very high or low.

When under an inappropriate workload, people may, for example, change their behaviour by neglecting side issues and concentrating on the main task. The effectiveness of a given strategy to control overload and to reduce stress depends upon the possibility of executing it in the operational environment and on the capabilities of the worker himself (Bainbridge, 1974).

Productivity, as well as stress, was affected by the selection of an appropriate strategy in an investigation involving industrial weavers (Hacker and Vaic 1973). High- and low-productivity workers were first selected. The more productive weavers used more efficient strategies than those producing less. The former's common strategy was to anticipate and prevent breakdowns in the process and therefore less time was spent repairing and correcting during the working day. Because both groups strove to achieve the same production quotas, the less productive weavers came under a greater workload at the end of the day. Their greater level of stress was revealed by several changes. Teaching the less productive weavers a more anticipatory strategy improved their performance and diminished their stress.

4.3.2 Absenteeism and turnover

According to a number of estimates, absenteeism due to sickness has increased in all industrialised countries over the past decades. Annual frequencies of absence have increased more rapidly than the number of lost working days, which indicates that short periods of absence have increased more than long ones. These changes are probably in part due to corresponding changes in legislation and medical insurance benefits, but psychosocial occupational factors are also likely to be an important cause.

In an 11-year survey of 184,122 men enlisted in the navy, Hoiberg (1982) showed a relationship between job-stress scores (ratings by the researcher) and hospitalisation for ten stress-related illnesses, including alcoholism, neuroses, hypertension, ischaemic heart disease and peptic ulcers.

Absenteeism and turnover are often related to job dissatisfaction. Unsatisfactory living conditions, together with poor transport, considerably reduce job satisfaction and result in frequent changes of employment. A review (Porter and Steers, 1973) concludes that job dissatisfaction is a central factor in withdrawal from work. Level of job satisfaction, in turn, may be determined by a multitude of work-related factors. Some of these factors can be identified and made into targets for preventive action.

Other studies have investigated work-related factors in causes of absenteeism and turnover, both of which seem to be determined to a large extent by the same type of work factors. Gardell (1978) compared absenteeism in a stressor-exposed group of sawmill workers and two control groups of the same age. Twenty-nine per cent of the "stress" group had been absent from work during the preceding year for 30 days or more. No individual in the control groups had as high a rate.

Literature reviews (Porter and Steers, 1973; Clegg, 1983) indicate that absenteeism and turnover are related to the following factors in the work setting: unmet expectations with

regard to pay and incentives; few promotional opportunities; lack of recognition, lack of feedback, and lack of fairness on the part of the supervisor; inexperienced supervisor; dissatisfaction with relations with co-workers; lack of support; task repetitiveness; lack of responsibility and autonomy; work role ambiguity; large worker unit.

There is progression from a tendency towards lateness to absenteeism (Clegg, 1983) and from absenteeism to turnover (Muchinsky, 1977).

Seamonds (1982) showed a drastic reduction in absentee rates among employees who had formerly been frequently absent, after participation in a health evaluation programme. The programme was implemented in order to strengthen their means to cope more effectively with job stressors.

Socio-demographic factors are related to absenteeism to a relatively great extent. Young people are more frequently absent than older workers. With increasing age, short-term absences tend to diminish and long absences increase (Behrend and Pocock, 1976). The number of children and day-care facilities are additional determining factors in absenteeism, especially among women (Nyman and Raitasalo, 1978).

4.3.3 Excessive tobacco and alcohol consumption

Smoking is a habit which has well-demonstrated health consequences. This habit may be influenced by a number of internal and external motives. It has been shown to be associated with tension and anxiety (Bosse et al., 1978). Several studies have shown a relationship between job stress and smoking; in particular, the decision to stop smoking was negatively related to exposure to various job stressors (Driken et al., 1973; Eden et al., 1973).

Increased or excessive alcohol consumption and escapist drinking behaviour is often regarded as one of several pathogenic mechanisms in response to psychosocial stressors at work. The evidence for this is, however, scarce, partly because of the great difficulty in obtaining reliable data on alcohol consumption and on the moderating influence of cultural heritage and social norms.

In a study by Kroes et al. (1974), escapist drinking correlated positively with work under- and overload, inappropriate use of knowledge and skills at work, insecurity in job tenure and few opportunities for participation, as well as with the estimated overall perceived workload.

Alcohol consumption was correlated with perceived health status and was significantly related to perceived occupational stress among seamen (Elo, 1979).

Strayer (1957) analysed the medical records of clients in an ambulatory alcohol clinic during a six-year period. The alcoholics were characterised by low job satisfaction. More

than one-half had problems in accepting their supervisors. Only about 20 per cent felt that they had an opportunity to work according to their own professional objectives. About one-fourth had no occupational goals.

Although these results highlight many problems that theoretically could be reasons for escapist behaviour, including drinking, it is impossible to infer any causal relations on the basis of these data.

4.3.4 Spill-over into non-work environment

It is a well-based hypothesis that long-term job-related stress affects non-work spheres of a person's life. General passivity and alienation among factory workers involved in tasks characterised by low skill demands, lack of variety, repetitiveness and low decision-making latitude were among the first observations of the spill-over of job stress into leisure (Gardell, 1976).

It has been widely suspected that chronic job stress has an impact on family interactions, and this subject is attracting increasing research interest (Brett, 1980). There is some evidence indicating that families of professionals whose jobs require personal contact are especially likely to be victims of the spill-over from work. In their survey of police officers and their spouses. Jackson and Maslach (1981) found that officers who were experiencing stress (as measured by a burn-out inventory) were more likely to return from work upset or angry, tense and anxious to complain about things. They also had difficulty sleeping at night in spite of their perceived physical fatigue. They spent more time away from the family, were considered by their spouses to be uninvolved in family matters and had fewer friends.

4.4 Persistent health consequences

4.4.1 Chronic somatic disorders

The aetiology of most so-called psychosomatic diseases is largely unknown. Most probably, aetiology, as well as pathogenesis, is complex, with interaction between many individual and situational, sufficient, necessary and contributory factors. However, evidence about the importance of psychosocial occupational factors is rapidly accumulating. Some of it is presented below (cf. Eisdorfer and Elliott, 1982).

Prolonged isometric muscle tension is known to cause pain and may contribute to some functional and possibly structural diseases of muscles, tendons and joints. Labile hypertension due to episodic sympathetic nervous system activation may deregulate the cardiovascular control system, in the long run

possibly leading to essential hypertension and ischaemic heart disease. Drastic fluctuations in autonomic control of gastrointestinal blood flow, motility and secretion may contribute to the development of a peptic or duodenal ulcer, chronic diarrhoea, or constipation. Constant or often-repeated mobilisation of free fatty acids which are not subsequently metabolised by the skeletal musculature might eventually be the source of other metabolic products (e.g. cholesterol) that accumulate in the arteries contributing to atherosclerosis.

The excessive release of adrenaline and noradrenaline may have direct local effects upon target organs such as the heart, increasing the risk of electrolyte imbalance, arrhythmias and even myocardial damage. Chronic activation of the adeno-hypophyseal-adrenocortical axis may produce local tissue damage, primarily as a result of cortisol's inhibition of amino-acid uptake by mucosal, skeletal muscle, skin and lymphoid cells. Loss of resistance of the gastrointestinal mucosa to acid and proteolytic enzymes, muscle wasting and diminishing antibody production which increases susceptibility to infection are amongst the other possible results.

Ischaemic heart disease and arterial hypertension. It is known that acute stressors can, under certain circumstances, precipitate angina pectoris, arrhythmias, congestive heart failure, stroke, myocardial infarction or sudden cardiac death, in those who already have predisposing medical conditions (Levi, 1971).

More recent studies contradict the common assumption that ischaemic heart disease is a manager's disease. It is more common in lower social groups, with low education and low decision latitude but high workload in a joyless job (Alfredsson et al., 1982).

Certain occupations which involve frequent exposure to mental stress, an overload of responsibility or frequent conflicting situations are associated with an increased risk of hypertension. Thus, Kotlarska et al. (1956) found an 11.8 to 14 per cent incidence of hypertension among elementary school teachers and bank clerks as against 0.8 to 4.2 per cent among miners and labourers. Mjasnikov (1961) referred to the high incidence of essential hypertension among telephone operators employed in a large exchange whose work entails constant mental stress without a moment's respite.

These findings are supported in a study (Cobb and Rose, 1973) investigating the incidence of hypertension, peptic ulcer and diabetes in air-traffic controllers and second-class airmen; data was obtained from annual medical examinations. Controllers were found to have a higher risk of developing hypertension than second-class airmen, and the added risk was related to working at high traffic density towers and centres. Controllers were also found to have a higher incidence of peptic ulcer and, to a lesser extent, diabetes, than the non air-traffic controller sample.

4.4.2 Occupational psychosocial hazards and mental health

Although the relation between psychosocial factors at work and impaired mental well-being has been demonstrated repeatedly in many countries, the role of such factors in the aetiology of major psychotic diseases is not clear.

It has been a commonly held belief that workers who are prone to psychiatric illness tend to have low socio-economic status and low education. Thus, they enter low skill occupations (Kasl, 1973). A large-scale study on stress and work by Caplan et al. (1975) illustrates that the incidence of ill health was greater for blue-collar than for white-collar workers. A higher proportion of white-collar professional workers, however, reported nervous strain at work than did skilled, semi-skilled and unskilled manual workers.

4.4.3 Acute psychological disorder: mass psychogenic illness

Outbreaks of "contagious" psychogenic reaction called mass psychogenic illness or mass hysteria are rare but are very disturbing when they occur at the workplace. This phenomenon is characterised by group reaction in which employees who usually function normally experience various subjective, non-specific symptoms of sufficient severity to produce an inability to work. The incident is usually preceded by some form of organisational stress and the spreading of rumours to which individuals who are susceptible react through collective action (Cohen et al., 1978). Common symptoms complained about are dizziness, nausea, headache and weakness. In certain developing countries, workers may even manifest outbreaks of violent behaviour (Chew, Phoon and Mae-lim, 1976).

