

Chapter 5.

The Stressful Workplace, Mental and Physical Health, and the Problem of Prevention

Daniel C. Ganster, University of Arkansas

For many people, work occupies more time and attention than any other sphere of their life. In many ways, work is central to an individual's self-concept, and success or failure in the workplace has profound effects on material well being and social status. For this reason, scholars have examined conditions in the workplace as well as the nature of work itself to find explanations for mental and physical well being. Much of this research has been under the general rubric of work stress, and work stress literature forms the basis of this article. My objectives are to (a) summarize recent studies that have attempted to discover important work experiences, or job demands, that play an etiologic role in mental and physical health, (b) discuss the impact of demographic changes in the workforce, (c) review the success of interventions that address these demands, and (d) enumerate the prospects for conducting prevention research as well as the important constraints that investigators in this area face.

Throughout this paper, I will focus on variables associated with conditions of work and the work place itself, and thus my discussion concerns persons who have jobs. I will not address the related concerns of unemployment and job loss except when they create stresses, such as job insecurity and role overload, for those still employed. Although I will not discuss the effects of unemployment itself, continuing trends in corporate downsizing and restructuring have potentially great effects on jobholders and thus will form a part of this review.

Theoretical Rationale for Studying Work Conditions

A logical starting point is a discussion of the underlying theoretical rationale for assuming that demands in the workplace might be important in determining mental and physical health. While many theoretical perspectives would point the investigator to the workplace to seek out conditions that could affect well being, this research has been guided by the "stressful job demands" perspective, whose roots can be found in Selye's General Adaptation Syndrome (GAS; Selye, 1976). This perspective assumes that various environmental demands on individuals require them to adapt, and such adaptation takes energy. Demands that exceed a person's ability to adapt, because of either severity or duration, lead to a breakdown of the mental and physical system. The GAS perspective provides a general underlying rationale, but it does not give a specific road map of particular demands that are important and generalizable across different jobs and organizational settings. The researcher needs a content theory that specifies the nature of the demands that are likely to matter most. The most influential theory in recent years is the job decision latitude, or demands-control, model (Karasek, 1979).

In its basic form, the model specifies two broad constructs that can vary independently in the work environment. Job *demands* are defined as psychological stressors such as requirements for working fast and hard, having a great deal to do, not having enough time, and having conflicting demands. These are psychological demands and not physical ones. A fast and hectic work pace may impose physical requirements that lead to fatigue, but the psychological effects of this workload (e.g., the anxiety associated with the need to maintain the work pace and the associated consequences of failing to complete the work) cause the stress-related outcomes predicted by the model. Job *decision latitude* comprises two components: the worker's authority to make decisions on the job (decision authority), and the variety of skills used by the worker on the job (skill discretion). Operationally these two components are combined into one measure of decision latitude or control.

The first hypothesis of the model is that "strain," which is a stressful condition that leads to mental and physical health problems, occurs when jobs are simultaneously high in demand and low in control. High demands produce a state of arousal in the worker that would normally be reflected in such responses as increased heart rate or adrenaline excretion. When there is a constraint on the responses of the worker, as would occur under conditions of low control, the arousal cannot be appropriately channeled into coping response and thus produces an even greater physiological reaction for a longer time. The second hypothesis is that positive outcomes (motivation, learning, and healthful regeneration) occur when an individual occupies an "active" job—one that has both a high level of psychological demands and a high level of control. The demands-control model almost completely dominates the occupational epidemiology literature concerned with work stress (Kristensen, 1989) and it has formed the basis for numerous studies in the organizational literature. Evidence for the buffering hypothesis has been mixed, but overall, control appears to be an important factor regarding employee well being (Ganster, 1989).

The job decision latitude model evolved from the activation theory work done by Frankenhaeuser and her colleagues in Sweden (Frankenhaeuser, 1979; Frankenhaeuser & Gardell, 1976). Based on the activation theory proposition that performance, mental efficiency, and well being are maximized at some intermediate level of physiological activation, their studies focus on working conditions that are likely to produce either underload or overload. The primary independent variables of interest in their lab and field studies include work pace, attentional demands, control over pacing and other working conditions, and underutilization of skills.

Dienstbier (1989) advanced this theoretical perspective and proposed a theory of physiological toughening, which has formed the basis for theories about the effects of long-term exposures to uncontrollable psychosocial demands in the workplace (Schaubroeck & Ganster, 1993). Dienstbier (1989) starts by articulating a more complex picture of physiological arousal and how it affects well being. Investigators often regard arousal as being unidimensional. Cannon's (1914) "fight-flight" model and Selye's (1936) refinements of it within the GAS suggest a single form of nonspecific response to stressors. Mason (1968), however, emphasized the difference between adrenal-cortical and adrenal-medullary arousal systems in terms of what they indicate about the nature of the stress response.

- The adrenal-cortical system is activated when the pituitary gland releases adrenocorticotropin into the blood, which in turn stimulates the adrenal cortex to release glucocorticoids such as cortisol
- The adrenal-medullary arousal system refers to a pathway originating with the hypothalamus and ending in the stimulation of the adrenal medulla, which releases the peripheral catecholamines (PCs) adrenaline and noradrenaline.

A healthy individual experiences low baseline levels of arousal. When faced with a challenging demand, there is a high PC arousal response (change from baseline) and a relatively small adrenal-cortical arousal response. At the termination of the demand, both types of arousal return relatively quickly to baseline levels. (Figure 1) Thus, high adrenal-medullary activity suggests a high level of active coping with a challenging demand. This activity does not presage later health problems or even subjective distress. In fact, adrenal-medullary arousal is positively associated with various facets of immune system functioning (Anisman & LaPierre, 1982). For example, natural killer cell activity has been enhanced by infusion of noradrenaline in rats (Solomon, Kay, & Morley, 1986). As described by Dienstbier (1989), PCs are major components of the sympathetic nervous system. Arousal of these stress hormones is often critical for responding adaptively to environmental demands. Cardiovascular arousal (e.g., heart rate, blood pressure responses) tends to correspond with PC arousal, as do other peripheral sympathetic nervous system responses (e.g., skin temperature response).

