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Work Stress and Health

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The nature of work has changed considerably over the past several decades in economically advanced societies. Industrial mass production no longer dominates the labor market. This is due, in part, to technological progress, and in part to a growing number of jobs available in the service sector. Many jobs are confined to information processing, controlling, and coordination. Sedentary rather than physically strenuous work is becoming more and more dominant. New management techniques, including quality management, are introduced, and economic constraints produce work pressure, rationalization, and cut-down in personnel. These changes go along with changes in the structure of the labor market. More employees are likely to work on temporary contracts, on fixed term, or in flexible job arrangements. Many instrumental activities that qualify as work are no longer confined to the conventional type of workplace located within an enterprise or organization, particularly with the advent of advanced communications technology (Cooper 1998). The workforce is getting older, and an increasing proportion of women enter the labor market, with an increase of double exposure among women with children or, more generally, in dual career families. Most importantly, over-employment in some segments of the workforce is paralleled by under-employment, job instability, or structural unemployment in other segments. This latter trend currently hits the economically most advanced societies as well as economies that lag behind. Overall, a substantial part of the economically active population is confined to insecure jobs, to premature retirement, or job loss.

THE CHANGING NATURE OF WORK AND THE ROLE OF COMPARATIVE MEDICAL SOCIOLOGY

Why is work so important for human well-being, and how does work contribute to the burden of stress and its adverse effects on health? In all advanced societies work and occupation in adult life are accorded primacy for the following reasons. First, having a job is a principal prerequisite for continuous income and, thus, for independence from traditional support systems (family, community welfare, etc.). Increasingly, level of income determines a wide range of life chances. Secondly, training for a job and achievement of occupational status are the most important goals of socialization. It is through education, job training, and status acquisition that personal growth and development are realized, that a core social identity outside the family is acquired, and that goal-directed activity in human life is shaped. Thirdly, occupation defines an important criterion of social stratification. Amount of esteem in interpersonal life largely depends on type of job and level of occupational achievement. Furthermore, type and quality of occupation, and especially the degree of self-direction at work, strongly influence personal attitudes and behavioral patterns in areas that are not directly related to work, such as leisure or family life (Kohn and Schooler 1983). Finally, occupational settings produce the most pervasive continuous demands during one's lifetime, and they absorb the largest amount of active time in adult life, thus providing a source of recurrent negative or positive emotions. It is for these reasons that stress research in organizations where paid work takes place is of particular relevance.

It is important to recognize that traditional occupational hazards, such as exposure to toxic substances, heat, cold, or noise, are no longer the dominant challenges of health at work. Rather, distinct psychological and emotional demands and threats are becoming highly prevalent in modern working life. There has been a recognition that the importance of work goes beyond traditional occupational diseases and, indeed, it is likely that work makes a greater contribution to diseases not thought of as "occupational" in conventional terms. At a descriptive level, recent reports find that, for instance, almost half of the workforce is exposed to monotonous tasks or lack of task rotation. Fifty percent work at a very high speed or to tight deadlines. Thus, over- and under-load at work are highly prevalent. Every third employee has no influence on work rhythm, and every fifth is exposed to shiftwork (Paoli 1997). There is now growing awareness among all parties of the labor market that psychosocial stress at work produces considerable costs, most importantly a high level of absenteeism, reduced productivity, compensation claims, health insurance, and direct medical expenses. Permanent disability and loss of productive life years due to premature death add to this burden. In the European Union, the costs of stress to organizations and countries are estimated to be between 5 to 10 percent of GNP per annum (Cooper 1998). At the same time scientific evidence on associations between psychosocial stress at work and health is growing rapidly.

What is the role of comparative medical sociology in this process? To start, sociological theory offers basic concepts to analyze work-related activities in

terms of social role, social status, power, social exchange, and social identity. Based on these concepts more refined theoretical models can be developed to identify those specific sociological aspects of working life that have a direct impact on health. The next two paragraphs briefly summarize three such sociological theories and they give a selective overview of empirical evidence on adverse effects on health produced by stressful work.

Essentially, comparative medical sociology in this field is confronted with two tasks: first, to apply these concepts, most importantly in the frame of social-epidemiological studies, in different countries to assess the health burden produced by stressful work. Comparative research in this perspective provides essential information on socioeconomic and sociocultural determinants of the relationship between workplace stress and health. This also implies a comparative test of the theoretical models themselves to study their similarities and differences, and to explore whether their combined effects on health are much stronger compared to the separate effect of each model.

