

RESEARCH ON STRESS IN THE STUDY OF WORK ENVIRONMENT

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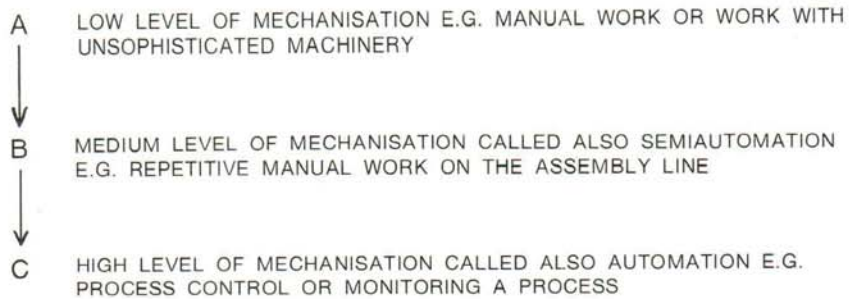
ABSTRACT

Along the progress of mechanisation of work, the scope of human activity in work environment has changed from creative and comprehensive to monotonous and mentally limited; as a result the work process is said to be dehumanised. The following aspects are typical of the highly mechanised work: the intense and compulsory rhythm of work, social isolation, work in shift, the monotony of work and the lack of possibilities for self-control. As a result job dissatisfaction, stress, alienation and even psychosomatic diseases are increased among the workers of these jobs. Stress research is an applicable approach to studying these problems, since its model rests on the assumption that a better understanding of the causes underlying stress and related problems can be gained by integrating within a common framework the concepts and methods of psychology, psychophysiology and psychosomatic medicine. It seems more fruitful to talk about "stress research" as a paradigm or an approach than about "stress" as a concept. We may name stress factors in the work environment by defining: the length of the work cycle, the task variety and the skill level or by examining the opportunities for social interaction in the course of work. Stress factors reflect strain on workers from: time pressure, machine-paced work, constant attention, piece-work and underutilisation of mental capacity. These components of work are qualitative with a strong psychosocial overtones. The process how to minimise the negative effects of the stress factors requires a more democratic organisation of work. This idea has been emphasised by all Scandinavian countries in their attempts for a renewal of the working life, in other words, in their pursuits to make work more human.

MECHANISATION OF WORK

Along with the mechanisation of work, the scope of human activity in the work environment has changed from creative and comprehensive to monotonous and mentally limited; as a result the work is said to be dehumanised. This is a term that is put forth among others by ILO, recently in the report of Director-General^{16,30}. The following aspects seem to be typical of a highly intensified work: the compulsory rhythm of work, social isolation, work in shifts, restrictions of free movements, and the lack of possibilities for self-control over one's work. Several studies on stress have pointed to these risk factors; as a result job alienation, lack of involvement in work, stress and even psychosomatic ill health is increased among the workers of these jobs^{2,4,6,10,12,13,22}. However, the progress of mechanisation is very complicated when seen from the view point of

workers' mental health and well-being at work. It may be seen in the following way, where the arrow "→" means the direction of the progress.



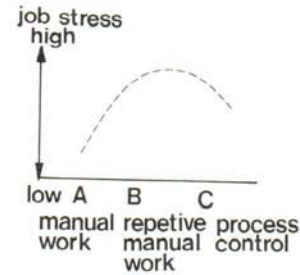
Research on job stress has indicated that work at the medium level of mechanisation is most harmful to one's mental health. We may find that very rough methods for work intensification can be applied at that level, which are in agreement with the technical conditions and nature of work. The intensity of work may be studied by examining: the length of the work cycle, the task variety, the skills demanded, the degree of self-control over one's work, e.g. methods of work and the rhythm of work, the possibilities for leaving the work for some time without a stand in the possibilities for decision-making at the shop-floor level.

We may count the piece-wage salary system among very rough methods for raising the level of intensity of work. The harmfulness of it to one's mental health increases when it is connected with other methods, e.g. rigid social or technical control on the assembly line. In one study on different salary systems, the abandonment of piece-work decreased stress and job dissatisfaction³. According to this study, the workers felt that they had more time than before to pay attention to the quality of work, as a result they found more pride and joy in work. They also had more time for social interaction with other workers. So, the overall atmosphere at the work place improved.

Research on stress has consistently pointed to these risk factors: short repetitive work cycles, machine-controlled work pace, rigid supervision and restrictions of free movements. They are said to be typical stress factors of a work on the assembly line⁹. On the basis of this research, an assumption has been made of an inverted U-shaped curve between job stress and levels of mechanisation. According to this assumption, the tasks of both low and high levels of mechanisation are less stressful than those of medium level of mechanisation. This may be seen in Figure 1.

