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ARTICLE *in* SCANDINAVIAN JOURNAL OF PUBLIC HEALTH. SUPPLEMENT · FEBRUARY 2002

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Scand J Public Health 2002 30: 41
DOI: 10.1177/14034948020300030701

ORIGINAL ARTICLE

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Socioeconomic status and psychosocial work environment: results from a Danish national study

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Scand J Public Health 2002; 30: 41–48

Objective: The aim of this study was to analyse the associations between socioeconomic status (SES) and a number of psychosocial work environment factors with a potential impact on inequality in health. *Methods*: A representative sample of 1,684 adult Danish employees filled in a standardized questionnaire or were interviewed by telephone. The response rate was 62%. The population was divided into four levels of SES (I to IV). The psychosocial work environment was described with 19 scales. *Results*: Quantitative, cognitive, and emotional job demands and a number of dimensions related to active and developmental work showed higher levels among high SES individuals. Job insecurity was highest among women with low SES. Dimensions describing interpersonal relations, social support, and leadership showed no clear associations with SES. *Conclusions*: Prevention aiming at improving health and reducing inequality in health should focus on the dimensions of active and developmental work: influence at work, possibilities for development, degrees of freedom, and meaning of work. Furthermore, job insecurity should be reduced.

Key words: Denmark, inequality in health; job insecurity, job stress, psychosocial factors, prevention, psychosocial work environment, social class, social support, socioeconomic status.

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INTRODUCTION

The association between socioeconomic status (SES) and health seems to be almost universal: people with high SES live longer, experience less disease, and have a lower risk of disability than people with lower SES. The few exceptions to the rule –such as heart diseases in some industrialized countries in the 1930s and a few cancer types today – do not distort this general picture.

During the last decades of the twentieth century it became the official goal of the WHO as well as a number of European countries to reduce inequality in health. In spite of this, inequality with regard to morbidity and mortality has persisted, and a number of studies have even suggested that the health gap between the lower and upper levels of SES has been increasing (1–4). Furthermore, it has been shown that inequality in health is more pronounced in the Nordic countries than in the rest of Western Europe (5, 6). These findings challenge conventional views concerning the Nordic countries as welfare states with strong egalitarian ideologies.

One of the necessary conditions for being able to reduce inequalities in health is that the associations between SES and health are understood sufficiently well. In the literature on SES and health a number of hypotheses have been suggested (2–4, 7–12). Among the main pathways that may connect SES with (poor) health are the following: (1) the structure and function of the healthcare system; (2) differences with regard to social background: the life-course perspective; (3) differences in housing and quality of neighbourhood; (4) differences in health-related behaviour such as smoking, diet, physical activity, and alcohol; (5) differences in work environment and risk of unemployment.

Furthermore, two more fundamental issues concerning the association between SES and health have been raised. First, the well-known distinction between selection and causality is very relevant when analysing the association between health and SES. Low SES may lead to poor health, but the association may also go in the opposite direction (13). Second, it may be fruitful to distinguish between explanations based on specific factors and those based on general susceptibility (14). According to the first assumption, the association between SES and health can be explained by a number of specific risk factors, while the second focuses on an increased susceptibility for a wide range of diseases among persons with low SES. The susceptibility hypothesis implies that an exposed low SES person will have higher risk of a disease than a high SES person exposed to the same risk factor.

 ISSN 0301-7311

In the following we disregard the issue of selection versus causality and we limit ourselves to one type of explanation: the specific factors. Furthermore we focus on one area of life: the work environment. The purpose of this article is to elucidate the associations between SES and a number of psychosocial work environment factors believed to influence health and well-being. Several studies have suggested that psychosocial factors at work may constitute important links between SES and health (1–4, 8, 10, 15–22), but to our knowledge no comprehensive analyses of the topic have been published so far.