A second task of comparative medical sociology in this field concerns policy implications of these research findings. What are the consequences of these results for worksite stress prevention and health promotion? What intervention strategies have been developed and implemented in different countries? What are the determinants of success and failure in this policy area? It is hoped that by coping with these two tasks future medical sociology may be able to further strengthen its case, including its impact on theoretical and methodological developments in general sociology.

THEORETICAL MODELS OF WORK STRESS

Before describing some prominent theoretical models of occupational stress the basic terminology needs to be clarified. Much critique has been raised about the ambiguity of the term "stress." To avoid this, the following terms were suggested: "*stressor*," which is defined as an environmental demand or threat that taxes or exceeds a person's ability to meet the challenge. Stressors, in particular novel or dangerous ones, are appraised and evaluated by the person, and as long as there is some perception of agency on the part of the exposed person efforts are mobilized to reverse the threat or to meet the demands. Such efforts are termed "*coping*," and they occur at the behavioral (even interpersonal), cognitive, affective, and motivational level. "*Strain*" is defined as the person's response to an unmet stressor in psychological and physiological terms. Psychological responses relate to negative emotions (e.g. anger, frustration, anxiety, helplessness) whereas physiological responses concern the activation of the autonomic nervous system and related neuro-hormonal and immune reactions. Clearly, when judging strain, the quality and intensity of a stressor as well as the duration of exposure have to be taken into account, as well as individual differences in coping and in vulnerability to strain reactions. Recent research indicates that only part of human strain reactions are subject to conscious information processing whereas a large amount bypasses awareness. The term "*stressful experience*" is introduced to delineate that part of affective processing that reaches

consciousness. Stressful experiences at work are often attributed to adverse working conditions created by exposed people themselves. While they usually refer to some common sense notions of “*stress*” it is crucial to note that these attributions differ from the explanatory constructs of stressful experience at work that have been identified by science.

Medical sociological research on work-related stress differs from traditional biomedical occupational health research because of the fact that stressors cannot be identified by direct physical or chemical measurements. Rather, theoretical models are needed to analyze the particular nature of the psychosocial work environment. A theoretical model is best understood as a heuristic device that selectively reduces complex reality to meaningful components. Components are meaningful to the extent that they provide the material from which the researcher can deduce explanations and, thus, produce new knowledge. Ideally, a theoretical model of psychosocial stress at work with relevance to health should encompass a wide variety of different occupations and should not be restricted to a specific time or space.

Person–Environment Fit

The first significant sociological contribution to modern occupational stress research dates back to studies conducted more than 30 years at the Institute for Social Research at the University of Michigan. They were guided by a theoretical concept termed “person–environment fit” (Caplan et al. 1980). Stressful experience at work, in this model, is conceptualized in two ways: first, as an experience where the work environment does not provide adequate supplies to meet the person’s needs; secondly, as an experience where the abilities of the person fall short of demands that are prerequisite to receiving supplies. In both conditions stressful experience results from a misfit between needs or abilities on the part of the working person and demands or opportunities on the part of the work environment. In particular, this is the case if job opportunities fail to fulfill the person’s needs as a consequence of unmet demands. As an example, a worker with limited skills is excluded from any promotion prospects even though he would badly need better pay to meet his level of living.

This approach represents a type of theorizing that is termed process theory. As such, it offers opportunities to be applied to a wide range of work but does not specify the particular content dimensions on which person and environment should be examined (Edwards, Caplan, and van Harrison 1998). As its basic terms are rather broad, it may be difficult to reach a consensus on how to measure core constructs. Nevertheless, person–environment fit offers an elaborate set of propositions of how critical constellations of work-related environmental and personal characteristics contribute to the development of stressful experience.

Demand, Support, and Control

A second, highly influential sociological model was introduced by Karasek (1979). This model is based upon the premise that strain occurs when there is

high psychological work demand in combination with a low degree of task control. Low control at work is defined in terms of low level of decision latitude (authority over decisions) and a low level of skill utilization. While high demand/low control jobs are assumed to produce strain in those exposed (“job strain”), this two-dimensional model offers a “salutogenic” in addition to a “pathogenic” perspective: jobs defined by high demands and a high level of decision latitude and skill utilization (“active jobs,” see Karasek and Theorell 1990) promote personal growth and feelings of mastery or self-efficacy. This part of the model is rooted in health-psychological and stress-physiological research on personal control and well-being that has attracted wide attention from several scientific disciplines (Stephens and Appels 1989; Skinner 1996; Spector 1998). More recently, the two-dimensional demand–control model was modified to include a third dimension, social support at work. The instrumental, cognitive, and emotional change at work was shown to buffer strain reactions (House 1981; Johnson and Hall 1988). Accordingly, highest level of strain – and strongest effects on health – are expected in jobs defined by high demands, low control, and low social support (Karasek and Theorell 1990).

