CHAPTER 16

Occupational Stress

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Nowhere are the rising costs of work-related chronic ill-health more evident than in the area of occupational stress. For example, claims for stress-related illnesses in California increased by approximately 560 percent over a 6-year period, inflating costs for individuals, organizations, and society at large.[1] Disability due to job stress alone—without evidence of any physical injury or illness—is now a compensable condition in about one-half of U.S. states.

Despite increased recognition by the legal, medical, and insurance communities, for many people—even scientists—stress remains an intuitively understandable yet nebulous construct, implying numerous events and processes. Although there are many definitions of job stress, it can be most simply viewed as the harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources, or needs of the worker.

Stress-related responses are ubiquitous in human society. This chapter focuses specifically on work-related stress. Other important sources of stress that impact individuals and communities include unemployment, poverty, environmental exposure, racial and ethnic discrimination, violence, and other factors that are beyond the scope of this chapter.

A BRIEF HISTORY OF JOB-STRESS RESEARCH

Occupational stress, as a field of inquiry examining job conditions and their health and performance consequences, is a relatively new research domain that crystallized in the early 1970s. Its conceptual roots can be traced to the animal research of Hans Selye and to Walter Cannon's work on the physiologic concomitants of emotion. In the early 1930s, Selye discovered that a wide variety of noxious stimuli—which he later referred to as *stressors*—such as exposure to temperature extremes, physical injury, and injection of toxic substances, evoked identical patterns of physiologic changes in laboratory animals. In each case, the cortex of the adrenal gland became enlarged, the thymus and other lymphatic structures became involuted, and deep-bleeding ulcers developed in the stomach and intestines. These effects were *nonspecific*; that is, they occurred regardless of the particular stressor and were superimposed on any specific effects associated with the individual agents. Some years later, Selye described this somatic response as the general adaptation syndrome (GAS) and defined stress as the nonspecific response of the body to any demand. His mention of *nervous stimuli* among the stressor agents capable of eliciting the GAS had an energizing effect on investigators working in the field of psychosomatic medicine. Cannon had laid the groundwork earlier for an understanding of how emotions affect physiologic functions and disease states in his description of the *fight-or-flight response*. This response, elicited by potentially dangerous situations, involved elevated heart rate and blood pressure, redistribution of blood flow to the brain and major muscle groups and away from distal body parts, and a decrease in vegetative functions. Perhaps equally important, Cannon advanced the concept of *physiologic homeostasis*, and developed an

"engineering" concept of stress and strain—with stress as the "input" and strain as the response. In particular, Cannon proposed the notion of critical stress levels that were capable of producing strain in homeostatic mechanisms. Although he used the term somewhat casually, Cannon, like Selye, conceived of *stress* as involving physical as well as emotional stimuli.

In the 1960s and 1970s, Richard Lazarus and his colleagues added immensely to the study of stress by describing in specific terms how an organism's perceptions or appraisals of objective events determine their health valence. Cognitive appraisal was described by Lazarus as an intrapsychic process that translates objective events into stressful experiences. The importance of this formulation lies in its recognition that subjective factors can play a much larger role in the experience of stress than objective events. Indeed, any given objective event can at once be perceived positively by one person and negatively by another; that is, "One person's meat is another person's poison."

The study of occupational stress was given impetus in the early 1970s by the establishment of the National Institute for Occupational Safety and Health (NIOSH), whose goal is to conduct research to reduce work-related illnesses and injuries. The importance of behavioral and motivational factors was clearly acknowledged in certain research provisions of the Occupational Safety and Health Act (OSHAct). For example, Sections 20(a)(1) and 20(a)(4) explicitly directed NIOSH to include psychological, behavioral, and motivational factors in research on problems of worker safety and health and in developing remedial approaches for such problems. Job-related hazards were interpreted broadly to include conditions of a psychological nature—undue task demands, work conditions, or work regimens that, apart from or combined with exposure to physical and chemical hazards, may degrade workers' physical or mental health. Since its inception, NIOSH has not only sponsored, but also conducted, many research studies, which have helped shape the course of job-stress research in the United States. For example, in 1988, NIOSH proposed a national strategy for prevention of work-related psychological disorders. Key elements in this prevention strategy include abatement of known job (environmental) risk factors, research to improve understanding of these risk factors, surveillance to detect and track risk factors, education and training to facilitate recognition of risk factors and their control, and improved mental health services.[2]

In 1996, NIOSH identified "organization of work" as one of the 21 priority research topics for the next decade and developed a comprehensive research agenda for investigating and reducing occupational safety and health risks associated with the rapidly changing nature of work.[3] This document describes how macrolevel forces impact occupational stress levels. For example, national and international economic, legal, political, technological, and demographic forces influence production methods, human resource policies, management structures, and supervisory practices. These factors, in turn, directly impact the work context, influencing the nature of jobs and the tasks that compose them. For example, fueled by global competition, organizational downsizing and restructuring has influenced not only the way work is performed but also—as many laid-off workers can attest—whether work was available to perform.

A MODEL OF JOB STRESS AND HEALTH

Working conditions play a primary role in causing job stress. However, the role of individual factors cannot be ignored. Exposure to stressful working conditions (job stressors) can have a direct influence on worker safety and health.[4] But individual and situational factors can intervene to strengthen or weaken this influence (Fig. 16-1). Individual and situational factors can modulate the effects of job stressors on the risk of illness and injury in different ways: they can decrease or completely deflect them, leave them unchanged, or potentiate them.