Based on earlier empirical studies and theoretical considerations we wanted to test the following hypotheses regarding SES and psychosocial factors at work. (1) We expected higher psychosocial demands in the higher SES. (2) We also expected higher levels of control, degrees of freedom, and possibilities for development in the higher SES. (3) We expected lower job insecurity in the higher SES. (4) With regard to social support, social relations, and other dimensions relating to the interpersonal relations at work we had no specific hypotheses.

MATERIAL AND METHODS

The National Danish Psychosocial Work Environment Study is based on responses to standardized questionnaires from a representative sample of 1,858 working Danes between 20 and 60 years of age (49% women, response rate 62%). Names and addresses were provided by the Central Person Register of Denmark. Two-thirds of the sample were allocated to receive a mailed questionnaire while we tried to reach the last third by telephone. (The possible response differences between these two groups will be analysed later.) The study had two purposes: first, to develop three standardized psychosocial questionnaires (a long version for researchers, a medium sized version for work environment professionals, and a short version for the workplaces); second, to get a detailed picture of the psychosocial work environment of the Danish workforce. The three questionnaires have now been developed and are being used by a great number of researchers, professionals, and workplaces in Denmark. This article is the first presentation in English of results from the study.

The individual questions in the questionnaire were collected from a number of established questionnaires in the UK, the USA, The Netherlands, Sweden, Finland, and Denmark. Also, a number of new questions were created and used for the first time. Our purpose was to create an instrument that could be used to describe and analyse all types of workplaces and yet yield a precise and comprehensive picture of the psychosocial work environment. After intensive theoretical discussions and statistical analyses (principal component factor analyses, analyses of internal reliability, and of ceiling or floor effects) we decided to use 19 scales to describe psychosocial work environment dimensions (Table I). Each scale was based on 2–10 questions, and almost all questions had five response options. (Further details on the questionnaires can be found on www.ami.dk/apss).

The 19 scales have many similarities to other questionnaires being used to assess the psychosocial work environment. There are, however, also some new features. First, we decided to include several demand scales (instead of only one as in most questionnaires). We planned to have one scale for emotional demands, but the statistical analyses demonstrated two distinct dimensions: emotional demands and demands for *hiding* emotions. Thus, the final questionnaire comprises five demand scales as shown in Table I. Second, we have included a number of *positive* dimensions relating to the psychosocial climate at the workplace such as workplace commitment, sense of community at work, quality of leadership, and feedback. Third, we have included the two dimensions meaning and predictability. We consider these two dimensions as "basic

Table I. *Main characteristics of the 19 scales used as measures of psychosocial dimensions of work: number of items per scale and Cronbach's alpha.*

Dimension	No. of items	Cronbach's alpha
Demands:		
Quantitative demands	7	0.80
Emotional demands	3	0.87
Demands for hiding emotions	2	0.59
Sensorial demands	5	0.70
Cognitive demands	8	0.86
Active and developmental work:		
Influence at work	10	0.83
Possibilities for development	7	0.82
Degrees of freedom	4	0.68
Meaning of work	3	0.77
Workplace commitment	4	0.74
Interpersonal relations and leadership:		
Social support	4	0.74
Social relations	2	0.65
Role clarity	4	0.77
Role conflicts	4	0.72
Predictability	2	0.78
Feedback	2	0.64
Sense of community at work	3	0.80
Quality of leadership	8	0.93
Job insecurity	4	0.61

Notes: $n = 1{,}858$. Respondents were assigned a value for a given dimension if they had answered at least half of the questions on the scale.

dimensions of stressors" (together with demands, influence, and support).

Table I shows that 14 of the 19 scales have Cronbach's alpha values for internal reliability of 0.70 or more, which is the standard conventional limit. Five of the scales have alphas between 0.59 and 0.68. These scales are very short with 2–4 items per scale, which is the main reason for these relatively low alphas. All scales were transformed so that the minimum value is 0 and the maximum 100 with equal weights given to the individual questions on the scale. Respondents who answered less than half of the questions in a scale were classified as non-responders with regard to the particular scale.