The outbreak of the symptoms is frequently preceded by a triggering event, such as the smell of a gas or solvent, or rumours of epidemics (e.g. encephalitis), which is presumed to be causally related to the symptoms. The individuals involved typically share a belief that there are certain external causes for their physical symptoms, even though there is no identifiable pathogen or corresponding hazard. Work settings in which mass psychogenic illnesses have occurred typically involve repetitive, perceptual-motor tasks performed at fixed positions and fixed work pace (Colligan and Murphy, 1979; Phoon, 1982). In most of the reported industrial incidents the workers were under considerable pressure to increase production, and labour-management relations were poor.

4.4.4. Occupational accidents

Occupational accidents are frequently associated with psychosocial factors (Hoyos, 1980). Accidents are more liable to occur in physically dangerous conditions at work when psychosocial factors interfere with workers' recognition and proper assessment of hazards. Stress at work, lack of training and piece-work are other factors having an apparent relation to accidents at work.

Poorly organised work relates to accidents. Role ambiguity, poor communication and conflicting expectations tend to result in unsafe behaviour. Safety efforts at various levels can be hampered if the formal and informal social environment is inadequate.

The acceptance of risk by the employer and by the workers is variable, depending on incentives, group pressures, group habits and societal norms.

The recognition of risk is lowered, and consequently liability to accidents increased, among workers who are troubled by extra job demands or emotional problems caused by general life circumstances.

Much has still to be done to clarify the direct and indirect role of psychosocial factors in the causation of accidents, and a great deal of uncertainty remains as explicit documentation is still scarce.

4.5 Examples of vulnerability factors

4.5.1 Introduction

The quality of the interaction between a person and the work environment does not have a one-to-one correspondence in immediate reactions and even less so in the long-term. These effects are modified by a number of factors which may be either predisposing or protective.

In developing countries, the determinants of special vulnerability in newly urbanised job recruits may include psychological aspects like unfamiliarity with the work-leisure dichotomy (ex-nomads) and separation of the end-product from labour (ex-peasants and rural craftsmen).

Somatic ill health resulting from infectious diseases, poverty, malnutrition, overcrowding, lack of education, sanitation and health care probably render individuals more susceptible to environmental psychosocial hazards at the workplace.

On the other hand, traditional communal interdependence and cohesiveness can enrich the occupational atmosphere, with positive effects on social structures and processes.

These factors modify the stress reactions both qualitatively and quantitatively and lead to differences between the reactions of individuals, even with respect to the same situations. On

the other hand, these variables may cause variations in the response of a single individual at various times.

4.5.2 Age and personality

Psychophysiological responses to exposure to experimental stressors indicate that older persons exhibit a stronger activation of the sympathetic nervous system. Under long-term, real-life working conditions, however, successful individual coping strategies may counterbalance these effects. It has been indicated that older persons intentionally avoid or cope successfully with potentially stress-producing situations, e.g. by using their professional experience and knowledge, their rationales for resolving problems, and so on. Workers' complaints of strain at work increase with advancing age, as do the difficulties of adjusting to shift work.

Many personality characteristics such as extroversion/introversion, neuroticism, type A/B behaviour patterns and flexibility rigidity have been shown to be related to stress and health outcomes (McMichael, 1979).

The locus of control, external or internal, has been discussed as one of the determinants of mental health (Rotter, 1966). Persons who feel externally controlled, objects rather than subjects, are apt to experience feelings of helplessness and powerlessness to influence the situation. In contrast, individuals who feel they are in control of their lives experience less threat in stressful situations because they feel capable of mastering the environmental factors (Averill, 1973).

The locus of control has been found to influence the perception, reactions and effectiveness of the performance of owners of small business enterprises in a stressful situation. The managers classified as "internal" (those who considered themselves to be in control of their lives) perceived less stress, responded in a more realistic manner to situations, and were more effective in their business affairs than the "externals" (Anderson, 1977). The correlation between self-reported stress and a belief in external control has been found to be significant in a group of teachers (Kyriacou and Sutcliffe, 1979).

Role insecurity, too heavy a workload, or work which is too difficult in regard to the worker's abilities are work characteristics that have been found to be related to a dimension of self which has been widely studied, lowered self-esteem (Kahn et al., 1964; Kroes et al., 1974). Ego strength and a pessimistic versus optimistic life concept, measured by a self-concept test and considered as moderators of job stress, have been found to correlate with psychological and psychosomatic symptomatology and perceived general health status among seamen.

Antonovsky (1973) has introduced another potentially important concept in the study of the moderators of work stress, suggesting that the Sense of Coherence (SOC), with its three

elements, meaningfulness, manageability and comprehensibility, is the core of individual forces of resistance. The author suggests that these characteristics are not stable traits but are strongly conditioned by occupational experiences at a young age. Certain work characteristics and working conditions promote the development of these features, while others may prevent it.

4.5.3 Social support

Depending upon its source, social support can be classified as institutional or interpersonal. Institutional support comes from general social and communal systems, while interpersonal support is based on the individual's relationships. According to the theory and various empirical findings, support increases the individual's ability to cope. The feelings of attachment and security created by perceived support is one key to the feeling of mastery over situations (Thoits, 1982).

In working life, social support from supervisors, co-workers and subordinates has been found to modify the effects of work stressors on various psychophysiological and behavioural symptoms of stress. Good relations in the workplace, especially with one's subordinates, have been found to act as a buffer against the stressful effects of too heavy a quantitative workload. The effect had been seen especially in physiological stress reactions but less in measures of psychological stress responses. Similarly, social support from family members and supervisors has been found to be effective in mitigating the effects of perceived work stress on health. Support from co-workers and more distant relatives seems less effective.

In a study of men forced to change jobs, psychophysiological stress reactions were observed only in those who reported receiving low levels of support from other people in their private lives (Cobb, 1976; Gore, 1978).

The mechanism through which social support exerts its buffering effect is not known. This action may take place on at least four levels. It may reduce the objective environmental stress factors, affect only the perceived stress factors, affect the perceived stress reactions, or increase the coping resources of an individual.

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5. ASSESSMENT OF PSYCHOSOCIAL FACTORS AT WORK, AND THEIR EFFECTS

5.1 Introduction

The evaluation of psychosocial factors and their effects on the job satisfaction, performance and health of workers require a variety of measurement approaches. These approaches will produce data for defining problems, determining contributory factors and deciding upon preventive or control actions. Assessments, including the systematic monitoring of psychosocial factors at work and different ways of measuring their effect, have been made in research projects for several decades. On the other hand, routine evaluation of the psychosocial work environment and of its effect on working people is very limited. Problems are often only attended to at a very late stage, when the signs are obvious (e.g. undue absence from work, alcohol intoxication at work, or an increasing number of job complaints). This stands in contrast to the preventive approach in occupational health. The possibilities for recognising the early warning signals of responses to psychosocial problems at work are not fully exploited.

A few countries have included routine monitoring of psychosocial factors in their occupational health and labour protection practices. However, even in countries where a monitoring scheme has been adopted, it is usually narrow in scope, and designed to cover a limited number of environmental or psychosocial problems.

There are many reasons for this unsatisfactory situation, the most important of which are possibly the following: unawareness, or lack of acceptance, of psychosocial factors as risk factors in ill-health; the absence of feasible methods of assessment and monitoring, and the lack of expertise for the use of existing methods; the impracticality of many techniques of measurement; and the lack of expertise and the absence of organisational bodies for the application of psychosocial information in a preventive programme (Report of a Meeting of a Preparatory Group on Monitoring of Occupational Psychosocial Hazards and Their Effects on Health, WHO, Geneva, 2-4 November 1982).

In this chapter, methods for measuring the effects of psychosocial factors will be described, followed by those methods used to measure the factors themselves.

5.2 Measurement of job satisfaction

Job satisfaction was one of the first indicators of the reactions of workers to evoke wide interest. Since the 1930s, measurement techniques have been developed to detect the extent to which people are satisfied with their jobs. This trend has been closely connected with a sophisticated - although very diverse - theory.

A number of studies have used single questions for measuring job satisfaction, such as, "All in all, how satisfied would you say you are with your job?". This kind of global assessment of job satisfaction has been known to favour positive reactions. Indeed, irrespective of worker groups under survey, responses to such questions are positive in at least 80 per cent of the cases. This finding has led to the application of multi-item measures. Questions here may be directed to specific aspects of the job (e.g. "How satisfied are you with your pay?", etc.) or require a number of general evaluative responses (e.g. "How much do you like your job?", "Would you choose your present job again?"). The answers to several such items are combined to provide an indication of job satisfaction.

5.3 Measurement of psychological and psychosomatic symptoms

Psychological symptoms are usually investigated with questionnaires, which include multi-item composite scales formed of single items measuring the following types of symptoms: anxiety, irritability, frustration, worry, depression, absent-mindedness, inability to concentrate, difficulty in controlling aggression and other emotions. Behavioural symptoms are usually included in the same scales, covering such reactions as increased alcohol and drug consumption, absence from work, increased passivity, sleeping disorders, and so on. Mood-rating scales are applied for measurement of short-term emotional reactions, e.g. at the end of the working day.

Functional disturbances, aches and pains in organs, and organ systems which are mainly affected by autonomic and hormonal changes due to stress are included in the psychosomatic symptom scales. Typical reactions measured with these scales are the following: headache; low-back pain; pain in the neck and shoulders; vertigo; dizziness; increased perspiration; trembling of hands; pains and functional disturbances in the stomach; and palpitation of the heart.

Total symptom scores of the various dimensions measured are usually made. This approach increases the reliability of the symptom measures.

Specific questionnaires for eliciting job-related symptoms reflecting stress, strain and tension, related to the immediate work setting, have also been composed. The "Job-Related Tension" method (Kahn et al., 1964) concentrates on the

consequences of organisational stress caused by work role conflicts and work role ambiguity. Respondents are requested to indicate how frequently they feel bothered about specific features of their jobs. Subsequent field trials have indicated that the method has acceptable psychometric properties for the measurement of the reaction to the two particular stressors (Cook et al., 1981). Some other scales include items on more general reactions such as, "Most people have days when they feel tired or worn out during a good part of the day. How often does this happen to you?". Another example is the Anxiety-Stress Questionnaire which includes such statements as, "I work under a great deal of tension". One considerable problem in the application of these type of technique is whether or not they are a means of detecting work-related effects. This does not mean that the measures are not reliable instruments of mental states in general, but people may be unable fully to isolate their purely work-related experiences from other life experiences.

General symptom questionnaires comprise another set of techniques for the measurement of various types of health disorders.