On the other hand, cortisol elevations are associated with passive coping (e.g., avoidance) when an individual has difficulty responding to demands. Cortisol responses are associated with fear, anxiety, and depression (Dienstbier, 1989), and Antoni (1987) suggests that chronic cortisol elevation can lead to suppression of immunological functioning and to mental health problems such as depression.

Drawing on a wide body of human and animal research, Dienstbier (1989) described the role of conditioning by chronic and intermittent stress exposures as a precursor to adrenal-cortical and adrenal-medullary responses to challenge. Intermittent, controllable exposures to challenging demands (e.g., aerobic exercise, cold temperature) promote adrenal regeneration (i.e., "toughening") of the individual. Although the complex micromediation mechanisms associated with this phenomenon are beyond the scope of this paper, this toughening presentation describes a regenerative process that is represented by (a) lower resting base rates on both the adrenal-cortical and adrenal-medullary systems, (b) more adrenal-medullary (e.g., cardiovascular and PC) responsivity to challenge, (c) less adrenal-cortical responsivity to challenge, and (d) rapid recovery to baseline levels of both systems following removal of the challenge. This pattern corresponds to that illustrated in Figure 1.

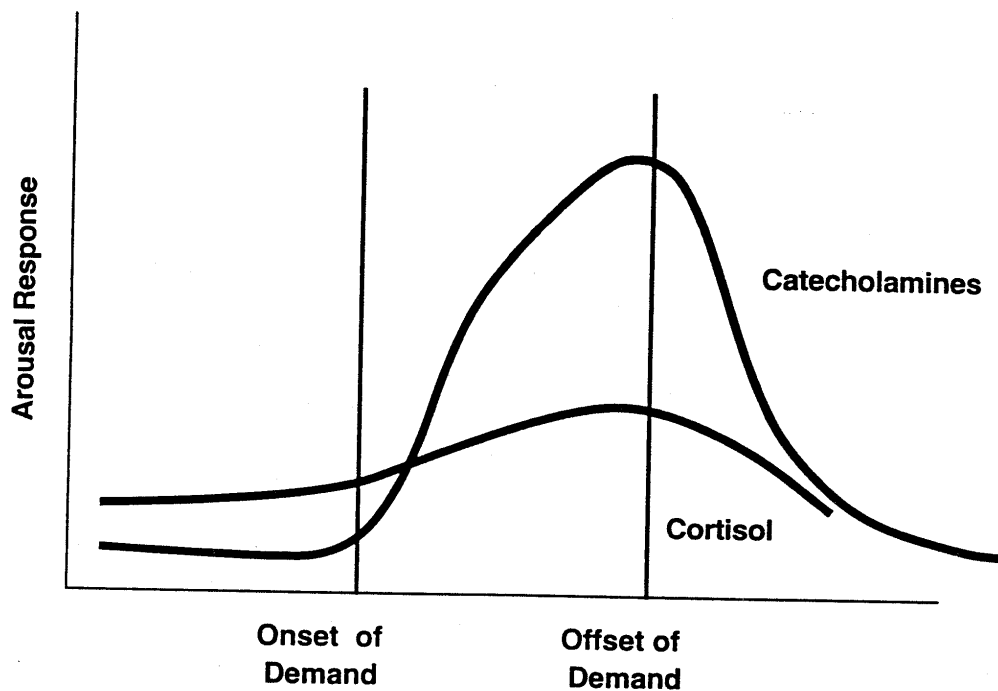


Figure 1. Arousal Response of a Healthy Individual

The PC arousal components of this process, as they occur in humans, were illustrated in three studies of aerobic trainees reported by Dienstbier, LaGuardia, Barnes, Tharp, and Schmidt (1987), who found that aerobic conditioning strengthened the PC arousal response to mentally challenging demands. That is, intermittent exposure to controllable stressors (aerobic exercise) led to a toughening process.

Dienstbier's (1989) theory of physiological toughening poses intriguing implications for how psychological demands in the workplace affect the health and effectiveness of workers. Whereas Dienstbier concentrated mostly on the toughening effects of intermittent and controllable demands, this theory could also explain the effects of exposure to demands that were chronic and uncontrollable, precisely the kinds of stressors highlighted by the job decision latitude model. An "untoughening" process (Ganster, 1991) was thus proposed in which chronic exposure to uncontrollable demands leads to a conditioning of sympathetic nervous system responses to demands in general. Individuals with such exposure develop a reduced capacity to cope physiologically with subsequent challenging demands. Relative to a healthy individual, a chronically stressed person shows higher resting base rates of both arousal systems. At the onset of a demand a chronically stressed individual shows a small PC arousal response and a large adrenal-cortical response. At the termination of the demand, both arousal systems show a poor rate of recovery to baseline levels.

This reduced capacity has several important implications. First, degeneration in responsiveness can impede an individual's ability to perform challenging tasks effectively and can lead to an increase in workplace hazards. Second, this diminished capacity reduces the individual's ability to cope actively with stressful demands. The inability to cope effectively with work stressors is theorized to determine whether the exposures result in health decrements over time. In sum, these processes suggest an interaction model in which chronic and uncontrollable work environment demands not only lead to poor health, but also diminish adaptive physiological responses.

Thus, over time, work stressors become more harmful to an individual as the capacity to respond to them is reduced. Consider the case of an air traffic controller. A crisis involving multiple aircraft on a collision course presents a stressful challenge that requires a rapid and strong physiological response from the adrenal-medullary system. This acute stressful demand differs from the chronic demands that the controller might experience from changing work shifts, infrequent breaks, and continually overloading demands. Individuals chronically stressed in this way are predicted to become untoughened, losing their ability to muster the strong adrenal-medullary response needed to effectively cope with the acute challenges that occasionally arise. Maladaptive conditioning depletes the individual's coping capacity and makes stressful demands even more taxing and damaging.

There is encouraging empirical support for the underlying toughening model proposed by Dienstbier (1989). The model's ability to explain the effects of work stressors, however, is only beginning to be evaluated (Schaubroeck & Ganster, 1993).