In Table I the 19 dimensions are grouped in four main categories: (1) demand dimensions; (2) dimensions on active and developmental work; (3) dimensions on interpersonal relations and leadership; (4) job insecurity. These four categories of dimensions were suggested by a number of factor analyses in which the 19 scales were treated as individual items. The similarity of the first three categories to the three dimensions of the demand-control-support model is, of course, striking.

In this paper the analyses are restricted to respondents who were working as employees at the time of the interview ($n=1{,}684$). The remaining 174 persons were self-employed or worked as apprentices. This group was divided into four levels of SES: Level I: White-collar workers with managerial positions ($n=209$); Level II: Other white-collar workers ($n=862$); Level III: Skilled blue-collar workers ($n=288$); Level IV: Unskilled and semi-skilled blue-collar workers ($n=325$).

The analyses were performed in two steps. In the first step we used analysis of variance (ANOVA) to check for interactions between SES and the two variables gender and age. Since the interaction analysis involved 38 tests (two types of interaction and 19 scales) and because of the large sample size we chose a significance level of 0.01 rather than the conventional level of 0.05 in order to guard against mass significance. In the second step we treated SES as an ordinal variable and used Spearman's correlation coefficients to test for monotone associations between the scales and SES.

Table II. *Associations between socioeconomic status and psychosocial factors at work.*

Socioeconomic status:					
Dimension:	I	II	III	IV	*p*-value*
Demands:					
Quantitative demands	55.4	44.8	42.4	37.3	***
Emotional demands	43.3	43.0	30.0	30.1	***
Demands for hiding emotions	32.3	32.9	26.7	25.4	***
Sensorial demands	58.7	64.1	67.5	63.0	***
Women	58.4	64.7	65.8	58.9	N.S.
Men	58.9	63.4	68.4	67.3	***
Cognitive demands	75.4	64.8	60.1	48.8	***
Active and developmental work:					
Influence at work	73.1	61.3	60.0	54.1	***
Possibilities for development	78.9	70.9	68.6	54.4	***
Degrees of freedom	79.0	62.4	65.2	55.7	***
Women	79.9	59.4	55.2	50.3	***
Men	78.6	66.9	70.3	61.4	***
Meaning of work	83.1	78.3	76.9	72.8	***
Workplace commitment	64.4	57.1	52.3	49.9	***
Interpersonal relations and leadership:					
Social support	64.4	69.5	69.2	66.3	N.S.
Social relations	74.5	67.2	72.1	66.6	N.S.
Role clarity	77.3	74.8	73.5	74.4	N.S.
Role conflicts	39.4	37.4	38.9	35.6	N.S.
Predictability	66.2	59.5	54.0	56.6	***
Feedback	39.6	38.9	37.7	38.0	N.S.
Sense of community at work	82.1	81.6	84.1	79.9	N.S.
Quality of leadership	57.0	57.3	54.1	55.1	*
Job insecurity	13.5	16.6	16.4	23.4	***

Notes: The *p*-values are based on Spearman's correlation coefficients: *$p<0.05$; **$p<0.01$; ***$p<0.001$; N.S. $p>0.05$.

RESULTS

The associations between SES and the 19 psychosocial work environment dimensions are summarized in Table II. We found significant interaction effects between gender and SES for two of the dimensions: sensorial demands ($p=0.006$) and degrees of freedom ($p=0.004$). For these two dimensions we show the results for the two genders separately. We found no significant interaction effects for age.

Four of the five demand scales are significantly and positively correlated with SES (higher demands in the higher levels of SES). The strongest positive associations are seen for cognitive demands (having to remember many things, to get many new ideas, to make quick decisions, etc.) and for quantitative demands (long working hours, time pressure, fast work pace, etc.). The scale for sensorial demands correlates negatively with SES (lower demands in the higher SES). This strong negative association is restricted to the male population, while the association among women is inversely U-shaped and non-significant.