Based on this view of job stress, a paradigm of stress was developed by researchers at NIOSH to guide efforts at examining the relationship between working conditions and health consequences (Fig. 16-2). In this paradigm, job stress is viewed as a situation in which job stressors—alone or in combination with other stressors—interact with individual worker characteristics and result in an acute disruption of psychological or physiologic homeostasis. This disruption (often called *job strain*) can be psychological (disruption in affect or cognition); physiological; or behavioral. Job strain, if prolonged, is thought to lead to a variety disorders, including cardiovascular disease, psychological disorders, and musculoskeletal disorders. In addition, job stressors are probably linked to risk of

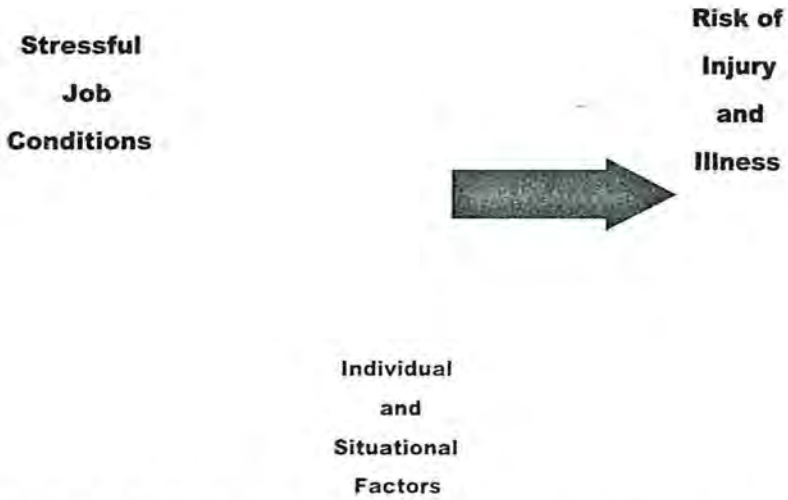

FIGURE 16-1 • This NIOSH model of job stress illustrates the different roles that individual and situational factors can have in reducing the impact of job stress (top arrow), having no effect on job stress (middle arrow), or exacerbating job stress (bottom arrow). (Source: National Institute for Occupational Safety and Health. *Stress at work*. Washington, DC: NIOSH, 1999. [DHHS [NIOSH] publication no. 99-101.])

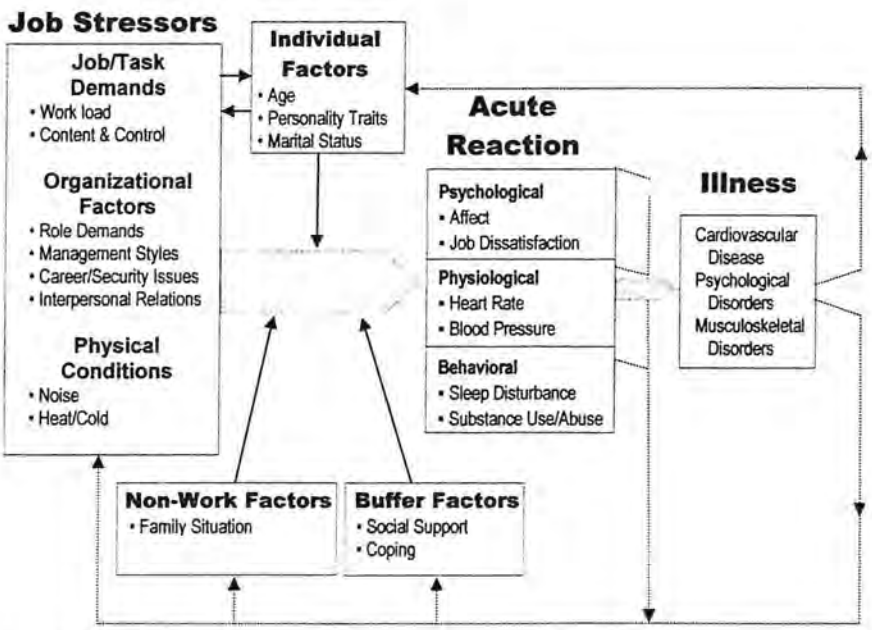

FIGURE 16-2 • Detailed model of job stress and health.

workplace injury and violence. Job stressors also have strain consequences for organizations (often called *organizational strain*) in the form of increased absenteeism, decreased performance, increased rate of accidents, and increased likelihood of employees looking for alternative employment (turnover).

Job stressors generally fall into three very broad categories: job/task demands, organizational factors, and physical conditions. Examples of common stressors in each category are briefly described in the following sections.

Job and Task Demands

Workload is a feature of occupations that is easily recognized as stressful and has received substantial empirical attention (Figs. 16-3 and 16-4). The strains associated with being overworked have been found to be uniformly negative—psychologically, physiologically, and behaviorally. Working excessive hours or performing more than one job, for example, has been associated with a variety of health consequences, including poor perceived health, increased injury rates, and increased cardiovascular disease morbidity and mortality[5](Box 16-1). Issues of workload and work pace become increasingly important in an environment where hours of work

FIGURE 16-4 • Secretaries often experience high levels of workload and report high levels of stress. (Photograph by Earl Dotter.)

FIGURE 16-3 • Garment workers, who often work on a piecework basis, can experience much stress at work. (Photograph by Earl Dotter.)

are increasing. In the United States, working couples have seen their average work year increase by nearly 700 hours in the past two decades, and 30 percent of workers are exhausted by the end of the workday.[3]

Shift work, a work-related stressor, is another job demand associated with health and safety consequences (Box 16-2). Working rotating shifts or permanent night work results in disruption of social activities and physiological circadian rhythms, impairing alertness and the sleep cycle.[6] For example, employees report that working nights or overtime affects their mental and physical health. The decreased alertness that occurs in these workers makes them more prone to errors and increases their risk for injuries. Most workers state that they work shifts because it is required by the job or because there was no other job available. Another source of stress comes from the friction between the shift schedule and the family and social life of the worker. Furthermore, rotating shift-work is associated with

BOX 16-1

Time, Work, and Stress on the Job and in Society

Sherry L. Baron

One of the most pronounced changes affecting working people and their families is how they experience and perceive time as a result of changes in demographics, society, technology, and work organization. Although the length of average workweek for full-time workers has not changed considerably over the past several decades, a substantial percentage of Americans—more than 26 percent of men and more than 11 percent of women—worked 50 or more hours per week in 2000. The sense of control of time at work, in the family, and in society has adverse effects on the health and well-being of workers, their partners, and their children—an important focus for research. Time demands can increase work stress, which is associated with both adverse mental and physical health outcomes (Chapters 16 and 26).