Even though this assumption of an inverted U-shaped curve between job stress and levels of mechanisation has been fairly well known and accepted^{4,22} the actual empirical evidence supporting it, is relatively scarce^{12,13,26}. In fact, there is growing evidence pointing to contrary results saying that automation may introduce new stress components which may be even more harmful to one's

FIG. 1 - A relationship between job stress and mechanisation. Job stress such as: lack of control over one's methods of work, restrictions of movements, repetitive and short work movements, piece-work. A Low level of mechanisation, B Medium level of mechanisation, C High level of mechanisation.



mental health^{9,29}. In one survey on stress, it was shown that certain risk factors in the work environment increased at the high level of mechanisation^{11,12,13}. So, the workers felt, among other things, that the possibilities for self-control over one's rhythm of work did not improve with the progress of mechanisation. However, the overall tendency of the survey was in agreement with the assumption of an inverted U-shaped curve. Accordingly, the workers in the process control and in the manual work found more joy and pride in work, than the workers of repetitive, short-cycle tasks on the assembly line.

So, even though automation does reduce certain risk components, such as repetitive, manual work or bad work environment in the physical sense, it may introduce new stress components that may be still more detrimental to one's health⁹. These new stress components are among other things: acute attention, lack of social interaction, high level of responsibility, work in shifts, monotony on duty and high demands on mental skills. Many of these components may be conflicting with each other, adding to the total mental load of these jobs (e.g. monotony on duty, on one hand and high demands on mental skills on the other hand, associated with a high level of responsibility).

Another critical component that is associated with jobs, in transition from semi-automation to highly automated production systems, are the demands put on a worker for a continuous adaptation into new and ever changing situations in the work environment. So, the worker may not find his job identity or involvement in work, but feels alienated in his job roles.

Optimistic forecasts for the progress of mechanisation on workers' mental health are put forth in the assumption of an inverted U-shaped curve between job stress and levels of mechanisation. Other, less optimistic forecasts suggest, however, that although automation does reduce certain stress components, it may introduce new ones that may be still more harmful to one's mental health.

The question is whether work satisfaction will improve and whether the strain on worker will diminish by a transition to production systems, where the repetitive, manual elements are taken over by machines and the workers are left with supervisory, controlling functions⁹. The answer to this question is a challenge for research on job stress. This research should be able to point to new ways of job design and job re-design based on human needs and aspirations.

RESEARCH ON STRESS - A PSYCHOSOCIAL APPROACH

The research on work environment with psychosocial overtones demands a multidisciplinary approach. We know from plenty of studies, that work and the contents of work are central features in overall life satisfaction, where rapid changes in one's work responsibilities and psychosocial work load are suspected of eliciting mental stress and psychosomatic diseases^{15,24,25,27,28,31}. In fact, within the psychosocial approach on stress research, joy and pride in work are supposed to be fundamental human needs¹¹.

Research on monotony and coercion at work has also pointed out that mental stress and fatigue from work spill over into less participation in free time activities. So, the view that the worker would be able to compensate for a dull and stressful job by stimulating and enriching activities in his free time, is being replaced by an understanding of the strong interaction between the contents of work, on one hand, and the activities of free time on the other^{19,20}.

For a welfare policy these findings give a piece of valuable information: the changes of work and work organisation spill over into changes in one's free time activities. To put it concisely, the more there are possibilities for participation and self-control at work, the more there is active participation in cultural, political and social life in the free time.

THE COMMON FRAMEWORK OF CONCEPTS AND METHODS

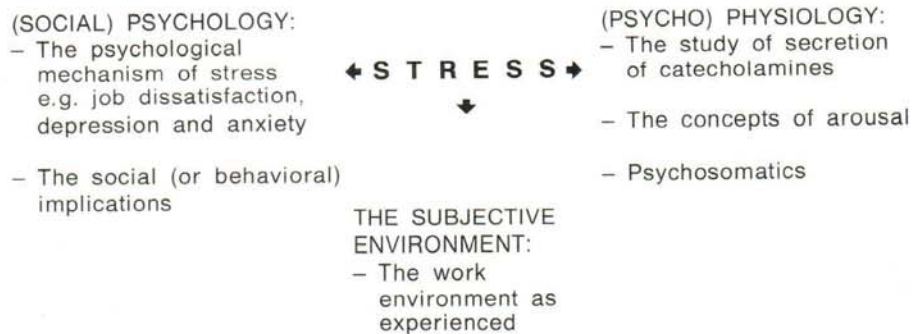


FIG. 2 - A multidisciplinary approach.

Within this framework we must adopt a multidisciplinary approach to problems of work environment with strong psychosocial nature. Actually, stress research is applicable to such approach as its model rests on the assumption that a better understanding of the causes underlying stress, dissatisfaction and ill health - related to work - can be gained by integrating within a common framework concepts and methods of social psychology, psychophysiology and psychosomatic medicine¹⁰. This may be seen with the help of the simple model in Figure 2.