Demand–control theory offers a sociological conceptualization of work stress that is restricted to the situational aspects of the psychosocial work environment, without taking into account aspects of individual coping. In terms of policy implications this restriction has the advantage of pointing to the structural level of measures of stress prevention at work (see below).

Effort–Reward Imbalance

A third, more recently developed model, the model of effort–reward imbalance, is concerned with distributive justice, that is with deviations from a basic “grammar” of social exchange rooted in the notions of reciprocity and fairness (Siegrist, Siegrist, and Weber 1986; see also Cosmides and Tooby 1992). This model assumes that effort at work is spent as part of a socially organized exchange process to which society at large contributes in terms of rewards. Rewards are distributed by three transmitter systems: money, esteem, and career opportunities including job security. The model of effort–reward imbalance claims that lack of reciprocity between costs and gains (i.e. high “cost”/low “gain” conditions) elicits sustained strain reactions. For instance, having a demanding but unstable job, achieving at a high level without being offered any promotion prospects, are examples of high cost/low gain conditions at work. In terms of current developments of the labor market in a global economy, the emphasis on occupational rewards including job security reflects the growing importance of fragmented job careers, of job instability, under-employment, redundancy, and forced occupational mobility, including their financial consequences.

According to this model, strain reactions are most intense and long-lasting under the following conditions: (a) lack of alternative choice in the labor market may prevent people from giving up even unfavorable jobs, as the anticipated costs of disengagement (e.g. the risk of being laid-off) outweigh costs of accepting inadequate benefits; (b) unfair job arrangements may be accepted for a certain period of one’s occupational trajectory for strategic reasons – by doing

so employees tend to improve their chances for career promotion at a later stage; (c) a specific personal pattern of coping with demands and of eliciting rewards characterized by overcommitment may prevent people from accurately assessing cost–gain relations. “Overcommitment” defines a set of attitudes, behaviors, and emotions reflecting excessive striving in combination with a strong desire of being approved and esteemed (Siegrist 1996). At the psychological level, experience of effort–reward imbalance is often paralleled by feelings of impaired self-esteem, whereas a balance experienced is assumed to promote “salutogenic” feelings of satisfaction, enhanced self-worth, and success. While specific individual coping characteristics (overcommitment) are included in this model it nevertheless offers a clear distinction of the extrinsic and the intrinsic component both at the conceptual and at the operational level.

A final comment on this model concerns its measurement. As stated above, a distinction is made between “strain” and “stressful experience” as evidence obtained from neuroscience tells that only part of strain reactions reach the level of conscious stressful experience (LeDoux 1996). This information to some extent contradicts the currently dominant cognitive stress theory that claims that strain experience is contingent upon conscious appraisal (Lazarus 1991). According to this new evidence, the effort–reward imbalance model attempts to include both types of information, “stressful experience” and “strain”: although relying on the respondent’s subjective judgments of stressful experience related to the efforts and rewards at work the researcher transforms this information into summary measures of strain according to a theory-based algorithm (see Peter, Geiler, and Siegrist 1998).

WORK STRESS AND HEALTH: SELECTED EMPIRICAL EVIDENCE

The majority of published medical sociological studies on associations of work stress and physical health (most importantly cardiovascular health) are based on the demand–control model or the effort–reward imbalance model. Therefore, this selective review of empirical evidence is restricted to these two models (for a recent review of person–environment fit research see Edwards, Caplan, and van Harrison 1998).

Demand–Control Model

A large number of prospective and cross-sectional studies were conducted to test the job strain model with respect to health outcomes. Almost thirty studies, the majority of which yielded positive results, at least as far as the control dimension of the model is concerned, were related to coronary heart disease or cardiovascular risk factors such as hypertension. Other investigations demonstrated associations with musculoskeletal disorders and mild psychiatric disorders, among others (for summary see Theorell and Karasek 1996; Schnall et al. 1998; Marmot et al. 1999). Two sets of findings deserve particular attention; the cohort studies exploring new manifestations of coronary heart disease, and the studies measuring ambulatory blood pressure on and off work.

Of the ten prospective investigations six documented positive findings with regard to low job control or the combined effect of high demand and low control. Odds ratios ranged from 1.4 to 2.6. Most of these large-scale studies were conducted in Sweden or in the United States, and one in the United Kingdom. In multivariate statistical analysis effects of potential confounders were controlled. It should also be mentioned that a few studies revealed no effects in the expected direction, but some of these used inappropriate measures of job strain.