Empirical Support for the Health-Impairing Effects of Work Demands

The empirical literature testing the links between work demands and mental and physical health is voluminous and is reviewed and compiled on a regular basis (see, for example, Ganster & Schaubroeck, 1991). I will only make a summary review of this vast array of empirical work in this paper and provide some representative illustrations.

Controversies in this literature have been concerned less with theoretical debate than with methodological issues that make the interpretation of reported findings difficult. Kasl (1978, 1986) has been a convincing critic of this literature over the years, articulating the methodological criteria that must be satisfied to reach conclusions about whether occupational experiences (e.g., high levels of workload) are causal agents in mental or physical disorders. Ganster & Schaubroeck (1991) applied these standards in a critical review of the occupational stress research literature and reached several general conclusions.

First, there are occupational differences in mortality and morbidity that are not easily explained by other risk factors. However, it is difficult to totally disentangle the causal effects of occupational characteristics, per se, from such factors as membership in a social class and the health-related behaviors that accompany such membership. Second, evidence from both naturalistic observations involving repeated within-subject comparisons and a few field experiments suggests that certain types of demands produce elevated levels of physiological response and emotional distress. Such demands include responsibility for tasks whose successful performance has significant consequences for the job incumbent and others, high levels of mental demands that require short-term memory and vigilance, and complex interactions with other people. Third, personal control in the workplace seems both to have a salutary main effect on well-being and, as predicted by the job decision latitude model, to help buffer the deleterious effects of other demands. Finally, although the buffering effects of social support are still not clear, emotionally and instrumentally supportive relationships at work, especially with one's supervisor, seem to have a significant positive impact on well being. Having made these broad conclusions about the evidence, I will illustrate the research strategies that my colleagues and I have used, with a discussion of their strengths and weaknesses.

One way to discover health-impairing effects of job experiences is to examine occupational differences in health outcomes. A number of large-scale studies have found impressive differences among occupations in morbidity and mortality (see Ganster, Duffy, & Hurrell, 1995, and Ganster & Schaubroeck, 1991, for reviews). Beyond occupational differences, investigators have attempted to link with exposures to specific occupational characteristics health outcomes. For example, Ganster et al. (1995) derived measures of occupational psychosocial demands and control from job analysis data and related them to measures of mental and physical health with a sample of 2,779 workers from 49 different occupations. Workers in occupations characterized by high levels of complexity and high levels of control experienced fewer symptoms of ill health and took fewer sick days. These relationships persisted even after controlling for gender, age, and exposure to nonpsychosocial conditions such as physical hazards. Even though measures of health outcomes were obtained from individual workers, the complexity and control measures were derived from occupational data. Thus, individual variation in exposure to job conditions within occupations, although probably considerable, was ignored and likely attenuated the findings.

A second strategy is to achieve a finer grained analysis of job demands by focusing at a level of analysis below the occupation itself. The most frequent level is that of the individual job incumbent, and researchers almost always measure job demands at this level by obtaining the self-reports of the workers. An obvious advantage of this approach is that the investigator does not ignore the large differences in exposures across individuals working in the same occupational category. A much discussed disadvantage, however, is that it becomes very difficult to separate the characteristics of the work from those of the workers themselves. Problems stemming from response consistency effects, attribution effects, and even certain individual traits such as negative affectivity (Schaubroeck, Ganster, & Fox, 1992) make relationships observed in such studies ambiguous concerning the causal effects of job demands (see Ganster & Schaubroeck, 1991, for a review). My colleagues and I have recently attempted to combine the advantages of working at the individual or job level of analysis while avoiding the problems associated with measuring job demands with just the reports of job incumbents. A recent study illustrates this strategy.

Fox, Dwyer, and Ganster (1993) studied the relationships between job demands and employee control on the one hand and a variety of mental and physiological indicators of well being on the other with a group of nurses in a private hospital. Studying individuals in just one occupation has both advantages and disadvantages. As noted earlier, major limitations of occupational-level studies are the coarse nature of job demand assessments and the potential confounding of occupational differences in demands with differences in socioeconomic status. One can attempt to statistically control for the latter confounds (Ganster et al., 1995), but limiting the investigation to one occupation in which all respondents share virtually the same socioeconomic status provides even better control. The challenge with sampling individuals from just one occupation, however, is to obtain enough variance in job demands to allow meaningful tests of relationships. The nursing occupation represents an attractive setting in this regard because even though nurses working in one facility all share similar socioeconomic status, they face large disparities in the types of demands with which they must contend.

Fox et al. (1993), asked 136 registered nurses to report on their job demands, such as work overload and conflict, as well as the personal control they had in performing their job duties. In addition, we obtained objective indicators of these demands by measuring patient loads, patient contact hours as a percentage of total work time, and the number of patient deaths each nurse witnessed. As expected, we found large differences in these demands across the different nurse specialties. Our outcome variables consisted of subjective well being measures as well as measures of blood pressure and cortisol levels obtained both during work shifts and at home during nonwork hours. Our intent was to test the job decision latitude model, so we examined the interactions between demands and control as well as their main effects.

Several findings from this study are worth noting. First, the objective measures of job demands were significantly related to blood pressure and cortisol levels, but their effects were not buffered by employee control. Subjective appraisals of demands, however, showed few deleterious effects of their own but significantly interacted with employee control. The physiological outcomes were best explained by these interactions between subjective work demands and employee control beliefs. Greater workloads significantly lowered the job satisfaction and raised the blood pressure and cortisol level of nurses with low levels of control, but showed no relationship with these outcomes for nurses with high personal control. Finally, interactions between demands and control explained physiological reactions recorded not only during the work shift but also at home, indicating that there are significant carryover effects that persist even when exposure to these demands ceases.

The carryover effects found in the Fox et al. (1993) study are a reminder of the harmful effects of job demands: the immediate strains on the mental and physiological systems last longer than the exposure itself. (Most studies do not provide any direct assessment of this process.) Our study of nurses demonstrated that there were consistent after-work physiological elevations in blood pressure and cortisol that were related to job demands and control. However, the toughening theory of Dienstbier (1989) discussed earlier and the untoughening extension of it predict that chronic exposures to uncontrollable demands alter how people respond to subsequent challenges. The nursing data suggest that chronically stressed individuals maintain higher average levels of physiological arousal, as the model predicts, but they do not tell us whether such individuals also have a reduced capacity to muster these adaptive responses when they are needed to cope with an acute stressor. To test this conditioning hypothesis, the investigator needs to relate chronic job exposures to the individual's arousal response to a specific challenging demand in a controlled setting.