According to this model, stress research ought to benefit from the concepts, methods and overall framework of social and behavioral sciences as well as psychosomatic medicine²¹.

The mechanism of human stress and the coping with it, is very complicated, though, and cannot be touched in more details in this paper. In fact, it seems more fruitful to talk about "stress research" as a paradigm or an approach rather than about "stress" as a concept. So, it is sufficient here to present an idea of it as an approach to research in work environment. This is shown in Figure 3 which gives an idea of a stepwise model to explain the pathway between the experience of job stresses and the psychosomatic complaints^{15,17,18,27,28}.

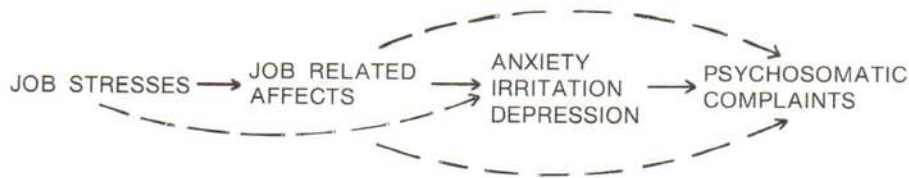


Fig. 3.—A stepwise model to explain the pathway between the experience of job stresses and the psychosomatic complaints.

The psychosocial research on stress has pointed out the meaning of subjective experience, which seems to be vital to stress mechanism²³. So, in one survey on stress in working life, the subjective experience of the harmfulness of certain factors showed clear correlations with personally experienced and medically established psychosomatic symptoms⁵. These risk factors were such as: intense rhythm of work, annoying noise in the work environment, machine-paced work, piece-work and monotony of work. Without this subjective experience the correlations were not as clear as with it.

In fact, without this reference to subjective experience made clear enough by psychosocial research between workload and stress, there is little ground for demands on new organisations of work in relation to human needs and aspirations.

For practical as well as for theoretical reasons it is useful to study the basic terms that are used in the research on human stress. It favours the terms underload and overload, along with the term controllability.

The term controllability is most interesting, as it has been pointed out both by biological and psychosocial research on stress that the possibilities for self-control over one's activities seem to be central for the stressfulness of a person-environment fit⁶. A lack of control may have several negative consequences, such as the state of "learned helplessness", which in turn, may lead to depression, irritation and lack of motivation for control⁹. So, a person in the state of "learned helplessness" may feel that events are independent of his own actions. This may, of course, lead to alienation and lack of motivation for self-control, more so when it is associated with monotony of work.

This has important implications for strategies of job reform, as it gives scientific grounds for demands on new work organisations based on workers' participation and self-control. In order to eliminate certain alienatory factors put forth by mechanisation of work, the need for more control over one's events in

the work environment has increased. As was seen before, mechanisation of work may decrease one's possibilities for self-control in the technical sense, even though the overall tendency is supposed to be towards less repetitive and less monotonous work cycles.

In theory, we may distinguish very well between the terms of underload and overload and even controllability. However, they are not unambiguous in an empirical sense; in other words we may not always find suitable empirical equivalents for them in real life situations. However, it is central for empirical research to indicate in concrete terms what we mean by the terms underload and overload and how we express in concrete terms the concept of controllability. This concretisation of the basic terms of stress research is important also for actions of job reform, as will be seen later on.

Among the job characteristics that we may associate with the term underload are such as: mechanically controlled work pace, standardised motion patterns, constant repetition of short-cycle operations and along with the term self-control: lack of opportunities for control over one's rhythm of work, methods of work and social interaction in the course of work.

Examples of overload include the rush caused by piece-work and high demands on superficial attention associated with a high level of responsibility. It should be noted that these job characteristics tend to occur in the same work situation. For instance, workers engaged in repetitive machine-paced tasks may be required to make skilled judgements at short intervals. Such a combination of monotony, time pressure and lack of self-control, typical of work on the assembly line, exposes the worker to a heavy total mental load.

As was seen before, research on job stress consistently points to these risk factors: short repetitive work cycles, machine-controlled work pace, restrictions of movements and social interaction. This is in line with the theoretical framework presented here.

In summary, we may see that a multidisciplinary research on job stress gives us a better understanding of the causes underlying job dissatisfaction, mental strain, fatigue and psychosomatic complaints – as related to work. The psychosocial aspect of it puts a heavy emphasis on the active role a person plays in the work environment. So, he does not only expose himself to the work environment but also aims at controlling it. For the strategies of job reform, this means new demands for worker's participation and self-control in the working life.

STRATEGIES OF JOB REFORM

We know from research on stress, that job fragmentation, lack of self-control and restrictions of social interaction in the course of work may have important impacts on workers' mental strain and related psychosomatic malaise.