The WHO's modification of the General Health Questionnaire (GHQ) originally developed by Goldberg (1972) appears to be a reliable and valid instrument for its purpose. It is insensitive to cultural differences in the expression of emotional disturbances caused by psychosocial stress. Further investigation is needed into its validity for measurement of work-related problems and its power to differentiate between work-related emotional reactions and those from other causes.

5.4 Measurement of subjective well-being

In the study of work and health, the main emphasis has been on the presence or absence of symptoms and illnesses. The WHO's definition of health as a complete state of general well-being is often cited, but not many studies on the positive aspects of health and health determinants have been made.

Variation in both the definition and measurement of mental health is common. One generally applicable classification system is the following, which includes indicators of both the positive aspects of mental health and its disturbances (Kasl, 1973). Mental health first covers the indices of functional effectiveness. The basic idea is to regard health and illness as the capacity of the person to perform in social relations and to fulfil institutionalised roles. Other characteristics of mental health are indices of well-being. This category contains the affective states (e.g. depression, resentment, anxiety) and "the various content areas of evaluation and atisfaction" (e.g. job satisfaction, life satisfaction, need satisfaction, self-esteem). The indices of mastery and competence form a third group of mental health indicators. Growth and self-actualisation, coping resources and the attainment of valued

goals are some of the functions that belong to this category. Psychiatric signs and symptoms form the fourth group of mental health indicators. Kasl considers this category as residual. It includes states which are not included in the other three categories and which have clinical significance.

The dimensions of positive mental health have not been found to correlate strongly with psychological and physiological symptoms such as anxiety, worry and dissatisfaction. They thus form a separate and somewhat independent dimension of health indicators, which is something other than just a state without illness.

The following features have been measured as indicators of positive mental health: a positive state of mind; a lack of neurotic symptoms; life satisfaction; the wish to live; and social activity. Closely related and partly overlapping indicators are used under the heading of social well-being, such as marital satisfaction, social participation and work ability.

The techniques for measuring the positive aspects of mental health have not received as stable a position in health research as the methods of illness have. Consequently, both the indicators of mental health studied and their measurements vary to a large extent.

5.5 Psychophysiological measurements and indicators

Physiological response systems that have been demonstrated as reactive to mental load and psychosocial pressures in the work environment include the following: electrical activity of the brain, the muscles, the skin, the gastrointestinal tract, the cardiovascular system, sexual activity, temperature, the pupil of the eye and the neuro-endocrine system. The most commonly applied methods are discussed here, primarily on the basis of reviews by Wilkins (1982).

5.5.1 Heart rate and sinus arrhythmia

The heart rate, which is one of the most commonly measured peripheral physiological indicators of workload and mental stress, responds to a wide range of stressors. Heart rate can be measured relatively easily and reliably by means of an electrocardiogram (ECG) when accurate data is needed. Although the usual measure is simple heart rate, the inter-beat interval may be recorded as an added indicator of acute stress. With regard to the latter, decreased variability in inter-beat intervals appears to be correlated with increased workload. This measure, referred to as sinus arrhythmia, has been suggested as one means of assessing mental workload.

While empirical results on sinus arrhythmia are accumulating, more consistency needs to be established,

especially in defining the baselines and significant changes in variability. One of the supposed advantages of this measure is that it is sensitive only to mental workload, as opposed to physical energy expenditure, and thus can be more reflective of psychosocial effects.

With respect to invasiveness and cost, the measurement of sinus arrhythmia is relatively undemanding since the data necessary for computing sinus arrhythmia can be recorded as easily as ECG or heart rate.

5.5.2 Blood pressure

Blood pressure has proven to be a common and effective indicator of stress as related to psychosocial or other factors. The physiological theory that relates blood-pressure changes to the secretion of pituitary and adrenal hormones during stress gives this measure conceptual validity. This measure is also of interest because of its known consequences for long-term health. A considerable amount of empirical data has been accumulated concerning the effects of stress on the blood pressure, and the general result is elevated blood pressure due to a variety of stressors. However, under conditions of very severe stress associated with shock, blood pressure generally declines. Blood pressure is well standardised in terms of its expected baseline values. It is not known, however, how small increases in blood pressure over a long time period affect health.

A variety of measures are available for reliable measurement of blood pressure in standardised conditions. A single blood-pressure measurement can be made quite easily and practically.

Techniques available for continuous recording of the blood pressure are relatively non-invasive. Vasomotor activity can be measured from the fingers or other peripheral areas for the detection of changes in the blood pressure as a response to variation of mental load at work.

5.5.3 Adrenal hormones

More than 50 years have elapsed since the publication of the first results about the activation of the adrenal medulla and the adrenal cortex in situations of stress. A number of studies have been published since then on various biochemical indicators of stress, carried out on animals in laboratories and on humans in various life conditions. A large number of important questions have appeared during this period and have led to the creation of accurate and highly sensitive methods for determination of the biochemical indicators of stress in tissues and body fluids: from spectrophotometric, fluorometric and chromatographic to radio-isotopic and radio-enzymatic methods.

As a result of the application of fluorescent and immunologic techniques, the determination of the noradrenergic, dopaminergic and adrenergic brain functions has become possible.

Recent progress in neurobiology is based on the discovery of many other transmitters, i.e. amino-acids and neuropeptides, which also play a role in stress reaction.

Urine and blood for hormonal analyses are often collected in short time periods and at varying hours of the day, as a current procedure in occupational stress research. The interpretation of such tests requires an understanding of the normal diurnal variation in the hormonal excretion.

A study of the parameters of the circadian rhythm and the degree of influence of external factors over them provides the opportunity to evaluate the degree of stress in different situations, both in simulated laboratory conditions and in the real-life work environment.

In spite of a certain homogeneity in the excretion of neurohormones in population samples, individuals may differ considerably in their response pattern. There are also differences between women and men and between different age groups.

5.5.4 Galvanic skin response (GSR)

GSR is a widely applied instrument especially in experimental research. The correlation of changes in the electrical conductivity of the skin to the level of stress is not fully explained, although there is good empirical support for the validity of GSR as an indicator of stress, with GSR generally decreasing under increasing stress.

GSR can be measured accurately, but not without artefacts. In particular, increased palmar sweating may reflect specific stressor effects as well as the stress response itself. Heat as a stressor is an example of a case where a direct stressor effect, rather than the stress response, will most likely be measured. It has been suggested that tissue conductivity may reflect stressor-specific cognitive activity rather than the general stress response. Individual differences can be quite large. No definite baselines are available for this measure, although broad ranges can be specified for expected values of GSR. The baseline value determined for GSR can depend strongly on the distance between measuring electrodes. Thus, changes in GSR within an individual are more significant and reliable measures. The appearance of some change in GSR in response to a stressor is usually reliable, but the magnitude of the change is less consistent. GSR decreases in response to a wide variety of stressors including heat, pain, cold, anxiety caused by the anticipation of painful stimuli, antagonistic interviews and others. GSR can be measured easily and unobtrusively. Its application is limited to the immediate, short-term effects of stress.

5.5.5 Critical flicker frequency (CFF)

As the frequency of a flickering light source is increased, there comes a point when the observer can no longer perceive the fluctuations. The perceived light becomes "fused" into a continuous steady one. The frequency at which the light just appears continuous is called the critical flicker frequency.

Important factors causing variation in an individual's critical flicker threshold value are attentiveness, arousal and fatigue (Oshima, 1981; Payne, 1982). While CFF has been applied in the study of fatigue and vigilance in industry, there remains much controversy about the method as a valid measurement of such states.

Flicker fusion tests are easy to administer and the procedure is non-invasive. The principal measurement problems in the industrial setting are the need for control of many kinds of outside influences and the variations caused by the absence of standardised equipment used for such purposes.

5.5.6 Electroencephalography (EEG)

The connection between EEG and stress has not been widely demonstrated in empirical investigations, but the application of certain stressors has been shown to result in alpha blockage. At this stage, EEG can most reliably be used as an indicator of arousal. Thus, it may also serve as an indicator of mental workload.

5.5.7 Gastrointestinal functions

Gastrointestinal activity is rarely measured in a real-life work situation, but it may have some research possibilities with regard to inferences about stress and ulcer development. The electrogastrogram (EGG) is relatively difficult to obtain, and considerable sophistication of measurement is needed for a reliable recording.

5.5.8 General appraisal

While physiological indicators offer objective indications of health-related reactions, their usefulness is hampered by practical difficulties in obtaining such measurements. Instrumentation developments, accenting miniaturisation, are now in evidence and may ease the apparent difficulties. Moreover, advances in computerised analysis have made the collection and the interpretation of data quicker and less expensive. Some simple paper and pencil measures may, however, sometimes be sufficient or at least give parallel information on the psychophysiological changes.

5.6 Assessing work characteristics

The influence of psychosocial factors at work on workers' job satisfaction, performance and health depends on a systematic determination of the relevant work characteristics and the employment conditions.

For gathering data on the work characteristics when considering these as possible, problematic or positive factors, two basic types of methods are usually applied:

- (a) job analysis with direct observation, measurements, statistics and theoretical approaches;
- (b) obtaining worker perceptions of the work and work conditions through questionnaires and interviews.

Considerable controversy exists over the priority of either of these approaches. Both methods have their own merits and weaknesses. With job analysis, information about work conditions can be obtained in an objective manner. Questionnaires give information about the worker's perceptions of the job conditions. These perceptions may not be an accurate reflection of the objective environment. For this reason some feel that the perceived aspects of the work environment should receive primary attention. Since improvements for prevention of psychosocial hazards are carried out in the objective environment, they cannot be tailored to each individual. Thus, "objective" information is needed. This dilemma cannot be fully solved, only compromised. The use of both methods concurrently seems to be the best way of dealing with this problem.

Questionnaire techniques

In the study of psychosocial factors in the work environment, the questionnaire approach is most frequently applied. A critical issue in the use of the questionnaires is the risk that the acquired information on job characteristics is influenced by the worker's reactions, such as an inability to separate job factors of concern from one's experience. This looms as a potential methodological artefact, in addition to other concerns such as response sets, social desirability, tendencies, and so on. Although these risks remain to a certain extent in any study using a questionnaire, these problems are partially due to weaknesses in the construction of the method.

A properly planned and administered questionnaire which has a sound theoretical basis is a quick and economical tool, especially in the study of large population groups and surveys of various workplaces. In addition, a questionnaire offers the possibility of gathering data about the workers' expectations regarding their work conditions. This approach is especially relevant in the light of the research based on the "person-environment fit approach".