A colleague and I attempted to directly test this conditioning, or untoughening effect, by sampling 568 workers from a variety of occupations who varied in their known levels of certain job demands (Schaubroeck & Ganster, 1993). From this sample, we selected only the 390 individuals who had been on the same job for at least two years. We arbitrarily chose this time period as one that would represent a fairly long-term exposure to the demands of a single occupation, a period presumably long enough for the hypothesized degenerative conditioning process to develop. We focused on demands concerning complex cognitive functions and demands relating to frequent interactions with demanding people. Previous literature indicates that such demands are experienced as highly stressful and uncontrollable. We tested our untoughening model in two ways. First, the model predicts that chronically stressed individuals will have consistently higher levels of arousal during the workday elicited by their high job demands. This elevated state of arousal, maintained for a long period, produces a depletion effect that leads to a diminished capacity to respond to acute challenges. We thus sampled blood pressure at rest, but in the middle of the workshift. As expected, we found that workers chronically exposed to high job demands also showed higher resting levels of blood pressure.

Second, the model predicts that chronically stressed workers will have less vigorous adrenal-medullary and cardiovascular arousal reactions to a challenging demand. We attempted to test this hypothesis by measuring the PCs, (adrenaline and noradrenaline) before and in the middle of a workshift. By examining the change in catecholamine levels during the workday, we found that chronically stressed workers demonstrated reduced PC responsivity when they encountered the demands of their job. Thus, these data lend some support to our untoughening theory. However, this test has a major limitation because the catecholamine responsivity was not assessed under the same conditions for each subject. In fact, samples were taken while subjects worked on their various jobs. Therefore, differences in responsivity might be a function of a maladaptive conditioning process, as we theorize, or might be caused by the naturally occurring differences in demands that the individuals faced during their workday.

To conduct a more controlled test of this hypothesis, we tried to combine the advantages of field and lab research approaches. It was important that we assess each subject's responsivity to the same novel challenge under the same conditions. To accomplish this, we brought a motor home equipped as a mobile physiological testing lab to each work site. Each worker was brought to this lab and was exposed to two different challenge tasks. First, we administered the Stanford Research Institute version of the Structured Interview for the Type A Behavior Pattern (Dembroski, MacDougall, & Lushene, 1979). This protocol is basically a stress interview that exposes the respondent to persistent and stressful interactions with another person and thus represents an interpersonal challenge task. Next we administered the Stroop Color Work Conflict Task (Stroop, 1935) as a source of perceptual and cognitive challenge. Throughout these tasks, we took multiple readings of heart rate, blood pressure, and skin temperature to calculate each individual's responsivity to the demands and his or her speed of recovery when the demands were terminated. In this way, we were able to test whether chronically stressed workers would indeed show less vigorous sympathetic arousal to a novel challenging task and a slower recovery to baseline.

We observed just these effects, after controlling for such factors as gender, education, age, body mass, Type A, and caffeine and nicotine consumption. The more that individuals had been exposed to chronic uncontrollable demands in their occupation, the less vigorous were their cardiovascular arousal and sympathetic nervous system responses to each of the challenge tasks. Likewise, even though their adaptive arousal responses were lower and resting baseline levels higher, chronically stressed workers took more time to recover to baseline levels. In summary, these data strongly suggest that chronic exposures to uncontrollable demands can not only produce chronically elevated levels of arousal, which itself can cause damage, but can also impair an individual's ability to successfully cope with acute psychological demands.

The overall empirical evidence that certain job demands can lead to mental and physical health problems is compelling, despite the limitations inherent in most individual studies. Among the most important of these demands are cognitively and perceptually overloading tasks, high intensity interactions with other people, and lack of control. On the positive side, high control and social support in the workplace (Ganster, Fusilier, & Mayes, 1986) appear to have positive effects that at times might even render other demands less injurious.

Implications of Recent Trends in the Workforce and in Organizations

Many observers of the American scene have identified significant changes in the demands on organizations to respond to global competitive pressures and the change in corporate cultures that this has wrought. Similarly, there are many predictions about how technology, especially the computer, will permanently alter the nature of work. Finally, many scholars have offered opinions about how the changing demographics of the workforce itself will change the nature of how work is organized, scheduled, and compensated. Currently the popular movements in management involve total quality management, restructuring, rightsizing, and reengineering-- all of which have implications for employee well being. I believe it was Mark Twain who noted that making predictions was risky—especially about the future. The world of work changes rapidly, making forecasts in this realm especially risky, but it seems that there are at least two trends that are highly relevant.

First, one cannot dispute the changed demographics of the workforce, especially the prevalence of single working parents and families in which both parents work. In 1980, both parents worked in slightly more than half of families. In 1992, both parents worked in 70 percent of families with young children (Hayghe, 1994). These significant structural and functional changes in American families have not been accompanied by equally dramatic shifts in corporate policies. The large number of dual career couples and single parents increases the number of workers who are stressed by the often-competing demands of work and home. Interest thus emerged in the 1980s in the stress of what is usually called work-family conflict (see Frone, Russell, & Cooper, 1992; Greenhaus & Parasuraman, 1987). There is growing evidence that the strain of balancing work and family responsibilities can lead to job dissatisfaction (Bachrach, Bamberger, & Conley, 1991), depression (Burden & Googins, 1987; Frone et al., 1992), and coronary heart disease (Haynes, Eaker, & Feinleib, 1984). Although these stressors may not reflect job demands, per se, the focus of this article, they do have implications for organizational practices that could either exacerbate or alleviate these strains (Thomas & Ganster, 1995).