Whereas prospective epidemiological investigations provide a powerful argument in favor of a “causal” relationship between work stress and heart disease, other study designs are needed to elucidate underlying mechanisms. One such study design is 24-hour ambulatory blood pressure monitoring. In fact, five carefully executed studies revealed a significant positive effect of exposure to job strain upon ambulatory systolic blood pressure recorded during work, and blood pressure was also found to be significantly elevated during leisure non-work time, among those exposed to job strain. In one study with a three-year follow-up it was found that exposure to job strain at baseline and three years later showed a 11.1 mm Hg effect on workplace and home systolic blood pressure compared to those unexposed at both times. Furthermore, those men who reported being exposed to job strain at baseline but not three years later showed a significant drop in blood pressure three years later (Schnall et al. 1998).

In addition to the stress physiological mechanisms and increased illness susceptibility among people suffering from stress at work may be mediated by unhealthy behaviors such as increased cigarette smoking or unhealthy diet. Several studies found evidence along these lines (Karasek and Theorell 1990). In conclusion, a body of literature has accumulated that strongly suggests a “causal” association between job strain and cardiovascular risk and disease. Less evidence is currently available on other disease outcomes. It should also be mentioned that most consistent effects are observed in middle aged blue-collar men, as opposed to white-collar men and to economically active women.

Effort–Reward Imbalance Model

Twelve independent investigations have tested the effort–reward imbalance model so far by applying either prospective or cross-sectional epidemiological study designs. Major health outcomes were incident coronary heart disease, prevalence of cardiovascular risk factors, measures of subjective health, and functioning or mild psychiatric disorders. Not all studies used identical (i.e. the originally designed) measures, but all tested the core theoretical assumption that a co-manifestation of indicators of high effort *and* indicators of low reward was required to produce the strongest health effects. A brief summary of these major findings is given here. First, based on current evidence and according to the occupation under study, between 10 percent and 40 percent of the workforce suffer from some degree of effort–reward imbalance at work, and at least a third of them are characterized by sustained intense strain reactions following exposure to effort–reward imbalance.

Secondly, with regard to future incident coronary heart disease, effort–reward imbalance at work was associated with a 2.7 to 6.1 fold elevated relative risk compared to those who were free from chronic strain at work. This excess risk could not be explained by established biomedical and behavioral risk factors, as these variables were taken into account in multivariate statistical analysis (Siegrist et al. 1990; Lynch et al. 1997; Bosma et al. 1998). Thus, the psychosocial work environment as measured by this model is associated with at least a moderate relative risk of incident coronary heart disease that is independent of established biomedical and behavioral cardiovascular risk factors. However, restricting the analysis to this association would result in an underestimation of the total burden on cardiovascular health produced by adverse psychosocial work conditions. This is due to the fact that chronic psychosocial strain at work in terms of effort–reward imbalance is also associated with relevant cardiovascular risk factors, e.g. high blood pressure (hypertension), high levels of blood lipids, or a co-manifestation of these two risk factors (Peter and Siegrist 1997; Siegrist et al. 1997; Peter, Geiler, and Siegrist 1998). These findings demonstrate that the explanatory power of the model goes beyond disease manifestation by enabling a more comprehensive definition of people at risk at an earlier stage of disease development.

Thirdly, effort–reward imbalance was associated with moderately elevated risks of impaired physical, mental, and social functioning (odds ratios ranging from 1.40 to 1.78 in men and from 1.81 to 2.33 in women; Stansfeld et al. 1998) and with moderately elevated risks of newly reported mild psychiatric disorders (odds ratios ranging from 1.67 in women to 2.57 in men; Stansfeld et al. 1999) in the Whitehall II study. Additional evidence along these lines comes from cross-sectional studies, confirming that the explanatory power of the model covers more than some specific physical diseases and biomedical risk factors; it also includes aspects of mental health and of physical, mental, and social functioning (Peter et al. 1998). In other words, an estimation of the total burden of health produced by occupational strain, as measured by this model, by far exceeds the amount identified by studies that focus on one single outcome measure.

Comparative Studies

Comparative studies across countries using identical measures of work-related strain are now underway. So far, most investigations were conducted in northern Europe, in the United States, Canada, or Japan; few are available from rapidly developing countries or even from countries that lag behind in economic terms (Karasek et al. 1998). Overall, preliminary findings confirm that substantial similarity in the amount of job stress is found across countries. Yet, the prevalence of work-related stress, as measured by both models, is higher among lower socioeconomic groups, thus pointing to a possible contribution of these models toward explaining part of the increased health burden observed among economically active populations with low socioeconomic status (Marmot et al. 1999).