The next five dimensions all show positive associations with SES in accordance with the hypothesis stated above. The higher the SES, the more influence at work, possibilities for development, degrees of freedom, meaning of work, and workplace commitment. The strongest associations are seen for possibil-

ities for development, influence at work, and degrees of freedom (women). With regard to degrees of freedom there is no gender difference among individuas with high SES, but a markedly lower level among women than among men from SES level V. The two questions on varied work/repetitive work are included in the scale on possibilities for development.

The following eight dimensions under the heading of "interpersonal relations and leadership" show a much less consistent and clear pattern. Only two of the scales – predictability (receiving adequate and relevant information about company plans for the future) and quality of leadership – show significant and (almost) stepwise gradients with the best working conditions in the higher SES levels. For the other scales the patterns are unclear and the *p*-values for trend are non-significant.

Finally, the scale for job insecurity shows a clear and significant association with SES in the expected directions: low insecurity in the higher SES.

The two figures (1 and 2) show the distribution of the four SES levels when considering two dimensions at the same time. First, Figure 1 shows a model where the two dimensions are quantitative demands and influence at work. This is very close to the well-known demand-control model proposed by Karasek (23) (in the Karasek terminology control is the combination of decision authority (influence) *and* skill discretion (possibilities for development)). Figure 1 shows that the four levels of SES follow the active–passive diagonal of the job strain model with level I as the most active group and level IV as the most passive. None of the SES levels is in the strain quadrant with high demands and low influence.

In Figure 2 we have constructed a similar model, but this time with *cognitive* demands and possibilities for development as the two dimensions. These dimensions seem to be highly relevant in the modern information society where more and more people work with symbols (computers, information, communication). In this model the four levels of SES follow a similar diagonal with high levels of cognitive stimulation and possibilities for development in SES I and very low levels in SES IV. In this figure SES IV seems to constitute a group rather isolated from the other three levels of SES.

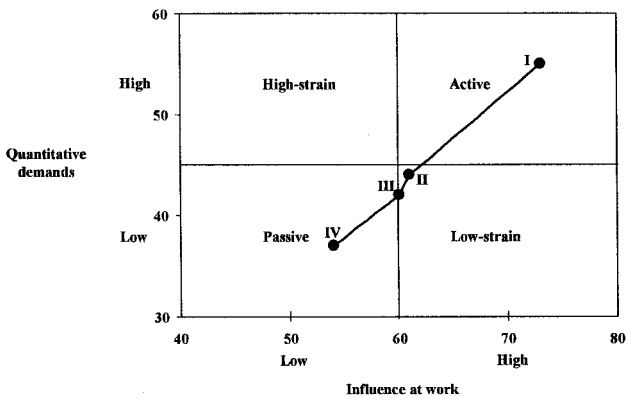

Fig. 1. Distribution of the four levels of SES according to quantitative demands and influence at work.

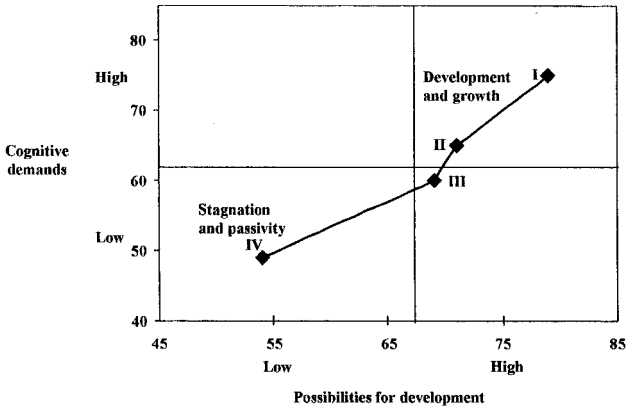

Fig. 2. Distribution of the four levels of SES according to cognitive demands and possibilities for development at work.