The other trend that shows little sign of abating is the change in corporate cultures and practices that affect job security. The 1980s saw the explosion of corporate mergers and acquisitions, often hostile and financed with high-risk bond issues. Many of these mergers and acquisitions were intended to capitalize on short-term gains in security prices rather than to improve operating efficiency. Consequently, many of the combinations were unstable and led to large layoffs. Such practices seem to have waned, but other forces have had the same effects on job security. In particular, global competition and its pressure on efficiency, especially with respect to labor productivity, still exert pressure for downsizing. Thus, job insecurity is likely to remain a major issue. The threat of layoff is a significant stressor and layoffs affect the attitudes and behaviors of those left behind-- the survivors (Brockner, et al., 1994). Despite the significance of layoffs, however, the prevention implications are not clear. Unlike for other stressors, such as certain job demands and work-family conflict, the literature does not suggest a prevention strategy. One can suggest that organizations adopt lifetime employment policies. But even the Japanese, for whom lifetime employment was a deeply held value in large corporations, have had difficulty maintaining this practice. Effective prevention is more likely to

come from social policy decisions that emphasize preparing the workforce to cope with multiple job changes.

The Effectiveness of Prevention Approaches in the Workplace

Prevention attempts in the workplace can be categorized into those that are designed to help workers better cope with their job demands and those whose intent is to reduce or eliminate the source of the stress itself. I will just briefly summarize the work that has been done in the first category and focus more attention on the programs that target the workplace conditions that give rise to health problems.

Approaches That Attempt to Change Individuals

Many studies have evaluated the impact of stress management training programs conducted in the workplace. The content of these programs varies greatly but usually includes some attention to cognitive reappraisal, relaxation, exercise, and biofeedback (Murphy, 1988). Employee assistance programs also often provide counseling or referrals to employees showing stress-related symptoms. Evaluation studies suggest several general conclusions. First, well-designed programs of sufficient duration can produce relatively short-term improvements in symptoms of psychological distress, including anxiety and depression. They also have demonstrated some effectiveness in reducing muscle tension and stress hormone levels, but there has been too little long-term follow-up to conclude that the successful interventions have a permanent impact. Most evidence suggests the need for periodic booster sessions, but these are rarely undertaken. Second, it is not clear that such programs are especially useful for preventing morbidity related to long-term exposures to uncontrollable job demands. My colleagues and I have argued for some time that perhaps the best use of such programs is to supplement organizational change efforts (Ganster, Mayes, Sime, & Tharp, 1982), but that the programs should not be considered the primary strategy for reducing mental and physical health problems in the workplace.

Physical fitness levels can buffer some of the effects of work stressors. For example, Csanadi (1981) reported that psychological disorders were correlated with self-reports of work stressors, but only among subjects (law enforcement officers) who did not regularly engage in aerobic fitness activity. Dienstbier et al. (1987) also suggest that aerobic exercise might be effective in physiologically toughening individuals and making them more adaptive to acute mental demands. In view of the encouraging evidence supporting this physiological toughening theory, exercise intervention programs deserve more evaluation research. Especially needed is investigation of whether aerobically fit workers respond differently to work demands.

Approaches That Attempt to Change Work Conditions

The research literature on work stress suggests several approaches for prevention, but evaluation research on work site change programs is still sparse. Especially rare are randomized experiments that test the effects of interventions targeting specific sources of distress and that employ meaningful outcome measures. The evidence would support experimentation with the following types of interventions: (a) job redesign interventions that increase worker control over important work processes; (b) job redesign interventions that reduce repetitiveness and sustained vigilance requirements; (c) training programs that help supervisors and work teams develop meaningful social support; and (d) organizational policies and practices that reduce work-family conflict, such as flexible scheduling and dependent care.

In recent years, my colleagues and I have directed effort at evaluating some of these approaches. In one experiment, Schaubroeck, Ganster, Sime, and Dittman (1993) evaluated a two-stage intervention program that attempted to reduce high levels of role ambiguity. The target population was a group of middle managers and their subordinates in the business services division of a large university. The responsibilities of this division consisted of all purchasing and inventory management for the university, including food services. A new director had recently been appointed and the division was undergoing what turned out to be the penultimate reorganization in a series that started several years earlier. The last reorganization occurred soon after the study was completed. The reorganizations had created considerable turbulence in individual roles and relationships among the various departments of the division. Reported stress levels were high, and many employees reported psychosomatic disorders and frequent sick days, with most being attributed to conditions at work. In a two-and-one-half-year study, we conducted two surveys, had countless meetings with staff and managers, and finally implemented a role clarification intervention that began with charting the responsibilities of the managers and their departments and ended with individual role negotiation sessions between each manager and his or her subordinates. We randomly assigned groups of subordinates to treatment and wait-control conditions and evaluated employee stress symptoms several months after implementation. Although the intervention significantly reduced employee perceptions of role ambiguity, it seemed to have little impact on employee health symptoms or sick days.

In another study, Thomas and Ganster (1995) evaluated the effects of various family-supportive organizational practices on the health of nurses and other health care professionals. In this study, we surveyed 398 individuals who had children ages 16 years or younger at home and who worked in one of 45 different acute care facilities in Nebraska. From the individuals, we collected data on work-family conflict and stress, job satisfaction, depression, somatic health complaints, and blood cholesterol, and diastolic blood pressure. From organizational officials, we collected information on family-supportive practices and policies that each facility supported. These reports were cross-validated with the reports of the individual respondents. Family-supportive practices included five information and referral services, eight different dependent care services or resources, flexible work scheduling, and the presence of socially supportive supervisors. We found that such supportive practices, especially flexible scheduling and socially supportive supervisors, were associated with lower levels of work-family conflict and health problems, including lower blood cholesterol. These findings suggest that organizations can take specific steps to increase employees' control over family responsibilities. This control, in turn, appears to help employees better manage the often conflicting demands of work and family life. Again, this study did not involve the experimental manipulation of these practices but relied on naturally occurring variation across a sample of 45 organizations. Although our findings cannot support causal interpretations about the benefit of these practices, they certainly provide strong encouragement for organizations to consider their implementation. Particularly encouraging was that the family-supportive practices that were most strongly correlated with health outcomes (flexible scheduling and socially supportive supervisors) are fairly simple and inexpensive approaches.