In planning a questionnaire, the following criteria have to be considered:

- the questionnaire is applied to clarify certain limited problems;
- the questionnaire is constructed on the basis of theoretical views on the job dimensions to be measured;
- the reliability and validity of the method are examined.

Björkman et al. (1981) thoroughly analysed the problems involved in the application of questionnaires in the study of psychosocial factors at work. They proposed a continuum starting with exact facts and completing with items concerning personal experiences. The reliability of the data is determined by the position of the items on the continuum. The items concerning exact facts produce more reliable information than personal experiences. This indicates that descriptive work assessment is more reliable than evaluative assessment.

Highlights of a few well-known questionnaires for the assessment of work characteristics are noted below. Further information is available in a review by Cook et al. (1981).

The Job Diagnostic Survey (JDS) developed by Hackman and his associates (Hackman and Lawler, 1971; Hackman and Oldham, 1975) is perhaps the most widely applied questionnaire for the assessment of work characteristics. The method aims to gather information on work characteristics, the factors affecting the perception of work characteristics and the reactions to them, as schematically presented in table 1 (Hackman and Lawler, 1971).

One of the main advantages of this method is that only 15 items are needed for job description. On the other hand, it is criticised for its incompleteness, as it lacks items concerning salary, job security, social status, and so on. The original dimensions were not identically replicated in later investigations. The method is possibly applicable with only certain groups of workers, i.e. those having a high aspiration level. Another reason for the inconsistency is the relatively complicated format for response. Problems may result from workers not having information or opinions about all the matters under question. Also, the questionnaire may not be assessing what the respondents feel are important to them. Improvements in this area have been developed by Cooper et al. (1980) using the Repertory Grid technique. This technique enables the researcher to generate questionnaire items from the workers themselves, and weights the items on the basis of their importance to the particular subject group.

On the basis of the Job Diagnostic Study (JDS), a method called the Job Characteristics Index (JCI) was developed by Sims et al. in 1976. In order to increase the reliability, additional scales were included in this method. The method includes 30 items on factors such as: skill, variety, autonomy, feedback from job, interaction with co-workers, task identity and friendships. In later analyses, the convergence and discrimination validity were shown to be sufficient for various worker samples.

Table 1: The job characteristics model

Core job dimensions	Critical psychological states	Personal and work outcomes
Skill variety Task identity Task and significance	Experienced meaningfulness of the work	High internal work motivation
Autonomy	Experienced responsibility for outcomes of the work	High quality work performance High satisfaction with the work
Feedback	Knowledge of the actual results of the work activities	Low absenteeism and labour turnover

Source: Hackman and Lawler, 1971.

Another method called the Perceived Work Environment (PWE), is based on a field theoretical framework (Newman, 1977). The hypothesis is made that a person's assessment of his or her work characteristics is determined by individual characteristics and the person's position in the organisation. The method intends, however, to gain assessments which are not evaluative but descriptive. The starting-point was not to use individual needs or any other person-related factors as a basis but to cover all parameters of work as comprehensively as possible.

The method includes the following dimensions:

- supervisory style;
- task characteristics;
- performance-rewarded relationships;
- co-worker relations;
- employee work motivation;
- equipment, and arrangement of people and equipment;
- employee competence;
- decision-making policy;
- work space;
- pressure to produce;
- job responsibility and importance.

PWE is a relatively new method, and the only available data on its psychometric properties are those collected in developing the technique. They indicated that the scales have relatively high reliability and could be replicated in various samples.

Empirical studies have identified several aspects of working conditions that can have deleterious effects on workers' mental and physical well-being. Research results include a number of inconsistencies which must be partly due to the lack of standard measures of work parameters.

The number of questionnaire techniques applied in various research institutes and by various teams is almost infinite. The stress theoretical framework has been applied repeatedly since the 1970s, when the study of psychosocial hazards and related health disorders spread widely.

Only a few examples of the published methods in this field are described briefly here. In a study in the United States on 23 occupations by Caplan et al. (1975), a method that includes the following 11 scales (each including several items) was applied:

- quantitative workload;
- variance in workload;
- responsibility for persons;
- job complexity;
- demands for concentration;
- role conflicts;
- job future ambiguity;
- underutilisation of abilities;
- inequality of pay;
- participation in decision-making.

Billings and Moos (1982) proposed a method called the Work Environment Scale, which includes the following dimensions of the work setting:

- (a) relationship dimensions:
 - involvement;
 - supervisory support;
- (b) personal growth or goal-orientation dimensions:
 - autonomy;
- (c) task orientation:
 - work pressure;
- (d) system maintenance and change dimensions:
 - clarity;
 - control;
 - innovation;
 - physical comfort;

The reliabilities of the scales ranged from 0.75 to 0.85.

The validity of the scales was not estimated.

A corresponding method has been developed as a joint effort by technical colleagues in Zurich and Berlin (Frese et al., 1981; Semmer, 1982). The method includes 12 scales.

Semmer investigated the correlations between the assessments of the workers themselves and trained observers. These correlations were relatively low in most scales (range from 0.30 to 0.40). However, scales dealing with the work content were assessed relatively consistently by the workers and the observers (range of correlations from 0.50 to 0.67). These data indicate

that the assessment of working conditions by the workers in question and by the external observers are partly based on different criteria.

In the Institute of Occupational Health, Helsinki, Finland, the process of developing a questionnaire for gathering data on work characteristics has been under way since the early 1970s. The method is based on field trials and statistical analyses of the scales applied on a number of worker populations. This method is a basic instrument in field surveys and the intention is that it should be generally applicable. It is complemented with specific supplements in each particular field of work. The method includes the following sub-scales:

- background: professional and other;
- job content;
- autonomy, freedom;
- participation in decision-making;
- responsibility for security;
- responsibility for material values;
- workload distribution, overtime;
- qualitative overload;
- quantitative overload;
- clarity of work role;
- feedback from work;
- supervision;
- contacts;
- isolation, solitary work;
- appreciation.

5.7 Observation methods

Direct observation of working conditions is an alternative or additional method for gathering data on psychosocial factors at work. Two main approaches are applied. The evaluative approach includes in the assessment the influence of the work characteristics on the worker. In the descriptive assessment, the work characteristics are merely recorded according to certain criteria. These results are evaluated later from the point of view of their possible effect on the worker.

In general, the application of rating methods for gathering data on stressors and mental load factors can only be reliably performed by experienced raters. The rater can seldom possess all the knowledge and expertise required in all circumstances. Therefore opinions and preferences of the rater tend to affect the ratings.

A number of methods have been developed for the assessment of work characteristics for research purposes. The methods are usually not standardised and many research units, even companies, develop their own techniques.

Only a few methods developed for practical application by non-specialists have been reported. In a study on working

conditions in Swedish sawmills, a method consisting of eight items was applied (Ager et al., 1975).

A corresponding method was developed in the German Democratic Republic by the Zentralinstitut für Arbeitsmedizin (1976) for the use of occupational health professionals and labour protection officials. The basic screening version of the method includes nine items.

In France a method has been developed for the estimation of work characteristics in the car industry (Les profils de postes, 1976). A large proportion of the items deal with psychosocial issues.

The American PAQ (Position Analysis Questionnaire) (McCormick et al., 1976) includes 194 items which refer to work processes, work situations and salaries. The authors consider it a worker-oriented method as it describes the working conditions from the worker's point of view although applied by an observer. The information gathered by the PAQ method can be classified into six main groups: availability of information; mental functions (thinking, decision-making); work output; relations with other people at work; job context and work environment; and other work characteristics.

PAQ has been used as a basis of several other methods. In the Federal Republic of Germany, a method called AET (Arbeitsanalytische Erhebungs verfahren zur Tätigkeitsanalyse) is an example of methods applicable for many purposes. This method includes 216 items, some of which cover psychosocial issues. Another comprehensive technique for job description developed in the Federal Republic of Germany is based on the principles of the PAQ technique, i.e. FAA (Fragebogen zur Arbeitsanalyse) (Friedling, 1974; Friedling and Hoyos, 1978).

In countries where occupational health services are participating in the control of psychosocial factors at the workplace and where systematic inspections of health risks are carried out there, the need for simple techniques applicable to the survey of psychosocial factors has recently arisen. The need for methods to be applied in gathering information for the practical purpose of occupational health care and ergonomic surveys is certain to increase rapidly world-wide.

In table 2 a summary is presented of such job description techniques which are applicable in workplace inspection by occupational health personnel and non-specialists in general. The criteria for the selection of methods for this presentation included the complexity of the methods relative to non-specialist users, and sufficient coverage of the stressors (Elo and Vehviläinen, 1983). Since only the main dimensions covered by the methods can be highlighted here, full credit cannot be given to the various important details involved. Obviously, a number of methods have been developed for internal application by various companies and services. An example of a method applied by a large paper company and another applied by the occupational health centres of a commune in Finland are given in the table. Some of the methods presented also cover hygienic factors and

Table 2: Psychosocial factors in the work environment

Known harmful indicators	Current methodology	Needs for development
<p>Stressors in work content, work organisation, management and leadership, organisational roles, human relations, career development, physical work environment, and work/leisure interface</p>	<p><u>"Objective" methods</u></p> <p>Job description and job analysis. Several methods are in use in various countries, many of which go into great detail. Many of the methods can be used only by specialists. Currently available methods are suitable almost solely for analysis of concrete work</p>	<p>Development of criteria for sampling of work units for description</p> <p>Standardisation of existing methods. Development of methods for description of abstract work. Development of quick screening check-lists for non-specialist (e.g. general health personnel) use. Development of norms, whenever feasible</p>
<p>Examples:</p> <ul style="list-style-type: none"> - repetitive, fragmentary work content, i.e. qualitative underload - too high a demand, i.e. qualitative overload - too much to do and time pressure, i.e. quantitative overload - too little to do, i.e. quantitative underload - lack of control over the work situation, e.g. machine pacing - high responsibility, especially for people - lack of possibility for decision-making - role ambiguity and role conflict - inadequate management; bureaucracy - poor person-to-person relationships - rotating work-shifts - lack of advancement and other career problems - lack of job security - physical and chemical hazards 	<p><u>Subjective methods</u></p> <p>Questionnaires, check-lists. A large number and variety have been developed. They are often made for individual studies</p> <p>Theoretical sophistication and technical outlook vary strongly. Some methods are, however, theoretically well based and include reliable and valid scales</p>	<p>Study of validity and reliability, for example by comparison with "objective" job analysis</p> <p>Cross-occupational and cross-cultural standardisation</p> <p>Development of short scales</p>

other aspects of working conditions, and deal only partly with psychosocial issues. The information given here is based only on these relevant parts. Such comprehensive methods are "Les profils de postes" from France, the method from the German Democratic Republic, and the method given as an example of an instrument developed by a large company.