DISCUSSION

The study base

The present study is based on a large representative sample of adult Danish employees, and the scales constructed in connection with the study cover a very wide range of psychosocial work environment factors. Nevertheless, the study also has some weak features of which the relatively low response rate (62%) is the most serious. Response rates in general national surveys have been declining in Denmark and other countries during recent years. A likely consequence is that people with poor working conditions may be underrepresented in our study. Persons with foreign background and/or poor reading ability are also likely to be underrepresented. Further, it might be argued that we should have included violence, harassment, and bullying at work in our analyses. These factors were, in fact, included in the questionnaire although they were not developed as scales. Analyses of violence, harassment, and bullying showed that these sources of poor health and well-being were associated with specific jobs (such as jobs in the police, pubs and bars, psychiatric health care, and emergency wards) and had little relevance for the present paper.

The results

Our results support and elaborate earlier studies that included a smaller number of psychosocial factors at

work (3, 4, 8, 10, 15–22). With regard to demands at work, the picture is quite clear: We find higher job demands in the higher levels of SES. The only exception is sensorial demands (vision, movements, attention, precision). These demands are very high among, e.g., drivers, mechanics, and nurses. Results concerning the other four types of demands, particularly cognitive and quantitative demands, clearly support our initial hypothesis. To our knowledge this is the first study that has analysed the associations between SES and scales for emotional demands. Our two scales in this field showed a somewhat different picture. The *emotional demands* were particularly high among groups working with clients, patients, inmates, children, etc. (nurses, social workers, prison wards, teachers and similar groups). The demands for *hiding emotions* were also high in these groups, but equally high among those working with customers (bus drivers, bank assistants, cashiers, and waiters). Occupational groups working with material products or symbols had low values on both of these dimensions.

The next set of dimensions in Table II reveals an even clearer picture with regard to associations with SES. All five dimensions are strongly associated with SES, which means that employees with high SES experience higher influence, more possibilities for development, more degrees of freedom, more meaningful work, and a higher level of workplace commitment. The scales measuring these five dimensions are, of course, positively correlated and should be seen as a complex of positive factors that enrich the job of the employee. In the Danish discussion on psychosocial work environment the term "Developmental Work" (Det Udviklende Arbejde) is used to describe jobs with high levels of influence, possibilities for development, and meaningfulness.

In contrast, the third set of dimensions in Table II does not display any clear or consistent picture. These factors seem to reflect the individual jobs and also the individual workplaces and departments more than the class structure. This conclusion is supported by ongoing studies of absence and burnout at the Danish National Institute of Occupational Health. In these studies the dimensions of interpersonal relations and leadership show large variations from one workplace to the other, even within homogeneous industries or job groups (Borritz and Nielsen, personal communication).

Finally, the dimension of job insecurity shows the expected association with SES. This dimension reflects not only the objective job situation of the worker, but also the economic climate, the resources of the individual, and the laws and regulations governing the labour market. In Denmark the formal rules protecting workers against being fired are very weak. In recent years the number of unemployed has, however, decreased markedly and this has resulted in a significant reduction in job insecurity (24).

Potential impact on health

The next question is how the psychosocial factors included in this study might influence health. With regard to the demand variables the question is rather complex. High demands are generally believed to cause stress and disease. This idea is part of "mainstream" stress research as well as lay conceptions of stress. According to the demand-control model (23), psychological job demands are the main "stressor" while control is seen as a "buffer" that makes adequate coping possible for the worker. This notion of demands as stressful has, however, been challenged in a number of ways. First, demands have in many studies been measured using unsatisfactory methods, leading to questionable validity and high risk of information bias (25, 26). Second, a number of recent studies on job strain and coronary heart disease have shown no association between demands and risk of heart disease. In some studies high demands even seem to be protective (27). Many studies with other end-points have shown similar results. Third, the association between demands and health seems to be curvilinear with high risks among those exposed to high as well as low levels of demands. Fourth, the optimal level of demands (qualitative as well as quantitative) seems to depend heavily on the resources of the individual worker. Thus, demands that are too high for one person might very well be suitable or too low for another. In conclusion, demands cannot be regarded as "harmful" in themselves. Among individuals with high status who have many personal and social resources, demands are often perceived as challenges and contribute to growth and development. For these reasons we cannot conclude that the higher levels of job demands found in the higher SES levels should necessarily be considered as potentially harmful. In this connection it is also of some interest to note that analyses of the present (cross-sectional) database showed strong *positive* associations between cognitive demands and good health.