Although average working hours have not increased, several factors have transformed the way the overall family experiences time. The most dramatic change has been the rapid increase in women's participation in the workforce. In 1970, in only 35 percent of married couples, both spouses worked; today, 60 percent of married couples are dual wage-earners. In the same period, there has been an increase in single-parent families, from about 10 percent of all families in 1970 to about 20 percent today. The result is that spouses have less time with each other and parents have less time with their children.

The schedule challenges of the dual-earning and single-parent families are made worse by the increasing proportion of workers employed in jobs requiring work hours outside of the standard 9-to-5 workday and the Monday-to-Friday workweek. In one of three dual-earner families and one in five single-parent families with children under 14, a parent works either a rotating or a nonstandard work shift. Whether single mothers or dual-earner couples *choose* nonstandard work in order to trade off childcare responsibilities between themselves or with extended family members, or are forced into those jobs because they do not have other options, there may be adverse impacts on family activities—especially those that require parental interactions at school or other activities geared to standard schedules.

The experience and perception of time at work has changed as well. As the productivity rate in workplaces continues to increase, the introduction of new technology and the intensification of job tasks mean that employees experience greater job demands. For very different reasons and in quite different ways, both salaried and hourly wage-earners may experience a sense that there is never enough time and always too much stress. Downsizing and outsourcing often require professionals and managers to work longer hours and take work home. Increased demand for after-hour and weekend services, in addition to the increased productivity demanded in manufacturing, means that low-wage workers often have to work nonstandard workweeks and work shifts, including rotating shifts, night work, or split shifts. Whereas the status of salaried professionals allows them more flexibility to leave work early in the event of a family responsibility, hourly workers usually are not allowed such flexibility.

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increased rates of cardiovascular and gastrointestinal disease. These effects are sufficiently well established to provide the basis of labor law in the European Union, which regulates the scheduling of shifts and rest days.

Narrow, fragmented, invariant, and short-cycle tasks that provide little stimulation, allow little use of skills or expression of creativity are job characteristics that are considered stressors in the NIOSH model.[2] Robert Karasek's demand–control–social support model is perhaps the best known of all models relating such job characteristics to well-being.[7] This model proposes first that high job demands, lack of job control, and lack of social support predict strain outcomes. In addition, this model suggests that demands, control, and social support interact

BOX 16-2

Shift Work

David H. Wegman

Shift work is an imprecise concept, although it usually refers to a work-hour system in which a relay of employees extends the period of production beyond the conventional daytime third of the 24-hour cycle. There are four major types of work hours: day work, permanently displaced work hours, rotating shift work, and roster work.

Day work involves work periods between approximately 7 a.m. and 7 p.m. *Permanently displaced* work hours require the person to work either a morning shift (approximately 6 a.m. to 2 p.m.), an afternoon shift (approximately 2 to 10 p.m.), or a night shift (approximately 10 p.m. to 6 a.m.). *Rotating shiftwork* involves alternation between two or three shifts. Two–shift-work usually involves morning and afternoon shifts, whereas three–shift-work also includes the night shift. Three–shift-work is often subdivided according to the number of teams used to cover the 24 hours of the work cycle—usually three to six teams, depending on the speed of rotation (number of consecutive shifts of the same type). *Roster work* is similar to rotating shift work but may be less regular, more flexible, and less geared to specific teams. It is used in service-oriented occupations, such as transport, health care, and law enforcement. In most industrialized countries, approximately one-third of the population has some form of "non-day work" (shift work). Approximately 5 to 10 percent have shift work that includes night work.

Effects on Health and Well-being

Sleep

The dominant health problem reported by shift workers is disturbed sleep and wakefulness. At least three-fourths of shift workers are affected. The sleep loss is primarily taken out of stage 2 sleep and REM sleep. Furthermore, the time taken to fall asleep (sleep latency) is usually shorter. The level of sleep disturbances in shift workers is comparable to that seen in insomniacs.

Alertness, Performance, and Safety

Night-oriented shift workers complain as much of fatigue and sleepiness as they do about disturbed sleep. This is particularly severe on the night shift, hardly appears at all on the afternoon shift, and is intermediate on the morning shift. The maximum is reached toward the early morning (5 to 7 a.m.). Frequent incidents of falling asleep occur during the night shift, and this has also been documented through ambulatory EEG recordings in process operators, truck drivers, train drivers, pilots, and the like. Remarkably, even though one-fourth exhibit sleep incidents, most workers seem unaware of them. This suggests an inability to judge one's true level of sleepiness.

Performance on Night Shift is Impaired

A classic study showed that errors in meter readings over a period of 20 years in a gas works had a pronounced peak on the night shift. Other studies demonstrated that telephone operators connected calls considerably more slowly at night and that train engineers failed to operate their alerting safety device more often at night. Performance may be reduced to levels comparable with those seen in connection with considerable alcohol consumption. There is evidence that the Challenger space shuttle disaster and the nuclear power plant incidents at Chernobyl, Three Mile Island, the David Beese reactor in Ohio, and the Rancho Seco reactor in California were due to fatigue-related errors during night work. Concern about resident physician performance after prolonged shifts has led to changes in residency on-call rules. Recent studies have documented an increase of motor vehicle crashes after prolonged shifts.