Factors such as work areas, machines and equipment, leadership, working hours, salary and other conditions of employment are included in the methods to a varying extent. Some of these factors are included in each method, and thus the techniques give information on a greater number of factors than the task itself and the immediate working environment. The instructions for the application of the methods and the way they can be used vary considerably. For instance, the use of the "profils de postes" method must be preceded by a training period of at least one week. The applicants of the method developed by Elo (Elo and Vehviläinen, 1983) were trained only in a two-and-a-half-hour session. A number of the users had, however, received previous training in psychosocial problems.

One of the rare investigations on the reliability and validity of an observation method constructed for the assessment of stress-producing psychosocial factors at the workplace was carried out by Elo and Vehviläinen (1983). For this reason, the method is described here in more detail. This checklist observation method is designed for use by occupational health personnel. The method includes 12 stress factors:

- responsibility for safety;
- responsibility for other people;
- responsibility for material values;
- solitary work;
- burdensome contacts;
- repetitiveness;
- forced pace;
- structural restraints;
- demands for attentiveness combined with few stimuli;
- demands for precise discriminations;
- haste;
- demands for complex decision-making.

Each factor is given a definition that is illustrated by pictures from workplaces in the user's manual. Two different scales can be applied, one dichotomous and the other a four-class scale. Recognition of physical, chemical and other potential stress factors is also emphasised. The assessment of overall job stress is requested on a three-class scale. The collection of data is based on observation of the work and supplemented by interviews of the supervisors and workers.

A study for testing the method was carried out in four plants in the paper, electronics and metal industries. The assessment was done for 50 jobs. The stress factors were assessed independently by the occupational health nurse and the occupational safety delegate of the plant in question, by the supervisor of the particular worksite, and by two

psychologists. The workers filled out a questionnaire about stress factors and stress experienced.

A number of statistical indices of congruence were used to demonstrate the agreement between various assessors (Pearson's product moment correlation, Kendall's coefficient of concordance, and Kappa). The methods of multitrait-multimethod matrix and factor analysis were used to investigate the clarity of the concepts. Regression analysis was used to evaluate the conceptual contents of "the overall assessment of mental load" and "the psychic strain" experienced by the workers.

Sufficient agreement was reached between all the assessors on most of the factors. The assessments of the two psychologists correlated with one another somewhat better than the opinions of all the assessors.

The best agreement between all the assessors was attained for the following factors: solitary work; demands for attentiveness combined with few stimuli; responsibility for safety; repetitiveness; responsibility for material values; and structural restraints. Forced pace proved to be the most difficult factor to assess. Between the psychologists there was a high degree of agreement also with regard to demands for complex decision-making, burdensome contacts, and haste.

A discrepancy was noted between the workers' own estimation of overall psychic strain ("Does your work cause psychic strain?") and the psychologists' overall assessments. The psychologists based their assessment primarily on underload (e.g. repetitiveness, lack of variation in tasks), whereas the workers based their responses on overload (e.g. experienced difficulty, haste). The workers' approach reveals the popular view that job stress is a situation in which there is too much work or work which is difficult to do.

The workers' questionnaire responses on other stress factors was highly correlated with the psychologists' assessments. The highest correlations were found on solitary work and responsibility for safety.

During this study each assessor evaluated the stress factors of jobs independently. In occupational health practice, the assessment of work conditions is usually done in groups and it is thus possible to discuss the results. It was demonstrated that the results of this method improve if group discussions form part of the assessment process.

The authors concluded that the method is reliable and valid for the assessment of stress factors at work by occupational health personnel. Instruction in its application, and the proper use of the illustrated manual are, however, crucial.

5.8 Assessing factors related to vulnerability

5.8.1 Measurement of personality characteristics

The measurement of such personality characteristics as mastery, self-confidence, locus of control, and competence, which are expected to be more modifiable than many of the personality traits, is of primary interest in the occupational health field and with regard to consensus on psychosocial factors at work. For the understanding of the psychological processes in the work-stress relationship, a selective monitoring of defences can also be considered feasible.

Stress-prone behavioural patterns are increasingly studied as indicators of individual susceptibility to various health problems. The type A behaviour which is characterised by extreme competitiveness, striving for achievement, impatience, haste, explosiveness of speech, and feelings of being under constant time pressure was shown to be related to coronary heart disease. Individuals were designated as type A or the opposite, type B, on the basis of clinical judgements. Type A behaviour and its relation to coronary heart disease has been demonstrated primarily in Western industrialised countries. Its applicability to other types of cultures is not yet confirmed.

5.8.2 Measurement of coping

Coping is defined as the cognitive and behavioural efforts made to master, tolerate and reduce problem situations and their emotional impact. The purpose of coping is twofold: to manage or alter problem situations and to control related emotions. Empirical investigation on the relationship of coping ability and styles to health is diverse and has mostly concentrated on critical health conditions.

For the measurement of coping a technique called "Ways of Coping" was developed. It is made in check-list form with "yes/no" alternatives for the response. Two main scales have been developed for the measurement of coping, i.e. a problem-focused P-scale with 24 items, and an emotion-focused E-scale with 40 items.

The items on the "Ways of Coping" check-list describe a broad range of behavioural and cognitive strategies an individual might use in a specific stressful episode. They include items from the domains of defensive coping (avoidance, intellectualisation, suppression), information seeking, problem-solving, palliation, inhibition of action, direct action and imaginative thinking.

More than 1,000 coping episodes were analysed. The "Ways of Coping" checklist of 68 items covers a range of cognitive and behavioural strategies. The dichotomous items are classified in two categories: problem-focused and emotion-focused items.

According to currently published data, the internal consistency of the scales is high.

The coping strategies of people varied according to the context of the problem (e.g. family, work) and the way it was appraised by the individual. No association was found with age, and the association with gender was only partial.

The ability to cope (measured with a different scale) was related to socio-economic status and education. Those higher in these respects were most able to cope while those with lower socio-economic status and with less education reported more stressful experiences.

Burke et al. (1979) have reported a technique that includes the following dimensions: distraction and suppression; alcohol and drug use; talking with others; withdrawal/escape; prayer or meditation; and active problem solving.

Coping processes are an important subject for study in prevention-oriented projects. They are, to a large extent, learned and modifiable, which gives an opportunity for constructive prevention actions in such situations where environmental changes cannot be implemented or their results take a long time to become effective on an individual level.

5.8.3 Measurement of social support

Concepts of social support vary to a great extent, as do methods for measuring it. Social support has been measured with a multitude of indicators and techniques ranging from single questions to inventories that include a number of multi-item scales. This diversity indicates that data on social support derived from various reports must be interpreted with great caution and must be seen as specific to the particular method used.

One of the best documented social support inventories is developed by McFarlane et al. (1981). This is a questionnaire method that has been applied as part of a home interview. The individual being interviewed is first presented with the following categories of potential areas of life stress: work; money and finances; personal health; and issues that relate to society in general. The questionnaire requests the subjects to list those persons (initials only), noting also the type of relationship (co-worker, relative, etc.) with whom they have had discussions concerning each of the above problem areas. Subjects are asked to rate the helpfulness of the discussions they had with each person mentioned. For clarification of the reciprocity of the relationship, the subject is asked to identify those individuals who contact him or her for similar discussions. As a second measure, the subjects are requested to mention the key persons to whom they would turn for support in times of severe stress. They are also asked if these relations are reciprocal.

The authors report a number of scale statistics based on a field trial of the interview. The validity and the test or

re-test reliability of the method indicate that it can be regarded as an appropriate instrument for measuring social support based on interpersonal relations.

5.9 Occupational safety and health data collection

In the discussions of measurement procedures that have taken place so far, attempts have been made to find methods of data collection which are more closely related to occupational safety and health practice. These include assessment of workplace conditions with regard to health and surveillance of the health of workers. General procedures for undertaking environmental surveys to detect and measure chemical or physical hazards at the jobsite have been prescribed, as have those for monitoring specific agents of concern. A WHO report, Environmental and health monitoring in occupational health (Geneva, Technical Report Series No. 535, 1973), describes such procedures. In addition, while basic health data and routine clinical examination are used to establish the general status of health, further diagnostic procedures are indicated where certain hazards are suspected to exist. Industrial health guide-lines are available to rate chemical or physical agents in terms of hazard risk, e.g. the Threshold Limit Values (1983) adopted by the American Conference of Governmental Industrial Hygienists (ACGIH), and assorted standards of the International Organisation for Standardisation (ISO). Observations which indicate workplace conditions exceeding limits of exposure to harmful agents dictate actions apart from, or in addition to, those related to psychosocial considerations.

With regard to the health data, indications of hypertension, myocardial infarction, peptic ulcer and neurotic signs should be closely examined with respect to psychosocial problems that could be connected with work experience. Excessive morbidity of this nature among the same work group would be a particularly clear indication that the conditions of work should be investigated, by means of some of the techniques described earlier. National statistics on morbidity and mortality as related to occupational factors are available in some countries. The nature of the medical problem could indicate where investigations should be made into psychosocial factors, their aetiology and their prevention.

Still other forms of data collection, indicative of psychosocial factors at work, may be found in measurements of workers' absenteeism, accidents and turnover. Records of this nature, as collected and available, could be examined to isolate groups of workers and job types in which occurrences are disproportionately high. This too would suggest follow-up investigations of the jobs with reference to psychosocial as well as other considerations.

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6. SYNOPSIS OF PSYCHOSOCIAL FACTORS: INDICATORS, METHODS AND TARGETS FOR DEVELOPMENT

The findings on psychosocial factors at work, their effect on health and methodologies for measuring both factors and effects have been described in Chapters 2, 3 and 4. Tables 2 to 8 in this chapter summarise the main points and indicate apparent gaps and needs.