Although the stress research literature suggests that the approaches discussed above should help reduce health-impairing work conditions, there have been few successful efforts to implement and evaluate them. The lack of such experimentation is not attributed to lack of theory or basic research, but is more a function of difficult obstacles facing the researcher.

Obstacles to Intervention Research

Although the evidence rather convincingly demonstrates that certain job demands are associated with a range of mental and physical health problems, the lack of experimental research generates two main inferential limitations. First, it is difficult to assert that job demands which consistently correlate with health status are in fact the important causal agents. Only controlled experimentation would allow that high level of confidence. Second, we have almost no evidence that efforts to change job demands will actually produce improvements in health. One can reasonably argue, then, that the first research priority should be to evaluate interventions that may reduce or eliminate exposures to job demands that the existing research suggests are toxic agents. Although this is not the first such call for experimentation (see Ganster et al., 1982; Ganster & Schaubroeck, 1991), researchers seem to have been reluctant to respond. Seven significant challenges may be discouraging hopeful intervention researcher.

Identifying an At-Risk Working Population

For intervention research to be successful, the working population being studied must show a high level of stress-related symptoms that are plausibly caused by working conditions. It helps if the population has a known high exposure to certain job demands that the literature indicates are linked to such health complaints. This discussion centers on intervention research, which targets problematic settings and seeks to make them more healthful, rather than on prevention research, which attempts to prevent the development of mental and physical health problems in the first place. For interventions to demonstrate a significant and practically meaningful effect in a time period that is short enough to maintain the integrity of an experimental design, one must start with a population that already shows severe problems. Finding such populations and establishing collaborative agreements with their employers is difficult.

Establishing Collaborative Agreements

Many, perhaps most, organizations in both the private and public sectors are reluctant to allow any sort of experimentation, especially when it concerns health and safety. There are probably several reasons for this hesitancy. For example, managers are fearful that interventions to render the workplace more healthful will involve high implementation costs and potential indirect costs stemming from reduced productivity. Managers are generally charged with maintaining productivity and reducing costs. Any intervention that does not promise help in either area is thus undesirable. In fact, organizations spend enormous sums redesigning work processes, often with the help of expensive consultants. The issue is not just cost, then, but rather cost and benefit. Managers must be convinced that there will be measurable benefits from either improved productivity or reduced costs. Promising better health and well being for their employees does not seem to be an attractive enough inducement for many managers.

A second hindrance to intervention research, and stress research generally, is that investigators are studying factors that presumably cause mental and physical health problems. More than one potential corporate collaborator has expressed fear about legal liability if researchers demonstrate that job conditions are making their employees sick. I do not dismiss such fears as totally unfounded, but I do think one can make some effective counterarguments. For one, the intervention is likely to be targeting practices that are common in the industry and that are generally seen as legal and acceptable. Thus, employers can argue that they were not engaging in practices that they should have known were dangerous. Moreover, a strong argument in favor of the company is that employers were making a sincere effort to improve the health of their employees. Implementing an intervention program should be convincing evidence that they were making a good faith effort to create a better workplace. Despite these arguments, however, getting past the organization's legal department often proves tough.

Conducting Pilot Research

In most intervention studies, the investigator must conduct a pilot study that produces the data with which to diagnose stress-related problems. This means collecting data about exposure to stressful job demands as well as employee health outcomes. These data must then show that the job demand exposures are related to the health outcomes. If the stressor measures are uncorrelated with the dependent variables of interest, it is difficult to make a convincing case to change the stressors through an intervention. A pilot study also provides the needed pretest measures both for the job demands that the intervention will attempt to affect and for the outcome variables. The difficulty with conducting such pilot studies is that they are often rather large and require funding support to be done successfully. Thus, the researcher must convince a funding agency either that the pilot study is worthy of support in its own right or that it will produce the data needed to design an intervention. This task can be difficult for the investigator. On one hand reviewers may see the pilot study as pedestrian if it is to be a project by itself. If it is a first step in a multiyear grant, on the other hand, reviewers might think there are just too many unknowns to recommend a project for funding. The investigator is often in the position of having to argue the plausibility of an intervention on theoretical grounds and having to convince reviewers that it can be done in the proposed setting, even though the details of the intervention cannot be specified in the proposal.

Choosing an Appropriate Focus for the Intervention

The investigator must choose a site in which the most likely stressor, the one that an intervention will be designed to change, is really amenable to change. The investigator might seek settings, for example, in which employees suffer from low levels of personal control, a factor that much theoretical and empirical research supports as linked to well being. Meaningful approaches to augment employee control, however, might not exist in some of these settings. For example, the researcher might gain entry to a manufacturing facility in which employees experience low control because of machine-pacing requirements, but the job redesign necessary to provide self-pacing would require far more investment than an organization could make, at least in the short term. One must target job demands with an established etiologic role in employee well being and with technology or resources available to make meaningful changes in them.

Designing an Effective Intervention

Designing an intervention to reduce the presence of certain job demands can involve a complex organizational change. Augmenting worker control, for example, can require a significant redesign of work processes, reporting relationships, and responsibilities. Such changes are not decided on and implemented overnight, but take considerable planning. Moreover, participants may require extensive training for the implementation to be effective.

The attempt that my colleagues and I made to reduce stress through role clarification illustrates the difficulty of this step (Schaubroeck et al., 1993). After more than a year of pilot research and months of meeting with managers and staff groups, the researchers, staff, and managers decided that role clarity should be the highest priority. It was difficult enough getting to this step, and we still had to decide how to actually change the role ambiguity throughout the organization. The organizational structure consisted of six area managers who in turn directed the work of their staff. Although the target population was the staff group, we could not improve their role clarity until ambiguities and conflicts about responsibilities were resolved at the manager level. We decided to use a method called responsibility charting to clarify roles and responsibilities among the managers and the areas they supervised. Responsibility charting is a fairly straightforward method, but no one on the research team had extensive experience with it. Fortunately, the collaborating organization could afford, and was willing, to hire a consultant.