Other Effects on Health and Well-Being

Gastrointestinal complaints are more common among night-shift-workers than among day workers. There is a higher incidence of coronary artery disease in male shift-workers than in men who work days. As with gastrointestinal disease, a high prevalence of smoking among shift workers might contribute to the increased risk of coronary artery disease, but smoking alone cannot explain the observed

(continued)

BOX 16-2

***Shift Work** (Continued)*

elevated risk. A few studies of pregnant shift workers suggest an increased risk of miscarriage and lower birthweight of infants of mothers who worked irregular hours but did not suggest a risk of birth defects. Health problems in shift workers usually increase with age as exposure to shift work increases. Being a "morning-type" person, as opposed to an "evening-type" person, is associated with poorer adjustment to shift work. Gender is not related to shift-work tolerance, although the extra burden of housework may put women at a disadvantage. Good physical condition of the worker may facilitate shift work.

One of the major effects of shift work is the interference of work hours with various social activities. Thus, direct time conflict reduces the amount of time available to spend with family and friends or in recreation or voluntary activities.

Factors Affecting Adjustment

Shift-System Characteristics

Aside from the night shift per se, an important shift-system characteristic is the number of night shifts in a row. Most studies indicate that the circadian system and sleep do not adjust (improve) much across a series of night shifts even in permanent night workers. Thus, a series of more than four night shifts might be expected to be particularly taxing. On the other hand, if it is of major importance that performance capacity remain high during the night, it seems that a solution with permanent night shifts is preferable, in combination with other teams that work a two-shift system (with only morning and afternoon shifts).

With respect to the duration of shifts, there appears to be increased prevalence of extended (to 10 to 12 hours) work shifts, popular because they permit long sequences of free time and reduced commuting. On the other hand, having a second job may exacerbate the effects of long shifts or lack of recovery days.

Although there is still a question about the best direction of rotation for shifts, phase delays are easier to adjust to than phase advances. For the rotating shift-worker, this implies that schedules that delay (rotating clockwise: morning–afternoon–night) are preferable to schedules that rotate counterclockwise. There have been, however, very few practical tests of this theory, particularly in relation to sleepiness.

Preventive Measures

The following preventive measures with respect to the organization of shift work deserve attention:

PRIMARY IMPORTANCE

- Avoid night work (and morning work if possible).
- Avoid quick changes.
- Maintain time between shifts, of at least 11 hours.
- Avoid double shifts or other greatly extended work shifts.
- Avoid very early morning shifts (starting before 6 a.m.).
- Intersperse rest days during the shift cycle.

CLEAR IMPROVEMENTS

- Schedule naps during the night shift.
- Provide long sequences of days off and few weekends with work.
- Avoid having a morning shift immediately after a night or evening shift.

PROBABLE IMPROVEMENTS

- Avoid long (more than three shifts) sequences of night or morning shifts (rotate rapidly).
- Introduce permanent night work as an alternative under certain conditions.
- Plan night shifts at the end of the shift cycle.
- Give shift workers older than 45 years of age the right to transfer to day work.
- Rotate shifts clockwise.

The most important individual preventive measure is good sleep hygiene, including sleeping in a dark, cool, sound-insulated bedroom; using ear plugs; and informing family and friends about one's sleep schedule. Another important preventive measure is strategic sleeping. For night shift-work, the sleep period should be between 2 and 9 p.m. If not socially feasible, the next-best alternative is to have a moderate morning sleep and then to add a 2-hour nap in the evening. Common sense suggests that the worker should avoid intake of major meals during the night shift.

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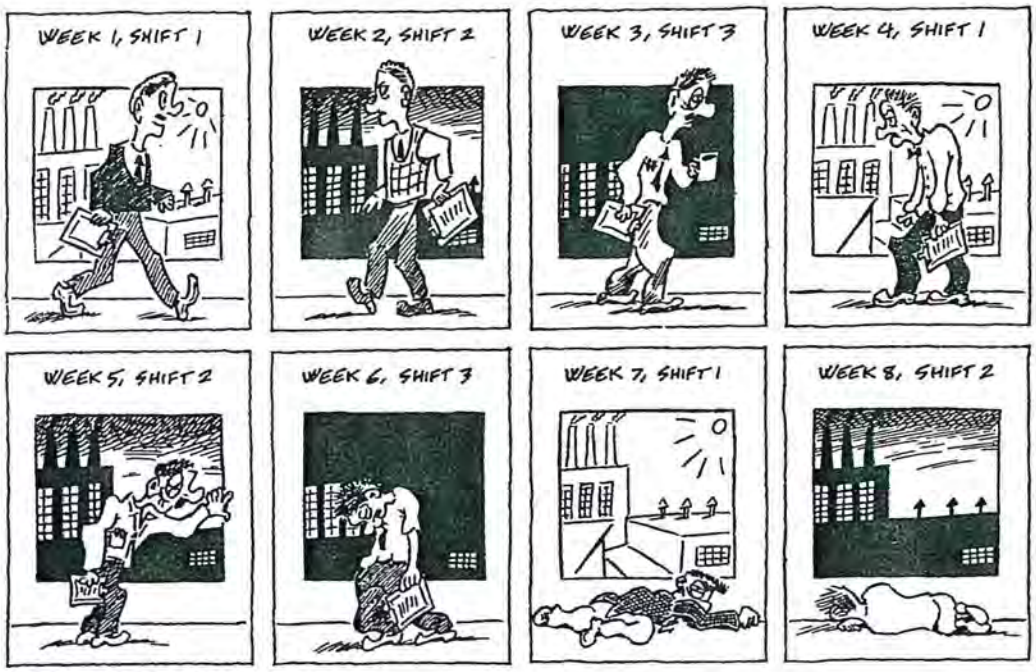


(Drawing by Nick Thorkelson.)