In this regard table 2 provides examples of known indicators, current methods and needs for development in dealing with psychosocial factors at work. Tables 3 to 8 give applicable indicators, current methods and needs for development in assessing different aspects of the effects of these factors. These tables also describe problems related to the use of available methods.

As these tables show, it is essential to develop methods which are more comprehensive and valid for assessing the effects of psychosocial factors at work. It is also important to establish the relationships between the various indicators and the methods currently in use. The tables may be used as reference material in furthering the development of applicable methods.

Table 3: Psychological responses to psychosocial factors

Known indicators	Current methodology	Needs for development
<p><u>Cognitive functions</u></p> <ul style="list-style-type: none"> - restriction of scope of perception - lowered ability to concentrate - disturbed memory functions - hesitation in decision-making - change in content of thinking - lowered creativity 	<p>The large number of existing texts of cognitive functions have not been much applied in stress research. They are mostly used in determination of the effects of acute stress, especially in laboratory conditions</p> <p>Questionnaires, applied, have only a limited coverage</p>	<p>Test for validity of existing methods to determine the effects of both short-term and long-term stress at work</p> <p>Increase coverage and validity</p>
<p><u>Emotional reactions</u></p> <ul style="list-style-type: none"> - feelings of deprivation, boredom, guilt, pressure, anxiety, tension, irritation, worry, sadness, pessimism, hopeless view of future events - apathy 	<p><u>Short-term effects</u></p> <p>Self-rated mood scales are in use for determination of the effects of acute stress. Data are usually combined with physiological measurement</p> <p><u>Long-term effects</u></p> <p>A large number of questionnaires are in use. Some are theoretically well based. There is great variation in technical outlook. Many versions are developed for individual studies. Comparison of data is difficult</p>	<p>Define correlations with concurrent physiological indicators. Increase reliability of repeated tests during one working day. Control the effect of response tendencies. Recognise ecological features. Develop simple measurements</p> <p>Standardisation of content and form. Theoretical clarification of differentiation between stress reactions and personality characteristics, i.e. state versus trait symptoms. Improving documentation.</p>
<p><u>Self-image</u></p> <p>Lowered self-confidence, increased discrepancy between ideal and perceived self-image</p>	<p>Questionnaires and psychological tests are available</p>	<p>Decrease the effect of response tendencies, i.e. increase validity</p>

Known indicators	Current methodology	Needs for development
<p>Biochemical changes in:</p> <ul style="list-style-type: none"> - neuroendocrinological function (excretion of hormones) - immunological mechanisms - blood lipids and carbohydrates - excretion alimentary acids <p>Altered activity in following organs or systems:</p> <ul style="list-style-type: none"> - brain, its electrical activity (EEG) - muscles (EMG) - skin, electrodermal functions (GSR) - gastrointestinal tract (electro-gastrogram) - cardiovascular system (heart rate and other indices of ECG, vasomotor activity, blood pressure) - sexual functions - pupil of the eye (pupillometrics) - posture - vision 	<p>Definition of hormones and other biological components in blood and urine samples and measurement of electro-physiological functions are in an state of measurement advanced</p> <p>Some indicators are highly sensitive. All indicators are unspecific and thus difficult to interpret. For this reason they must often be combined with psychological measurements and analysis of work stressors</p> <p>Methodology has been complicated, but technology is continuously simplified</p> <p>Continuous monitoring of some indicators is already done with a combination of measurements both in laboratory and real-life settings</p>	<p>Increase of specificity of indicators</p> <p>Increase of practicality of measuring instruments</p> <p>Decrease of the effect of measuring on the reaction to be measured</p> <p>Test of feasibility of methods in routine versus specialised measurement</p> <p>Test of specific feasibility of methods in various types of work</p> <p>Development of computer-controlled monitoring of various indicators at the same time during work activity</p> <p>Development of simultaneous monitoring of psychological and physiological indicators</p> <p>Clarification of patterns of anabolic and catabolic hormone excretion</p> <p>Test of correlations between excretion of catecholamines, cortisol and corticosteroid metabolites</p> <p>Development of indicators of recovery from acute stress, of the accumulation of disorders, and of the pathogenic mechanisms</p>

Known indicators	Current methodology	Needs for development
General:		
- excessive use of coffee, nicotine, alcohol and medicines (especially tranquilisers and stimulants)	Partially and unsystematically covered in questionnaires	Development of indicators. Increase of validity is essential
- change in eating habits	Statistics are sometimes used, but comparison is difficult because of differences in criteria	Standardisation of statistics
- disturbed sleep	Indicators are highly unspecific	
- neglect of physical exercise		
- lowered social participation and activeness		
- assuming sick role, increased use of or neglect of health services		
- change in general life-style		
- acting out, anti-social behaviour		
- disruption of interpersonal ties and sexual relationships		
- suicide		
Work:		
- absence from work and postponement of duties	Statistics used on absence and accidents are unsystematic	Standardisation of statistics
- lowered work performance, both qualitatively and quantitatively	Performance is measured mainly in laboratory conditions. In field work, performance is measured mainly in concrete, simple work. Sampling is a problem	Development of sampling criteria for performance measurements
- increased number of accidents		Development of methods for evaluation of performance in non-concrete work
- interpersonal conflicts		
- risk-taking behaviour		

Table 5: Behavioural responses to psychosocial factors

Table 6: Perceived symptoms and health disorders

Known indicators	Current methodology	Needs for development
<u>Physical functional disorders:</u>		
- muscular tension and pain, e.g. headache and low back pain	Questionnaires, with great variety of background and of form, are used	Development of validity of indicators, especially in specific field of occupa- tional stress
- vertigo, dizziness	Clinical examination	
- dysfunction of stomach and other alimentary tract		
- cardiovascular symptoms, e.g. palpitation, pain respiratory symptoms, difficulty in breath- ing and "getting air"		
<u>Psychological borderline states:</u>		
- inclination to depression and to other reactive neuroses	Clinical examination Questionnaires	
- mental and somatic disease	Statistics	

Table 7: Indicators of well-being and "positive health"

Known indicators	Current methodology	Needs for development
Field is extremely undeveloped	Questionnaires, scanty single items are in use	Development of indicators
	Unsystematic clinical interviews	Development of methods for determination

Known indicators	Current methodology	Needs for development
<p><u>Psychological:</u></p> <ul style="list-style-type: none"> - resourcefulness and creativity - problem-solving ability - ego-strength - flexibility - social skills - level of self-esteem - introversion/extroversion - positive/negative attitude towards future events - ego defences - internal/external control 	<p>A large number of test batteries and questionnaires are available with known psychometric qualities for various population groups. Their application in stress research has, however, not proved very successful</p>	<p>Development of indicators and increasing specificity; minimisation of contamination with outcomes of stress</p> <p>Development of new methods to determine individual cognitive appraisal of environment and oneself</p> <p>Development of indicators of resources to be enhanced, e.g. with education and training</p> <p>Increase of validity of measurement</p> <p>Standardisation of techniques</p>
<p><u>Interpersonal:</u></p> <ul style="list-style-type: none"> - primary relationships - network of social supports 	<p>Questionnaires with great variation in individual items</p>	<p>Development of indicators, increasing validity for occupational stress research</p>
<p><u>Biological:</u></p> <ul style="list-style-type: none"> - age and gender - physical strength 	<p>Questionnaires Sometimes physical examination</p>	<p>Development of valid and simple-to-measure indicators and simple techniques for determination</p>
<p><u>Behavioural:</u></p> <ul style="list-style-type: none"> - behavioural habits (e.g. type A/B behavioural pattern) - lifestyle (e.g. eating, exercise and cultural activities). 	<p>Questionnaires Observation Statistics</p>	<p>Development of valid indicators of behaviour and life-style with consideration of their determinants</p> <p>Increase of reliability of measurement</p>

7. ACTION AT THE ESTABLISHMENT LEVEL

7.1 Problem recognition

Corrective or constructive action at a workplace presupposes that information is available on the need for such action. The complex nature of considering psychosocial factors at work, health and other outcomes suggests that data collection must include a variety of indicators. The material contained in the preceding chapters suggests numerous methods. Each method by itself, however, provides only a part of all the information that is required. An aggregate method, covering the essential data needs and forms of data collection that could offer a basis for gauging psychosocial work factors and relevant health consequences, is proposed here. Considerations weighed in selecting the particular measures and methods include the following:

- (a) the collective methods and measurements should acknowledge major types of health disturbances - emotional, behavioural and physiological - the job/environmental/organisational correlates and individual/mediating factors deemed most critical, as based on available data;
- (b) wherever possible, the methods and measures should demonstrate good reliability and reasonable validity;
- (c) the methods should be simple to administer by a health practitioner or other data collector;
- (d) the means of data collection should be inexpensive;
- (e) the methods and measures should be suitable for both developed and developing countries;
- (f) the methods are well known and/or could be made broadly available.

Table 9 gives suggested methods of data collection, and shows factors to be investigated and the means of data collection envisaged. Although most of the table is self-explanatory a few further comments are necessary. Self-reports and observations made by others are required for the determination of certain factors. A person's perception of the work situation can condition outcomes irrespective of more objective views. There are numerous questionnaire methods and scales for tapping the worker's reaction to relevant job/environmental/organisational variables. Most importantly, it is recommended that items designed to disclose information about the listed factors should be incorporated in any questionnaire that is used. It may not yet be possible to achieve uniformity and agreement in questionnaire methods, given cultural differences and other issues. Indeed, questionnaires may require tailoring in the

Table 9: Data collection for assessing psychosocial factors at work and health outcomes

Health disturbance	Nature of measure/Measurement method
A. Emotional/ Behavioural	<p><u>Self-report</u></p> <ul style="list-style-type: none"> . Use of shortened version of General Health Questionnaire (GHQ) to note: <ul style="list-style-type: none"> - sleeping problems - tenseness/anxiousness - depression - undue fatigue - inability to concentrate - aches and pains - headaches . Additional items to tap: <ul style="list-style-type: none"> - job satisfaction - alcohol consumption - amount of smoking - drug abuse <p><u>Reports from other sources</u></p> <ul style="list-style-type: none"> . Absenteeism (work records) . Accidents (accident reports) . Turnover (personnel reports)
B. Disease	<p><u>Reports from other sources</u></p> <ul style="list-style-type: none"> . Hypertension, myocardial infarction, peptic ulcer, neurotic indicators as determined from medical records and/or clinical examinations performed as part of primary health care practices

Workplace correlates/ Determinants	Nature of measure/Measurement method
A. Job/Environment	<p><u>Self-report</u></p> <p>Use of questionnaire to tap the following:</p> <ul style="list-style-type: none"> . Job control . Importance of job performed . Co-worker/supervisor relations

Table 9 (contd.)