With regard to the next group of dimensions in Table II the situation is quite different. The literature on psychosocial factors, stress, and health is almost unanimous when it comes to dimensions such as influence, meaning, degrees of freedom, variety, and possibilities for development (23, 28–30). These dimensions seem to be health promoting not only in the sense that they prevent diseases and ill health but

also by promoting personal growth, development, and competence. The same can be said about most of the dimensions in the next section of the table, but this is less relevant in this context since these dimensions do not show clear and unequivocal associations with SES.

Finally, job insecurity is a well-established risk factor in the stress literature (31). A situation with job insecurity implies low control and low predictability, which are two of the fundamental dimensions of stressors (32). Also, job insecurity can be regarded as a "low reward" situation in the sense of the Siegrist effort–reward imbalance model (33).

Possibilities for action

As mentioned in the introduction of this article the goal of reduced inequality in health can be pursued in several ways. One of these ways is to improve the working conditions in general and the psychosocial work environment in particular. If this strategy is chosen, our analyses suggest that such improvements should focus on the concept of Developmental Work (in this study operationalized by such concepts as increased levels of influence, meaning, degrees of freedom, and possibilities for development). Such a strategy of job enrichment and development should be supplemented by efforts to increase the competence and qualifications of the workers in order to match the changing demands of the jobs. Also, decreased job insecurity could be a potential way of reducing job-related stress and enhancing occupational rewards. Such a strategy is in accordance with the Copenhagen Declaration: "Reducing Social Inequalities in Health" (34).

A strategy focusing on such improvements in the psychosocial work environment would not only reduce stress and ill health, but also reduce absence from work and labour turnover, lead to increasing productivity and creativity, and result in more personal growth and development (29, 30, 35). In spite of these great potential benefits, interventions leading to more active and developmental work are quite rare and are often met with resistance and barriers of many kinds (36, 37). Dimensions such as influence and degrees of freedom are not just "factors" that can be changed without consequences for the whole structure in the labour market. In fact, it can be argued that influence or control is exactly what constitutes socioeconomic or class differences. Hence, changing the organization of work is changing the hierarchy of society.

One has only to imagine what the consequences would be of giving bus drivers or air pilots the degrees of freedom of a researcher. That would certainly eliminate what is left of regular bus and air traffic. Or imagine that seamstresses had the influence and meaning of work of an executive director. Perhaps the shirts would be more fancy, but who would pay more than $500 for a shirt?

These examples illustrate that the structural components of the organization of work are not just "factors" that can be changed in the same way as one may choose to eat less fat or more fibre. On the other hand, these remarks should not lead to passivity or resignation. In fact, intervention research is rapidly developing in quantity as well as in quality, and many good examples already demonstrate that the organization of work *can* be changed in directions beneficial to workers' health and leading to reduced inequality in health (36–44).

Instead of focusing on the potential barriers and problems in this connection, perhaps it would be more fruitful to consider the price to be paid if we do nothing about the fundamental differences in psychosocial working conditions. The two Figures (1 and 2) illustrate this point. A laissez-faire policy where the organizational structure is left unchanged will tend to increase social exclusion and decrease the social cohesion of the industrialized societies. Figure 2, in particular, illustrates what will happen if we disregard these issues: The unskilled workers will experience increasing problems with cognitive job demands and demands for change in a future society based on information technology. At the same time the material production will be moved to other countries in the global economy, which means that the unskilled workers will be the first victims of downsizing, privatization and outsourcing.

Thus, there are many reasons for giving psychosocial working conditions high priority in future prevention strategies, in spite of the problems mentioned above. The best way to identify and overcome barriers and difficulties in this important field is to launch well-designed intervention projects in collaboration with workers and employers.

ACKNOWLEDGEMENTS

This study was supported by the Danish Working Environment Fund.

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