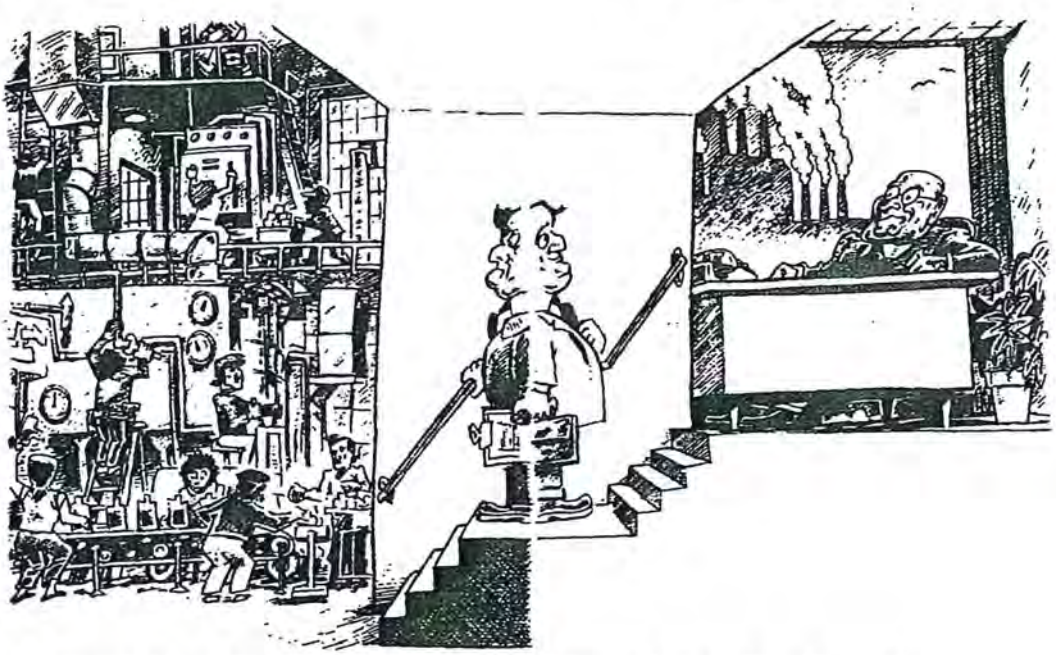
to predict strain, such that high control and high social support buffer the effects of job demands on strain outcomes.

Karasek postulated that the amount of work does not seem to be as critical to worker health as the interaction of workload with the amount of control or discretion the worker has over the work and related work processes (referred to as *decision latitude*). The ever-growing number of studies using the model suggests support for the first hypothesis—the main effects of demand, control, and social support—and limited support for the hypothesized interaction among these factors. The combination of low decision latitude and high psychological demands is a risk factor for cardiovascular mortality in most studies.[8] Indeed, it is widely accepted that worker control or discretion over working conditions is integral to worker health. The theoretical basis and specific mechanisms of the effects of control on health, however, are not clear.

Organizational Factors

Many studies have examined the psychological and physical effects of various role-related demands in organizations. *Role conflict* exists whenever individuals face incompatible demands from two or more sources. *Role ambiguity* reflects the uncertainty employees experience about what is expected of them in their jobs; the opposite of role ambiguity would be role clarity. *Inter-role conflict* exists when employees face incompatible demands from two or more roles. The most common form of inter-role conflict is work-family conflict, where the demands of work conflict, with the roles of parent and spouse. Each of these role-related stressors have been linked, in the job-stress literature, to strain and, in some cases, illness outcomes. Given the revolutionary changes in the way that work has been structured and performed in recent years, these stressors are also believed to be highly prevalent and problematic.[3]

Various management styles, including total or partial intolerance of worker participation in decision-making, lack of effective consultation, and excessive restrictions on worker behavior, are also stressful. Of these style characteristics, exclusion from decision-making has received the most research attention and has been shown to be related to a variety of strain outcomes, including lowered self-esteem, low job satisfaction, and overall poor physical and mental health. By contrast, studies have demonstrated that greater participation in decision-making has led to greater job satisfaction,



A supervisor's job may be highly stressful due to its high degree of role conflict. (Drawing by Nick Thorkelson.)

lower turnover, better supervisor–subordinate relationships, and greater productivity. Increasing worker participation seems to result in reductions in work-related psychological strain.

Stressors include career-related concerns, such as job insecurity, fear of job obsolescence, under- and overpromotion, and more generally concerns about career development. The importance of job insecurity as a stressor in the workplace is highlighted by observations that the temporary or contingent labor force is rapidly increasing and that job tenure has declined for many workers.[3]

Recently, the development of the effort–reward imbalance model of job stress has focused attention on the role of organizational rewards as a job stressor.[9] In general, this model proposes that strain results when rewards are not consistent with efforts in the work environment. Efforts are described as the strivings of individuals to meet the demands and obligations of the job. Rewards are conceptualized as encompassing financial rewards, esteem rewards, and career rewards, including job security. The theory is based on the notion that workers attempt to maintain a state of equilibrium and cannot maintain an imbalance between effort and rewards over an extended period of time, and eventually this condition will result in ill health. Although initial studies using cardiovascular risk as the outcome generally support the theory, a long-term evaluation is still needed.

Organizational culture and climate factors can be associated with worker stress, although the mechanism by which this happens is not known.