This research does not, however, take place in a social vacuum, without reference to the society around. In fact, the rise in demands for a better quality of work environment reflects the social, technical and even economic development

of a given society. Along with the increased standard of living, increased years of schooling and increased information flow, the demands for a better quality of work environment have increased.

The research on satisfaction and stress at work may be seen in this overall context, too. In fact, it belongs to this same idea of new demands for a better quality of working life: e.g. demands for worker's participation and more meaningful work, demands for better conditions in the physical sense and demands for greater personal control in the course of work. We may witness this rise in demands to take place in all western societies^{8,16}. Responses, of course, have been different owing to different social and technical context in different countries.

In Finland as in other Scandinavian countries, we may distinguish two approaches, which are, however, overlapping^{1,11,14}. The first is known as a "new factory experimentation" and it involves experiments on work re-organisation introduced by the management of given companies. The second is a legislative approach aiming at a new legal framework for job reform.

The first approach involves experiments on new techniques of work such as job enrichment, job rotation and autonomous work groups organised by the management of the companies in question. They are organised at the shop-floor level aiming at greater self-control and less coercive modes of work. From this comes the term "new factory" experimentation: the self-control is limited to mean participation at a very concrete level, that is, at the shop-floor level.

Because of this limited framework, these experiments have been open for criticism, mostly, by the trade unions of both blue and white collar workers. From their point of view, the experiments have been conceptualised in too narrow a framework to have any relevance to real workers participation. In fact, they are seen as a managerial response to demands for job reform put forth by workers' organisations. As a result, new questions have been raised in connection with these experiments, such as: Are the experiments merely an attempt to mask the lack of real participation and real improvement? or: Are they merely a substitute for outmoded techniques such as those employed in the "human relations" approach^{1,7,16}? In fact, too little is known about the impacts of these experiments on workers' job satisfaction and mental health.

Moreover, the experiments have been limited also in that sense, that they have not been open for scientific discussion as to the criteria used for the evaluation of their output. It seems to be part of employer policy not to identify these experiments as scientific research or to call in social and behavioral scientists to assist in the field experiments¹¹. This aspect of "new factory experimentation" is particularly frustrating to research workers of the field.

The second approach is called a legislative approach and it means that within a legal framework new strategies for job reform are introduced. This development is now taking place in Finland as in other Scandinavian countries. Within this framework the Act of Co-determination as well as the Act of Occupational Health will be put in effect in the near future in our country. There

are also long-term plans made for a new Act of Work Environment. The idea of this law is, in the line with other Scandinavian countries, to include within the area of labour protection factors of psychosocial importance, such as monotony and coercion at work, piece-work and lack of self-control. This approach is strongly supported by the trade unions.

The Act of Co-determination is most interesting in this connection, as it gives workers (or their representatives) the right to influence in concrete terms, decisions related to their work and work environment. According to this, co-determination is expected on areas dealing with e.g. personnel policy, work organisation, technical matters, new equipment and even methods of rationalisation. The overall framework is here wider than in the "new factory experimentation", since it is supposed that through this participation at the shop-floor level, workers get interested in decision making at all levels in the company, also related to economic and large-scale technological matters. This idea is supported by several studies. It seems to be true, that increased autonomy and greater control as expressed at the shop-floor level spills over into more interest in decision making at all levels in the company. In other words, the co-determination seems to reduce certain alienatory factors put forth by e.g. mechanisation of work.

It has been pointed out, too, that through this approach it has been possible to avoid that concepts like "Humanisation of Work" and "Quality of Working Life" are used in too narrow a perspective – merely to further productivity goals^{7,11}. At the same time the approach has guaranteed the trade union interest in questions concerning new technology, methods of work and related problems like job satisfaction and stress. In comparison with the "new factory experimentation", the legislative approach is more open for free discussion on the relevance of job re-organisation in the overall welfare perspective.

In summary then, we may see that the both approaches of job reform are aiming at less coercive modes of work and more worker participation at the shop-floor level of the companies. However, the overall framework is different, as seen before, owing to their different motivational and social context.

In many ways, the demands for a better quality of working life reflect the technical as well as the social development of a given society. So, even the research on job satisfaction and stress must be seen in this context.

As was seen before, this research has made it clear enough, that job fragmentation, mechanisation and lack of self-control associated with monotony of work may have negative impacts on workers' mental health. The very basic terms of this research, like underload and overload and controllability are put in concrete terms in the strategies for job reform. As was seen before, the concretisation of these terms is vital for the actions in question.

The idea is that the quality of working life must be in harmony with the technical and social development of the society. The need for this is getting more and more urgent, since, along with the mechanisation of work, the impacts of work on workers' health is more and more of a strong psychosocial nature.

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