Gender is another important determinant of the associations between work-related stress and health. In a majority of studies effects were substantially

stronger in men than in women. The complexities of gender (role)-specific effects are still poorly understood, but part of the explanation can be attributed to inadequate conceptualization of the strain evolving from work/non-work interface including double exposure to work and family in women (Ort-Gomer and Chesney 1997).

Cross-cultural research in this area holds promise for further knowledge on social determinants of the ways in which work affects health. For instance, in Europe, a clear north-south differentiation is seen with respect to work characteristics where physical working conditions are less favorable in the south, but psychosocial job demands are highest in northern countries (Kompier and Cooper 1999).

Along these lines comparative tests of the work stress models are desirable. Such tests provide an opportunity to study their separate and combined effects on health outcome. In addition, these models might be extended beyond the work role to include other core social roles in adult life such as family and marital roles. In fact, preliminary evidence from a large-scale study in Sweden indicates that combined effects on cardiovascular health produced by the job strain model and the effort-reward imbalance model are stronger compared to the separate effects of each model (Peter et al. 1999). Moreover, in a British study mentioned (Bosma et al. 1998) it was found that the demand-control model (the control dimension only) and the effort-reward imbalance model were equally strong, independent predictors of reports of incident coronary heart disease when appropriate statistical controls were performed.

POLICY IMPLICATIONS IN A COMPARATIVE PERSPECTIVE

Overall, worksite health promotion activities are realized with little concern about scientific advances obtained in the field of occupational stress research. By and large they are focused on changes in individual health behavior or in traditional occupational health concerns (e.g. toxic agents or technical safety), ignoring the powerful effects of work organization and labor-market conditions on health. Eventually this may change in the future as all three models described above (as well as additional models not mentioned in detail, for summary see Cooper 1998) provide a rationale for evidence-based preventive activity.

Person-environment fit theory concludes that work demands need to be tailored according to the worker's abilities. This involves both specific measures of organizational development and of person development. Moreover, organizational interventions must suit the needs of affected individuals that are closely linked to the work role (e.g. motivation, learning, satisfaction; Edwards et al. 1998). In the demand-support-control model, special emphasis is put on autonomy, skill discretion, and personal growth. Measures of work reorganization include job enlargement, job enrichment, skill training, enhanced participation and teamwork (Karasek and Theorell 1990). Practical implications of the effort-reward imbalance model concern the development of compensatory wagesystems, the provision of models of gain sharing, and the strengthening of non-monetary gratifications. Moreover, ways of improving promotional

opportunities and job security need to be explored. Supplementary measures are interpersonal training and skill development, in particular leadership behavior.

A sociological perspective of innovations in this field must take into account the political, legal, economic, and cultural constraints operating in individual countries. For instance, a recent comparative analysis of strategies of work stress prevention in eleven European countries identified three separate clusters of countries (Kompier and Cooper 1999). A first cluster, consisting of Sweden, Finland, and the Netherlands, already pays a lot of attention to the topic by incorporating the psychosocial factors at work into their legal framework on working conditions. Moreover, systematic data on these aspects is collected and intervention measures are promoted. In a second cluster, consisting of Belgium, Denmark, United Kingdom, Germany, and Ireland, the issue of work stress and health is on the political agenda, but decisive steps concerning legislation, monitoring, and intervention have not yet taken place. The third cluster is composed of southern European countries (Italy, Greece, and Portugal). In these countries work stress is not yet recognized as an important policy issue.

In addition to describing the global situation in the 11 European countries the study of Kompier and Cooper (1999) analyzed key factors of successful implementation of this social innovation, e.g. in leading enterprises in most advanced countries. These factors were: (1) a stepwise and systematic approach to the problem including adequate risk analysis (in this step, scientific evidence and skills obtained from medical sociology and social epidemiology are most useful); (2) a combination of situational (work-directed) and personal/interpersonal (worker-directed) measures; (3) a participative approach involving both employees and (middle) management; (4) top-management support by incorporating preventive activities into regular company management.

In conclusion, medical sociological research on work stress and health has witnessed substantial progress in recent past. Its theoretical concepts and empirical results contribute to the accumulation of an impressive body of knowledge, whose impact on policy, in terms of implementing worksite stress prevention programs, is now growing. Despite these advances, the discipline is confronted with important challenges, both at the scientific and policy level.

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