Interpersonal Relations

Poor interpersonal relations in the workplace are stressors that result in a variety of strain consequences. Violence and aggression as well as poor-quality leadership represent two forms of interpersonal relations that are stressors. Although incidents of physical violence are relatively rare, they have a dramatic effect on individual and organizational well-being. Aggression in the workplace, much more prevalent than violence, is associated with impaired physical and psychological health. Poor-quality leadership has been associated with increased levels of employee strain. Employees who perceive their supervisors as abusive experience low levels of job and life satisfaction, lower levels of commitment, increased work–family conflict, more psychosomatic symptoms, and psychological distress.

Physical Conditions

Adverse environmental conditions exacerbate overall job demands placed on employees, thus lowering worker tolerance to other stressors and decreasing worker motivation. Environmental conditions, including excessive noise, temperature extremes, poor ventilation, inadequate lighting, and ergonomic design deficiencies have been linked to employee physical and psychological health complaints as well as attitude and behavior problems. For example, outbreaks of mass psychogenic illness (often called *collective stress response*), when they rarely occur, are generally in workplaces that employees regard as physically uncomfortable. Psychological job stressors appear to produce increments in muscle tension that may exacerbate muscle loads and symptoms resulting from physical task demands.[10]

MODERATING FACTORS

Several personal and situational characteristics can modify the way individual workers exposed to a work environment perceive or react to it. These characteristics, known as "moderators," are depicted in Fig. 16-2, in the blocks labeled individual factors, nonwork factors, and buffer factors.[1]

Individual Factors

The most widely discussed personal characteristic related to stress at work has been the coronary artery disease-prone type A behavior pattern. Type A behavior is characterized by intense striving for achievement, competitiveness, time urgency, excessive drive, and overcommitment to vocation or profession. Although investigators in the past have reported the type A pattern to be independently associated with coronary artery disease, more recent studies have suggested that the variables of hostility, cynicism, anger, irritability, and suspicion may be the primary pathogenic component of type A found to be significant in earlier studies. Similarly, though earlier studies suggested an interaction between certain job stressors and type A characteristics that may lead to heart disease, overall the evidence that people with type A are more adversely affected by various job stressors is limited.

The hardy personality style and an internal locus of control are also thought to mediate the stressor–illness relationship. Hardy persons are believed to possess various beliefs and tendencies that are useful in coping with stressors, such as optimistic appraisals of events and decisive actions in coping. Hardy persons report less illness in the presence of stressors. Persons with an internal locus of control—a general belief that events in life are controlled by their actions—also have shown a consistent tendency to report better health than those who believe that life events are beyond their control.

Stage of career development, though little studied, may also moderate the stressor–illness relationship. For example, work experience (job tenure) seems to moderate worker responses to negative events at work. For workers in midcareer, job stressors lose potency in affecting physical health, but stressful events outside the job domain become increasingly deleterious to health.

Non-work Factors

Workers do not leave their family and personal problems behind when they go to work, nor do they forget job problems on returning home. Difficult transportation options, childcare needs, and available community resources may also moderate home and work stress. Nearly all models of job stress acknowledge extraoccupational factors and their potential interaction with work in affecting health outcomes. Few studies, however, have attempted to examine the respective health effects of job and extraorganizational stressors. Although some investigators have incorporated generic stressful life-events scales into job-stress surveys, these scales provide only crude indications of social, familial, and financial stressors. In future studies, more attention needs to be paid to nonwork factors. Interpersonal, marital, financial, and child-rearing stressors can exacerbate existing job stressors to promote acute stress reactions. Alternatively, the absence of extraorganizational problems may make stressful job situations more tolerable (that is, less stressful) and may impede the development of stress reactions. Environmental factors are recognized modifiers within the job-stress model. For example, a worker living in a noisy, high-crime neighborhood will be exposed to added stress and be unable to recover from stress endured at work. Or a worker facing a long commute by automobile, with traffic and construction delays, will be subjected to significant stress. In contrast, the environment a worker lives in can offer good opportunities to reduce stress, such as by biking, running, and walking, or to enhance social interaction among neighbors.

Buffer Factors

Social Support

Stress researchers have sought to identify factors that reduce or eliminate the effects of job stressors. These factors are termed *buffer factors*. One of the most extensively studied buffer factors has been the degree of social support an individual worker receives from work and nonwork sources. However, evidence for a buffering effect of social support has been mixed. Whereas some studies have found that social support buffers the relationship between a variety of job stressors and psychological symptoms, others have found no such buffering effect. These disparate results appear, at least in part, to be the result of differences among researchers in conceptualizing and measuring support.

Coping

Another potential buffering factor is coping. The literature on coping is voluminous, but until relatively recently little of this knowledge has been incorporated into studies of occupational stress and health. *Coping* is not a stable trait or disposition but rather seems to be a transactional process that is modified continuously by experience within and between stressful episodes. Further, a specific coping strategy that alleviates stress in one situation may not alleviate stress, or may actually increase perceived stress, in other situations. Clearly, the coping responses that people use are a function of the social and psychological resources at their disposal. Social supports and psychological resources, like mastery and self-esteem, are what people draw upon in developing coping strategies. Research has shown that these resources vary by socioeconomic status with people who are better educated and more affluent possessing more resources and a wider range of coping alternatives. It also appears that no single coping response is uniformly protective across work and nonwork situations. However, having a large and varied coping repertoire can be helpful in reducing stressor–strain relationships. Although various coping responses have been found to be effective in the areas of marriage, child rearing, and household finances, coping is sometimes strikingly ineffective when applied to occupational problems. This may be due to the impersonal nature of work and the lack of worker control over this class of stressors. Future research on coping would benefit from a clear delineation of the various types of coping strategies and their relative effectiveness across work and nonwork situations.

Lifestyle Factors

Lifestyle factors, such as physical fitness and exercise, smoking cessation, sound nutrition habits, and stress management, have the potential to buffer the health effects of job stressors, but clear evidence for such a buffering effect is lacking. However, such evidence could result from a new NIOSH initiative (Steps to a Healthier U.S. Workplace), which is creating an opportunity for occupational safety and health professionals and health promotion professionals to develop and implement collaboratively workplace programs that prevent occupational illness and injury, promote health, and optimize the health of U.S. workers.