<u>Workplace correlates/ Determinants</u>	<u>Nature of measure/Measurement method</u>
-----------------------------------------------	---------------------------------------------

- . Production/workload pressures
- . Perception of workplace hygiene

Adaptation of existing questionnaires used to gather such information. Examples include: Work Environment Scale. Perceived Work Environment Measures.

Reports/observations from other sources

Use of check-lists to rate task characteristics, including:

- . Repetitiveness
- . Forced pace
- . Isolation
- . Need for sustained attention (vigilance)
- . Demands for precision
- . Haste
- . Consequences of error

A check-list used by Elo and Vehviläinen (1983) provides an example of a form suitable for making such determinations

- . Ergonomic and industrial hygiene check-lists and guide-lines are available to rate physical factors in the work environment (e.g. the Threshold Limit Values (1983) adopted by the American Conference of Governmental Industrial Hygienists (ACGIH), and various standards of the International Organisation for Standardisation (ISO)). Observations indicating workplace conditions in which limits of exposure to known harmful agents were being exceeded would dictate concerns/actions apart from, or in addition to, those related to psychosocial problems. Minimum measures here should indicate no known hazards in excess of current standards.

Table 9 (contd.)

<u>Individual factors</u>	<u>Nature of measure/Measurement method</u>
A. Demographic	<u>Self-report</u> As part of medical history items to be noted should include: <ul style="list-style-type: none">. Age. Sex. Marital status. Size of family. Nature of housing (space per person). Migrant worker. Commuting time/effort
B. Health status	<u>Reports by others</u> The examinations by the primary health worker should include: <ul style="list-style-type: none">. Height/weight determinations to categorise nutritional status. An appraisal of physical fitness in the light of available biochemical measures
<hr/>	
<u>Mediating factors</u>	<u>Nature of measure/Measurement method</u>
A. Social support/ Coping behaviour	<u>Self-report</u> A questionnaire should be given or other forms of inquiry should be undertaken to determine at the minimum: <ul style="list-style-type: none">. If the individual has one or more significant other persons with whom he/she can discuss personal problems. The nature of the individual's coping style (confrontational, avoidance, submissive)
B. Recent life events	<u>Self-report</u> In the course of the above inquiry, it should be ascertained if there has been: <ul style="list-style-type: none">. Recent change in marital status. Recent death among close family and relatives. Recent change in place of residence

light of these considerations. Care also needs to be taken in collecting and using data from questionnaires. Questionnaires should be administered in a systematic manner by persons trained in their use; the questionnaire should not be of such a length that it overburdens the respondent; and wherever possible, attempts should be made to sample sufficient numbers of respondents to ensure reasonably valid and reliable results. At the present time it is not considered advisable to choose one questionnaire method as being superior to any other.

In most instances, the factors are listed in table 9 with only a general idea of an appropriate data-collection strategy. At the present time, it is not realistic to give a more prescriptive approach. Rather, it is suggested that users may develop their own techniques of gathering information. There could and should be more uniformity after a number of trials. The suggested methods of data collection are therefore not to be treated as the ideal approach for assessing the causes and effects of psychosocial health hazards. They should be considered only as elements of a prototype approach to be subjected to evaluation, modification and reapplication in order to increase its usefulness and uniformity. For this purpose, parallel field trials of the proposed procedures should be integrated so that their feasibility and merits can be tested. Such trials might include studies of workers and job conditions within one or more common industries, but with the broadest possible cultural/geographic representation. The results of these trials would suggest the nature of changes or reformulations that should be made in the proposed set of observations.

Workplace conditions presenting psychosocial hazards should be detected through observation of individual and group reactions to the measures just proposed. Specific indicators, or signs reflecting progressively severe forms of stress-related disturbance would be:

- (a) persistent or recurrent negative moods or emotional states reflecting increased anxiety, depression and irritability;
- (b) a functional change in one or more of the bodily organ systems indicating deviation from the norm (e.g. elevated heart-rate);
- (c) significant behavioural changes indicating coping or escape behaviour with regard to work experience (e.g. increased rate of absence for unexplained reasons);
- (d) biochemical and/or physiological changes of a more slowly reversible, non-specific and possibly pathogenic nature (e.g. recurrent digestive disturbances, hypertension);
- (e) frank, aberrant behaviour detrimental to health, interpersonal relationships and work goals (e.g. excessive alcohol consumption);
- (f) morphological changes indicative of physical disease or mental debilitation (e.g. myocardial infarction, peptic ulcers, neuroses).

Indications of reactions such as those given above suggest undue stress arising from psychosocial influences. They should prompt close examination of the data recorded on the workplace, and on individual and mediating factors, with a view to finding possible sources. It should be noted that a worker's subjective identification of the source of distress may not be reliable or valid. Indeed, workers may be insensitive to certain stress-producing factors, even though they are producing objective stress signs or may unconsciously deny their presence. Hence, while workers' complaints of distress on the job should always be acknowledged, their use for identifying psychosocial hazards is open to question. More objective indicators built into the proposed plans for data collection can provide confirmation.

In fact, appropriate comparisons should be made with norms or other reference data that may be available. These could be national norms, industry-wide norms, company norms, regional or local norms. With regard to questionnaire methods of data collection, data from other groups of workers may have to be obtained and matched with that for the target group for reference.

7.2 Interventions

Given that emotional disturbances, behavioural problems and health disorders related to negative psychosocial factors at work occur, what type of remedial interventions are possible?

There are many approaches to controlling the adverse effects of psychosocial factors at work and to promoting a good psychosocial climate within an enterprise. Some focus on the content and nature of the work performed, on the work environment and on organisational structures. Others are directed towards individual workers or towards the interactions between the worker and his environment.

These measures may include in particular:

- (a) job redesign: modification of the content of work, enrichment of tasks, rotation among different tasks, etc.;
- (b) organisational measures: modification of the work organisation, greater autonomy, delegation of responsibilities, etc.;
- (c) ergonomic measures and improvement of the work environment; control of occupational hazards, improvement of the ambient factors (temperature, lighting, colours, etc.);
- (d) modification of the working space and of working time: arrangements to avoid crowded workplaces or work in isolation; determination of periods of rest in consultation with the persons concerned;
- (e) information on work processes, early information concerning technological changes and the introduction of new technologies;
- (f) workers' participation as regards organisational measures, work methods, etc.;

- (g) appropriate training and education: health education, recognition of hazards, preventive measures, etc.;
- (h) helping workers to cope with stress; provision of psychological first aid, etc.

Although there are numerous possible forms of intervention, it must be realised that a large majority of workers are employed in agriculture and small-scale enterprises, particularly in developing countries. There will be great difficulty in applying such methods unless assistance is provided. Action at national level is therefore essential.

Increasing awareness is a prerequisite to the implementation of practical measures. All those concerned must be convinced of the importance of the problem, of the validity of the studies or inquiries which are carried out and of the need for control measures. Information must be disseminated effectively and people must be persuaded that action is necessary. Efforts must be made to increase awareness in the general population, among employers and workers, among occupational health and safety professionals and among public authorities.

Training and education of the relevant target groups is a basic requirement. Occupational health personnel need training in the psychological, behavioural and physiological indicators, the early detection of health impairments and the recognition of psychosocial factors at work, their assessment and the preventive measures to be applied. Occupational safety specialists should also be trained to understand the importance of psychosocial factors in relation to accident prevention. Professional skill is often lacking, particularly in developing countries and a special effort is needed.

Managers and supervisors should have some basic knowledge on how to recognise stressful situations and on the methods which may be used to control psychosocial stressors at work. Workers' health education should include information about psychosocial hazards at work.

Progress in the recognition and control of psychosocial hazards at work cannot be made without the full co-operation of the workers themselves. Workers' participation is therefore an essential feature of any action on psychosocial factors at the enterprise level.

Furthermore, workers' participation is in itself of great importance in reducing potential psychosocial tensions at work. Early information and participation concerning changes in work organisation or work processes is necessary, and it is known that the influence of participation on a worker's job is of great importance to both job satisfaction and health.

Activities specifically relating to psychosocial factors should aim in particular at the establishment of good human relationships within the enterprise, conducive to a good psychosocial climate. Measures should be taken by management, with the support of workers and the advice of services or specialists concerned with occupational safety and health at work

(safety engineer, occupational health physician, ergonomist, etc.). Pilot projects may be used as demonstration models.

Occupational health services have a special role to play in the recognition and control of psychosocial factors at work. They are in a position to bridge the gap between research and practice and to place psychosocial factors at work in the perspective of both work and health protection and promotion. The monitoring of workers' health is particularly useful for the early detection of adverse health effects caused by psychosocial factors. Enterprises may also call upon experts from outside the undertaking - such as ergonomists, physiologists, sociologists and inspection services - to advise on specific problems.

In the case of small-scale industries, self-employed groups of workers, agricultural workers and those workers generally referred to as disadvantaged, the primary health-care system in various countries should include elements of occupational health and safety, including the identification and control of adverse psychosocial factors at work.

Because of the multi-cause/multi-effect nature of health problems and disturbances related to psychosocial factors, a multidisciplinary approach to psychosocial factors at work is needed. Control measures cannot be applied in a simple one-factor/one-solution approach. A systematic approach should be followed and a combination of strategies should be introduced. The various activities relating to the improvement of working conditions and environment and workers' health should take account of psychosocial factors at work.

There is a need for efficient and systematic action at the enterprise level. In this connection it should be recalled that the Occupational Safety and Health Convention, 1981 (No. 155), and Recommendation, 1981 (No. 164), adopted by the International Labour Conference, provide that it is the responsibility of the employers to ensure that the workplaces, machinery, equipment and processes are safe and without risk to health. The measures to be taken should include the strengthening of the co-operation between employers and workers in the fulfilment by the employer of the obligations placed upon him in the field of occupational safety and health.

8. ACTION AT THE NATIONAL LEVEL

8.1 Basic principles

The conclusions concerning future action in the field of working conditions and environment, adopted by the International Labour Conference in June 1984, and several World Health Assembly resolutions, recall that the improvement of working conditions and environment and the promotion of workers' health and well-being represent a positive contribution to national development and are part of the criteria for success of any economic and social policy.