The responsibility charting procedure was completed over several weeks. We then trained each manager in how to clearly communicate the roles and responsibilities to their staff. This communication process actually involved a role negotiation procedure that differed from the way that many of the managers had previously communicated with their staff. We thought it necessary for the consultant to assist each of these dyads in the role negotiation process. Furthermore, we videotaped these sessions for later assessment. In short, identifying the stressor to be targeted took more than a year, and designing and implementing the intervention took another year, even with the assistance of an external consultant.

Implementing a Randomized Design

All the output of the previous steps results in only an elaborate case study that yields little interpretable evaluation data unless one can use a randomized design. Selection effects (Cook & Campbell, 1979) are usually the most pressing threat to internal validity in the field because managers often want to focus the intervention on those employees that need it most. The investigator must convince the organizational members that a randomized design is necessary to learn how effective the intervention really is. Implementing a randomized design and maintaining it in the field is a challenge. Unlike in laboratory experiments, subjects assigned to experimental conditions in the field do not always remain in the conditions to which they were initially assigned. Moreover, they often interact with each other extensively, which creates the threat of diffusion of the treatment to control group subjects or their resentful demoralization because they are not getting what is often perceived as a desirable job change. Combating these threats requires extensive communication with all subjects involved in the study. It also requires the investigator to be flexible and to make extensive contingency plans.

Solving the Dependent Variable Problem

In large-scale epidemiological studies, researchers can examine disease endpoints, hospital admissions, deaths, and other outcomes that represent the cumulative effects of long-term exposures to stressful job demands. For the field experimenter, time is the problem. Experimental groups can be maintained for only so long. People quit, retire, and change jobs, and a randomized design often involves the use of a wait-control group. That is, to maintain the cooperation of the control group subjects over the course of the experiment, the investigator promises them treatment after the data have been assessed. People are not willing to wait indefinitely. Although investigators would like to see the effects of their interventions over the ensuing years, they simply cannot wait that long. Once the control group receives the intervention, of course, the researcher can continue to monitor outcomes for both groups but no longer has an internally valid design that supports causal inferences.

Investigators need outcome variables whose underlying causal lags with the targeted stressor can reasonably be assumed to match the duration of the randomized experiment. On one hand, this constraint effectively rules out deaths from cardiovascular disease and probably hospital admissions for clinical depression as viable outcome variables. On the other hand, many observers view short-term outcomes involving employee attitudes and morale as relatively unimportant. Although I would not dismiss these criteria, the investigator also needs to examine more objective indicators. Measures of stress hormone production (e.g., cortisol) and markers of immune system functioning are useful outcomes, as are resting blood pressure and physiological reactivity to a standardized stressor (Schaubroeck & Ganster, 1993). Evidence indicates that such outcomes are responsive to interventions over several weeks or months, and they are epidemiologically meaningful. They can now also be obtained with relatively noninvasive techniques. The main problem is expense. Physiological reactivity measures are expensive in both subject and experimenter time, while biochemical measures require expensive assays.

The investigator should also try to obtain as many measures relating to productivity and organizational expense as possible. It is probably unrealistic to expect large gains in labor productivity, but most stress reduction interventions should help organizational members be more effective. Although our stress outcome measures showed disappointing improvement in the role clarification study (Schaubroeck et al., 1993), managers later told us that they felt the organization was functioning much more smoothly and efficiently because of the intervention. Organizational archival measures, especially those concerning employee sick days, accidents, and health care costs, are important outcomes that have a large impact on the bottom line. Organizations must be convinced that stress-related interventions will have significant bottom line effects before they will wholeheartedly adopt them, and well-conceived interventions will achieve this goal.

Conclusions

There is compelling theoretical and empirical support for conducting intervention research in the workplace. The obstacles that investigators face, however, are formidable. Intervention research teams require a mix of skills, including evaluation research, stress and health measurement, and organizational change expertise. Such research can be done, but it requires some flexibility on the part of investigators, and especially on the part of funding agencies. Agencies such as the National Institute of Mental Health (NIMH) and the National Institute for Occupational Safety and Health (NIOSH) should consider special funding initiatives for organizational intervention research that can accommodate the uncertainties inherent in multistage intervention research programs. Programs such as NIMH's Prevention Intervention Research Centers are useful in this regard, but they can fund research at only a limited number of sites. Another example is the National Science Foundation's Transformation to Quality Organizations program. Although its emphasis is on general organizational effectiveness rather than on employee health and well being, the National Science Foundation has established a somewhat flexible set of criteria for funding research that assesses interventions in this area.

The potential for improving worker health by redesigning work, increasing social support, and instituting family-supportive policies is great. Funding research that evaluates such interventions should be granted a high priority. The great advantage of conducting such intervention research is that successful interventions could demonstrate benefits for both employees and their employing organizations. Because interventions have so much potential to improve organizational effectiveness as well as employee well being, their subsequent diffusion is much more likely, even without the assistance of governmental research funding. Organizational decision makers, however, must be convinced with data from well-conducted studies that prove the feasibility of designing interventions and that show that such interventions improve the health of the organization and its members.

References

- Anisman, H., & LaPierre, Y. (1982). Neurochemical aspects of stress and depression: Formulations and caveats. In R. W. Neufeld (Ed.), *Psychological stress and psychopathology* (pp. 179–217). New York: McGraw-Hill.
- Antoni, M. H. (1987). Neuroendocrine influences on psychoimmunology and neoplasia: A review, *Psychology and Health*, 1, 3–24.
- Bacharach, S. B., Bamberger, P., & Conley, S. (1991). Work-home conflict among nurses and engineers: Mediating the impact of role stress on burnout and satisfaction at work, *Journal of Organizational Behavior*, 12, 39–53.
- Brockner, J., Konovsky, M., Cooper-Schneider, R., Folger, R., Martin, C., & Bies, R. J. (1994). Interactive effects of procedural justice and outcome negativity on victims and survivors of job loss, *Academy of Management Journal*, 37, 397–409.
- Burden, D. S., & Googins, B. (1987). *Boston University balancing job and homelife study*. Boston: Boston University School of Social Work.
- Cannon, W. B. (1914). The emergency function of the adrenal medulla in pain and the major emotions, *American Journal of Physiology*, 33, 356–372.
- Cook, T. D., & Campbell, D. T. (1979). *Quasi-experimentation*. Chicago: Rand McNally.
- Csanadi, S. B. (1981). *Physical activity and stressor-strain relationships in law enforcement*. Unpublished doctoral dissertation, University of South Florida, Tampa.
- Dembroski, T. M., MacDougall, J. M., & Lushene, R. (1979). Interpersonal interaction and cardiovascular response in Type A subjects, *Journal of Human Stress*, 5, 28–36.
- Dienstbier, R. A. (1989). Arousal and physiological toughness: Implications for mental and physical health, *Psychological Review*, 96, 84–100.
- Dienstbier, R. A., LaGuardia, R. L., Barnes, M., Tharp, G., & Schmidt, R. (1987). Catecholamine training effects from exercise programs: A bridge to exercise-temperament relationships, *Motivation and Emotion*, 11, 269–295.
- Fox, M., Dwyer, D., & Ganster, D. C. (1993). Effects of stressful job demands and control on physiological and attitudinal outcomes in a hospital setting, *Academy of Management Journal*, 36, 289–318.