PATHOPHYSIOLOGICAL CORRELATES OF JOB STRESS

Despite the amount of data linking stressful job conditions to poor health, surprisingly little is known about the actual pathophysiologic mechanisms that underlie the relationships between stress and disease. Both direct and indirect pathways have been described. The direct pathways that are thought to play a role are disregulations of the neurohormonal system (pituitary–adrenocortical axis), the autonomic nervous system, and the immune system. A combination of these pathways, influenced by genetic factors, probably links exposure to job stressors and adverse health effects. An indirect pathway links job and nonjob stressors first to high-risk behaviors, which then lead to adverse health effects. For example, strain effects from rotating shift-work directly influences the circadian rhythm, with resultant changes in the autonomic nervous system and the immune system.

To further complicate the relationships, job stressors can be seen as influencing the early development of disease, such as the precursors of coronary heart disease (CHD), or as a trigger for an ultimate event, such as an acute myocardial infarction. For example, acute stress elevates catecholamine levels, leading to increased heart rate and blood pressure, decreased plasma volume, coronary constriction, and increased lipid levels, platelet activity, coagulation, and inflammation. Chronically, stress causes autonomic imbalance, leading to decreased cardiovascular reactivity, neurohormonal changes, a pro-coagulant state, and increased lipid levels.

Immune system responses may mediate some of these relationships. Many animal studies have demonstrated that experimentally induced stress increases susceptibility to a variety of infectious agents and the incidence and rate of growth of certain tumors. Some human studies have shown that psychosocial factors, including stressful life events, are related to diseases under immune system regulation. And stress has been linked to changes in levels of circulating antibodies, lymphocyte cytotoxicity, and lymphocyte proliferation.

PREVENTION AND INTERVENTION

The gap between etiologic and intervention-related knowledge is great in the realm of occupational stress. Despite the ever-burgeoning literature on the nature, causes, and physical and psychological consequences of occupational stress, surprisingly little is known about intervention for occupational stress. Views differ regarding the importance of worker characteristics versus working conditions as "the" major cause of organizational stress; these views have, in part, led to the development and use of primary, secondary, and tertiary prevention (intervention) approaches for occupational stress. The aim of *primary prevention intervention* is to reduce risk factors or job stressors. The aim of *secondary prevention intervention* is to alter the ways that individuals respond to risks or job stressors. And the aim of *tertiary prevention intervention* is to heal those who have been traumatized. Research on primary and tertiary prevention intervention has been recently reviewed by this author,[12] and secondary prevention intervention has been the subject of reviews by Murphy[13] and van Der Klink and colleagues.[14] The following provides a brief overview of research findings for all three types of intervention.

Primary Prevention Interventions

Primary prevention interventions can be characterized as either psychosocial or sociotechnical. *Psychosocial interventions* focus *primarily* on human processes and psychosocial aspects of the work setting and aim to reduce stress by changing workers' perceptions of the work environment; they may also include modifications of objective working conditions. In contrast, *sociotechnical interventions* focus *primarily* on changes to objective working conditions and are considered to have implications for work-related stress. Some interventions involve elements of both approaches.

Psychosocial Interventions

Most primary prevention interventions appear to be psychosocial. Many are based on the principles of participatory action research (PAR)—a methodology in which researchers and workers collaborate in a process of data-guided problem-solving to improve the organization's ability to provide workers with desired outcomes and to contributing to general operational knowledge. PAR involves workers and experts from outside the workplace, in an empowering process of defining problems (identifying stressors), developing intervention strategies, introducing changes that benefit employees, and measuring outcomes. Some PAR interventions have specifically focused on efforts to redesign work or work processes. In general, there is very limited evidence for the efficacy of PAR and other participatory-type interventions; studies evaluating its efficacy tend to be methodologically weak, difficult to interpret, and causally ambiguous. When found, the effects of the interventions have often been on job satisfaction and perceptions of the working environment; few effects on health-related outcomes have been reported. It is unclear whether the general lack of health benefits are due to ineffective interventions, the insufficient duration of the studies, or the nature of the health-outcome variables studied. Moreover, which effects are attributable to the act of participating in the intervention and which are attributable to changes in working conditions or processes resulting from the intervention are unclear.

There is, however, some evidence for the efficacy of psychosocial interventions focused on supervisors and managers rather than workers. Although few in number, these interventions resulted in positive organizationally relevant outcomes and found modest positive effects on individual well-being. An intriguing aspect is that the effects on well-being may extend beyond the supervisors and managers themselves, possibly representing a potentially effective and seemingly cost-efficient approach to primary prevention. No firm conclusions, however, can be drawn, and more research is needed.

Sociotechnical Interventions

In contrast, sociotechnical interventions are generally not a result of employee–employer or employee–employer–researcher collaboration.

Sociotechnical interventions have generally involved changing only a very limited variety of objective working conditions, such as the modification of workload, work schedules, and work processes. However, as a whole, sociotechnical intervention studies provide more consistent and robust evidence for the efficacy of the intervention than psychosocial intervention studies. In addition to incorporating self-report measures of affect, such as job satisfaction, anxiety, and depression, most of these studies have incorporated objective outcome measures, such as blood pressure, job performance, and sickness absence, in the study design. In general, these studies have also tended to use more rigorous experimental and quasiexperimental designs.