The above-mentioned conclusions also indicate that the following principles are fundamental in pursuing this objective:

- (a) work should take place in a safe and healthy working environment;
- (b) conditions of work should be consistent with workers' well-being and human dignity;
- (c) work should offer real possibilities for personal achievement, self-fulfilment and service to society;
- (d) the improvement of working conditions and environment should be considered a global issue in which the many factors affecting the physical and mental well-being of the worker are closely inter-related; a global and multidisciplinary approach is therefore essential to the effective improvement of working conditions and environment, and to promoting workers' health and well-being.

8.2 National policy

Present knowledge of how psychosocial factors affect the health of workers and influence performance needs to be expanded in both industrialised and developing countries. Actions undertaken so far remain limited and fragmentary, and the relevant results of research carried out are not disseminated widely enough amongst the countries and persons concerned.

The small-scale enterprise sector remains of concern to all countries. Workers are exposed to physical, chemical and biological hazards, and also to a certain number of risk factors containing psychosocial elements. Workers are not always adequately covered by social security, in particular because such enterprises are only rarely visited by labour inspectors and are even less frequently visited by occupational health inspectors. Available information shows, however, that action undertaken

according to national conditions and practice is not only desirable but possible.

Throughout the past decade the psychosocial environment has attracted the close attention of specialists, practitioners, public authorities, employers and workers, and their organisations. This interest should be intensified.

A commitment for action, within a tripartite framework, should result in the elaboration, implementation and periodic evaluation of a coherent national policy on occupational safety and health and working conditions, taking into account national conditions and practice. This policy should indicate the respective functions and responsibilities in respect of occupational safety and health and working conditions of public authorities, employers, workers and others, taking account of the complementary character of such responsibilities. Practical measures taken within this overall framework at different levels of intervention should take psychosocial factors at work into account. Governments should acknowledge the concept of psychosocial factors at work in drafting legislation.

In accordance with the Declaration of Alma-Ata on primary health care, 1978, disadvantaged workers in small-scale industries and agriculture in developing countries should be protected in their occupational psychosocial environment by measures undertaken by primary health care (PHC). PHC workers should therefore be trained in this area.

8.3 Possible activities

Activities relating to psychosocial factors should be integrated at various levels of action and should be directed, according to national conditions and practice, towards the strengthening of information and training activities; the collection of statistical data (particularly on psychosocial factors); the organisation of national, regional or sectoral meetings; better use of acquired knowledge, complete support for practical research; the training of specialists at different levels; the adaptation of the texts of laws and regulations, taking into account the progress made in that area; and the strengthening of labour inspection services.

It is of utmost importance that all the parties concerned should be made aware of psychosocial factors at the workplace and of their effect on the health, the nervous system and the private lives of workers. Informational activities and training should be undertaken at all levels (specialists, practitioners, public authorities, employers, workers and other persons concerned) in the various branches of economic activity, with priority being given to groups of workers exposed to major hazards and to high-risk sectors. The occupational health services and the primary health-care services should participate in this group action at the national level in order to bring about new attitudes and behaviour to improve safety, health and adaptation

of the working, family and social environment. Current training and information methods (audio-visual means, television, press and radio, national, sectoral or regional public awareness campaigns, etc.) should include information on psychosocial factors at the workplace in their programmes.

To promote such awareness further, the competent authorities, with the co-operation of the social partners, social security funds and occupational safety and health services, should set up or strengthen programmes for the collection of statistical data concerning the health of workers and working conditions and environment, including psychosocial factors, and should evaluate their practical application.

The public authorities should organise seminars, symposia and meetings at national and regional levels to promote the exchange of experiences and the dissemination of relevant information.

Data and information derived from research have not been used fully or systematically. In respect of the improvement of the working environment, work organisation and, more particularly, job content, there is a relatively long period of time between research and its practical application, especially as the research remains stored in separate disciplines and data banks. Investments provided for new research have been far larger than those allocated to the integration, translation and use of existing knowledge. For this reason the public authorities, employers and workers, and their organisations, in co-operation with researchers and practitioners, should work towards a better flow of information with respect to psychosocial factors and their integration and implementation at the workplace.

Professional co-operation between scientists and practitioners should be promoted in order to clarify and describe psychosocial problems and possible methods of alleviating them. Additionally, the design of new technologies should take psychosocial factors into account.

The public authorities should promote and encourage research, with a view to identifying problems related to psychosocial factors and to establishing preventive measures to contribute to or reinforce the psychosocial climate in the enterprise. The public authorities and the social partners should be informed of the possibilities and limitations of research, so as to be able to formulate reasonable questions with respect to problems of high priority. It is also important that the data collected should be returned to the workers themselves, in a form comprehensible to them. Advice and technical assistance should be furnished regularly to the enterprises (employers and workers).

Obviously it will not be possible to promote research without a great training effort at various levels, and in particular at specialist level. Specialists must not overlook the psychosocial factors in their reflection, research and intervention at the workplace. In national programmes for training and general education, special attention should be given

to psychosocial factors at work. This should apply also to the training programmes for specialists and for various categories of personnel, as appropriate.

Given the specific conditions and needs of each country, the partial or total implementation of this group of projected measures should create favourable conditions for the progressive integration in national laws and regulations, according to progress made, of certain psychosocial factors present at the enterprise. Laws and regulations, however, are only effective to the extent that they are actually applied and meet a need felt by the persons concerned. The public authorities should therefore provide inspection services with a sufficient number of qualified personnel and with the necessary means for the staff to carry out their duties, particularly their visits of inspection to enterprises.

9. ACTION AT THE INTERNATIONAL LEVEL

In the future, more attention will be given to psychosocial factors at work by specialists, governments, employers, workers and society as a whole. Many aspects should continue to be of concern to the WHO and the ILO, one of whose permanent objectives is the protection and promotion of workers' health and well-being.

The ILO and the WHO are conscious of the increasing importance of the role of psychosocial factors at work and this should lead them to intensify their activities, both direct and indirect, in this field. These activities should be essentially promotional and practical.

Actions undertaken by the WHO and the ILO should aim in particular at encouraging and assisting member States in the elaboration and implementation of coherent national policies which should include questions relating to psychosocial factors at work with the purpose of improving working conditions and environment and promoting workers' health and well-being. Within the framework of this policy, special emphasis should be placed on the participation of employers and workers as a condition of success of the actions to be undertaken.

Both organisations should use their means of action, including technical co-operation with developing countries, in order to support and promote activities at the national level.

Given the inadequate coverage of occupational health services in some countries, support should be given to the development of occupational health activities on psychosocial factors carried out within primary health-care systems; account should specifically be taken of disadvantaged workers.

The WHO and the ILO should provide support to the training of qualified personnel, in particular to the specialisation of health personnel. Technical co-operation activities should take into account needs expressed by member States as regards inquiries, diagnosis and monitoring of all health-relevant factors and as regards material means to strengthen their competence.

The promotion of training activities at various levels in member States concerning psychosocial factors is an important area for international co-operation. Such activities should be carried out in consultation with employers' and workers' organisations and with the collaboration of specialised institutions and national, regional and international training programmes, for the benefit of all categories of persons concerned.

The development of institutions and technical or scientific bodies should be encouraged, as well as the establishment of relationships between institutions concerned with psychosocial

factors in order to promote co-operation at the national level concerning the recognition of positive and negative psychosocial factors at work and the identification of practical measures which could be taken at the enterprise level.

The ILO and the WHO should also undertake or promote studies and research of a practical nature in order to collect and provide the information necessary to guide action at international level, as well as by governments, employers, workers and their organisations. Such activities may also facilitate the recognition of hazards related to psychosocial factors at work, improve knowledge of such hazards and promote appropriate preventive measures, as well as the assessment of the results of specific actions.

Facilities need to be provided for the exchange of views and experiences concerning psychosocial factors, for example through the organisation of tripartite seminars and other meetings at national, regional or international levels. This should help to increase the awareness of all concerned about the importance of psychosocial factors at work and to publicise new knowledge in the field of prevention of hazards due to these factors. Meetings already included in the programme of organisations (regional conferences, ILO industrial committee meetings, advisory groups, meetings of experts, etc.) should devote reasonable attention to psychosocial factors and their effect on the health of workers, supervisors and management, as well as on the productivity of the enterprises; the effects on the living conditions and on the family and social environments should not be overlooked.

Another field where international co-operation should develop is the intensification of activities relating to the collection, analysis and dissemination of experience and information relevant to psychosocial factors, taking into account the needs of public authorities, employers, workers and their organisations, research institutions and others concerned. Governments should be informed about problems, measures to be taken and experiments made in various countries all over the world.

Priority should be given to the collection and dissemination of information of a practical nature such as that in legislation, collective agreements, training activities, ongoing research, technical publications and reports. The information should be made easily accessible by such means as data banks, audio-visual materials, periodic publications, information sheets and so on, which would then provide information on the state of the art concerning psychosocial factors and their consequences, positive and negative, on the workers' health and productivity at the enterprise level. The WHO and the ILO should bring their support and experience to bear on the establishment of regional and subregional or national information networks. They should use and develop, with special emphasis on psychosocial factors, the information systems already available at the international level, such as the WHO network of collaborating centres on

occupational health, WHO control technology documents, the ILO International Occupational Safety and Health Information Centre (CIS), the ILO Clearing-house on Conditions of Work and the ILO International Occupational Safety and Health Hazard Alert system.

The WHO and the ILO should assist in the preparation of guide-lines and training materials relating to psychosocial factors at work. These should be based on current knowledge of psychosocial factors and on recent experience gained in this field. They should contain new facts as regards legislation and collective agreements. Special attention should be paid to the presentation of practical improvement measures applicable at enterprise level.

Support should be given to activities relating to the elaboration or revision of laws and regulations which should include psychosocial factors and take into account relevant international labour Conventions and Recommendations.

10. REMARKS

In reviewing the various recommendations made at the national and international level, the Committee finds that particular attention should be given to the following main areas:

- (a) the survey and collection of data to indicate the types and magnitude of occupational psychosocial factors and their effect on health in various parts of the world;
- (b) the transfer and exchange of information on psychosocial factors at work and their effect on health;
- (c) the development of educational material on the recognition of problems and on the implementation and evaluation of control and preventive measures.

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