- Frankenhaeuser, M. (1979). Psychoneuroendocrine approaches to the study of emotion as related to stress and coping. In H. E. Howe, Jr. and R. A. Dienstbier (Eds.), *Nebraska Symposium on Motivation, 1978: Human Emotion* (pp. 123–161). Lincoln: University of Nebraska.
- Frankenhaeuser, M., & Gardell, B. (1976). Underload and overload in working life: Outline of a multidisciplinary approach, *Journal of Human Stress*, 2, 35–46.
- Frone, M. R., Russell, M., & Cooper, M. L. (1992). Antecedents and outcomes of work-family conflict: Testing a model of the work-family interface, *Journal of Applied Psychology*, 77, 65–78.
- Ganster, D. C. (1989). Worker control and well being: A review of research in the workplace. In S. L. Sauter, J. J. Hurrell, and C. L. Cooper (Eds.), *Job control and worker health* (pp. 3–24). Chichester, England: Wiley.
- Ganster, D. C. (1991, April). *Neuroendocrine approaches to studying job design*. Paper presented at the annual meeting of the Society for Industrial and Organizational Psychology, St. Louis, MO.
- Ganster, D. C., Duffy, M. K., & Hurrell, J. J., Jr. (1995, August). *The role of objective occupational demands in determining worker stress and well being*. Paper presented at the annual meeting of the Academy of Management, Vancouver, British Columbia, Canada.
- Ganster, D. C., Fusilier, M. R., & Mayes, B. T. (1986). Role of social support in the experience of stress at work, *Journal of Applied Psychology*, 71, 102–110.
- Ganster, D. C., Mayes, B. T., Sime, W. E., & Tharp, G. D. (1982). Managing organizational stress: A field experiment, *Journal of Applied Psychology*, 67, 533–542.
- Ganster, D., & Schaubroeck, J. (1991). Work stress and employee health, *Journal of Management*, 17, 235–271.
- Greenhaus, J. H., & Parasuraman, S. (1987). A work-nonwork interactive perspective of stress and its consequences. In J. M. Ivancevich & D. C. Ganster (Eds.), *Job stress: From theory to suggestion* (pp. 37–60). New York: Haworth.
- Hayghe, H. V. (1994). Are women leaving the labor force? *Monthly Labor Review*, 117, (7), 37–39.
- Haynes, S. G., Eaker, E. D. & Feinleib, M. (1984). The effects of employment, family and job stress on coronary heart disease patterns in women. In E. B. Gold (Ed.), *The changing risk of disease in women: An epidemiological approach* (pp. 37–48). Lexington, MA: Heath.

- Karasek, R. (1979). Job demands, job decision latitude, and mental strain: Implications for job redesign, *Administrative Science Quarterly*, 24, 285–306.
- Kasl, S. (1978). Epidemiological contributions to the study of work stress. In C. L. Cooper & R. Payne (Eds.), *Stress at work* (pp. 3–48). Chichester, England: Wiley.
- Kasl, S. (1986). Stress and disease in the workplace: A methodological commentary on the accumulated evidence. In M. F. Cataldo & T. J. Coates (Eds.), *Health and industry: A behavioral medicine perspective* (pp. 52–85). New York: Wiley.
- Kristensen, T. S. (1989). Cardiovascular diseases and the work environment: A critical review of the epidemiological literature on nonchemical factors, *Scandinavian Journal of Work, Environment, and Health*, 15, 165–179.
- Mason, J. W. (1968). Organization of psychoendocrine mechanisms, *Psychosomatic Medicine*, 30, 565–808.
- Murphy, L. R. (1988). Workplace interventions for stress reduction and prevention. In C. L. Cooper & R. Payne (Eds.), *Causes and consequences of stress at work* (pp. 88–114). Chichester, England: Wiley.
- Schaubroeck, J., & Ganster, D. C. (1993). Chronic demands and responsivity to challenge, *Journal of Applied Psychology*, 78, 73–85.
- Schaubroeck, J., Ganster, D. C., & Fox, M. L. (1992). Dispositional affect and work-related Stress, *Journal of Applied Psychology*, 77, 322–335.
- Schaubroeck, J., Ganster, D. C., Sime, W., & Dittman, D. (1993). A field experiment testing supervisory role clarification, *Personnel Psychology*, 46, 1–25.
- Selye, H. (1936). A syndrome produced by diverse noxious agents, *Nature*, 138, 32.
- Selye, H. (1976). *The stress of life* (2nd ed.). New York: McGraw-Hill.
- Solomon, G. S., Kay, N., & Morley, J. E. (1986). Endorphins: A link between personality, stress, emotions, immunity, and disease? In N. P. Plotnikoff, R. E. Faith, A. J. Murgo, & R. A. Good (Eds.), (*Enkephalins and endorphins: Stress and the immune system* pp. 129–144). New York: Plenum.
- Stroop, J. R. (1935). Studies of interference in serial verbal reactions, *Journal of Experimental Psychology*, 18, 643–662.
- Thomas, L. T., & Ganster, D. C. (1995). The impact of family-supportive work variables on work-family conflict and strain: A control perspective, *Journal of Applied Psychology*, 80, 6–15.