Secondary Prevention Interventions

Secondary prevention interventions, often termed *stress management*, involve techniques and procedures designed to help workers modify their appraisal of stressful situations and/or to deal with the symptoms of stress. Typically, such interventions are prescriptive, person-oriented, relaxation-based techniques such as biofeedback, progressive muscle relaxation meditation, and cognitive-behavioral skills training. They differ from other health-promotion programs in the variety of training techniques and wide range of health-outcome measures used to assess program effectiveness. In contrast to primary prevention interventions, they do not seek to alter the sources of stress at work (job stressors) through organizational change strategies or job redesign.

Cognitive-behavioral skills training, frequently used in stress management, involves techniques designed to modify the appraisal processes that determine perceived stressfulness of situations and to develop behavioral skills for managing stressors. It helps people to restructure their thinking patterns through cognitive restructuring. In general, it can reduce psychological strain, especially anxiety, and improve organizationally relevant outcomes, such as job satisfaction. However, it has not shown consistent improvement of physiological strains.

In contrast, muscle relaxation techniques can benefit some physiological strains, such as blood pressure, but not others. Such techniques involve focusing one's attention on muscle activity, learning to identify even small amounts of tension in a muscle group, and practicing releasing of tension from muscles.

Meditation methods used in worksite stress-management studies, often secular versions of Transcendental Meditation, involve sitting upright in a comfortable position, in a quiet place, with eyes closed, and mentally repeating a mantra while maintaining a passive attitude. The few studies that have examined the efficacy of such worksite-based meditation provide surprisingly consistent evidence that they reduce psychological, physiological, and behavioral strain. More research is needed on the efficacy of meditation methods.

Combinations of two or more stress-management approaches into a single intervention are frequently used, the most common combination and most effective of which seems to be muscle relaxation coupled with cognitive-behavioral skills training—apparently more effective than either technique used alone.

Tertiary Prevention Interventions

Tertiary organizational stress prevention is therapeutic—treatment of the physical, psychological, or behavioral consequences of exposures to job stressors. No comprehensive discussion of this subject is found in the stress literature—perhaps because so many individual physical, psychological, and behavioral illnesses are thought to be related to job stress. The following is an overview of tertiary stress interventions that are often based in organizations.

Medical Care

Many large companies have occupational medicine departments that offer services that include urgent medical care, employee examinations, disability reviews, health promotion activities, and referrals for medical treatment (see Chapter 12). In general, these departments are not structured to provide extensive or long-term care for stress-related illness or injury and must rely on making referrals to appropriate health care providers. Mental health problems related to job stress can present special challenges to occupational medicine departments that may not be well equipped either to deal with them or to make referrals.

Counseling and psychotherapy are commonly used methods to treat individuals suffering from work-related mental health problems. Common techniques of psychotherapy and counseling include behavioral and cognitive therapy, supportive counseling, and insight-oriented psychotherapy.

Counseling and psychotherapy can have marked benefits on symptom reduction, but it may not have beneficial impact on work performance (as measured by reduced absenteeism).

Many companies offer limited counseling at the workplace through employee assistance programs (EAPs) that often provide a variety of mental health–related services. Employees can refer themselves to EAPs or be referred by management. The goals of an EAP are to restore employees to full productivity by (1) identifying those with drug abuse and those with emotional or behavioral problems that result in deficient work performance; (2) motivating these employees to seek help; (3) providing short-term professional counseling assistance and referral; (4) directing employees toward the best assistance available; and (5) providing continuing support and guidance throughout the problem-solving period. Very few studies have addressed the cost-effectiveness of EAPs. There is little agreement on evaluation methodology. And, some have questioned whether there should be any economic evaluation of EAPs. However, reduced health claims, financial savings, lower absenteeism rates, and increased return on investment have been reported.

For many employees, a stigma continues to be associated with psychological treatment of any kind. This fear, along with concerns regarding confidentiality, may limit the use of workplace-based mental health resources. Employees may also feel that the company has a vested interest in their productivity that is of greater importance than their health. This concern may be exacerbated by the fact that EAPs are gatekeepers with financial biases not to refer employees for more sophisticated and long-term care and to refer to mental-health-care providers with limited training who may charge the employer less money. Indeed, who provides the care seems to be an important issue. For example, psychologists, psychiatrists, and social workers seem to achieve equally positive results, whereas results by other counseling professionals—who generally charge less money—do not appear to be as positive. There are paradoxes embedded in the very nature of EAPs, which lead to conflicting demands and to occupational stress for professionals on the staff of EAPs, such as conflicts of employer versus employee assistance and pressures to provide short-term individual solutions to what may be long-term structural problems.[15]

Implications for Practice and Policy

A tremendous gulf exists between our knowledge regarding job stress and the most efficacious and economical means of preventing it and treating its consequences in the workplace. There is only limited evidence that certain primary prevention interventions have worked, although it is unclear why they worked. Those that focus on a few stressors and those that do not introduce too many changes too quickly appear to be the most successful. Before primary prevention interventions are designed and implemented, the most prevalent and problematic stressors must be identified and prioritized according to their potency and amenability to meaningful change.[16] Practitioners and researchers should target appropriate objective and subjective outcomes by which to assess the efficacy of interventions and valid and reliable measures of these outcomes. Objective measures that are organizationally relevant need to be included, without which other organizations will be reluctant to engage in these interventions.

Regardless of whether they are primary, secondary, or tertiary in nature, job-stress interventions seem to be implemented in relative isolation from one another within an organization. For example, management, human resources, medical departments, and/or EAPs may be given the responsibility for an intervention, and there may be little involvement or cooperation of other organizational structures. Primary, secondary, and tertiary interventions for job stress should be integrated within the organization as a whole.

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A good, brief overview of available interventions.

APPENDIX

WEB SITES

<http://www.cdc.gov/niosh/topics/stress/>
This site, sponsored by NIOSH, provides information about job stress and health, and links to other sources of information on job stress.

The findings and conclusions in this chapter are those of the authors and do not necessarily represent the views of the National Institute for Occupational Safety and Health.

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