JOB STRESS, EMPLOYEE HEALTH, AND ORGANIZATIONAL EFFECTIVENESS: A FACET ANALYSIS, MODEL, AND LITERATURE REVIEW

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Job stress (and more generally, employee health) has been a relatively neglected area of research among industrial/organizational psychologists. The empirical research that has been done is reviewed within the context of six facets (i.e., environmental, personal, process, human consequences, organizational consequences, and time) of a seven facet conceptualization of the job stress—employee health research domain. (The seventh facet, adaptive responses, is reviewed in the forthcoming second article of this series.) A general and a sequential model are proposed for tying the facets together. It is concluded that some of the major problems of the research in this area are: confusion in the use of terminology regarding the elements of job stress, relatively weak methodology within specific studies, the lack of systematic approaches in the research, the lack of interdisciplinary approaches, and the lack of attention to many elements of the specific facets.

A report by the APA Task Force on Health Research (1976) exhorted psychologists, including industrial/organizational (I/O) psychologists, to take a role in examining the health problems of Americans. It is interesting that, over the years, little mention has been made of employee health in the journals that reflect research activity of I/O psychologists (Newman and Beehr, Note 1). The purpose of this and a forthcoming article (Newman and Beehr, Note 2), therefore, is three-fold: (1) to review the state of the art regarding health research in the context of people at work, (2) to provide understanding of the topic and, (3) to suggest avenues for research and practice.

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The first part of this article discusses some reasons why I/O psychologists may have neglected the employee health research domain and some reasons why they ought to take a more active role in it.

Second, a brief conceptual analysis of job stress is presented, followed by a facet analysis of the job stress—employee health research domain and a general model relating the facets. Then, a sequential model to aid understanding of the complex relationships among the different facets as they occur over time is presented. It is hoped that this article benefits both researchers and practitioners (i.e., managers, employees, and psychologists who are asked to do something about job stress).

The Importance of Employee Health

There may be two reasons for the relative lack of activity in this research domain. One reason may be the belief that employee health is not as important as other work-related events (e.g., job performance) are. A few facts, however, indicate that health is very important to many people.

There is growing concern by individuals, by consumer groups, by professionals, and by all levels of government with the issues of physical and mental illness and health maintenance. Obviously, the previously mentioned APA Task Force is concerned about health, for example.

The importance of health to Americans is also reflected in the fact that they spent more than one hundred million dollars seeking health care services in 1972 (Burns, 1973). During fiscal year 1974, roughly one dollar of every fourteen dollars for goods and services produced in this country was a health dollar (i.e., almost 8% of the gross national product). Health care is the largest service industry in the United States today.

Another indication of the importance of health to Americans and of their increasing willingness to take a personal, active role in health maintenance and illness prevention is the rapidly growing "relaxation movement" (e.g., meditation, biofeedback, physical fitness programs, etc.)—seemingly, in response to an increasing need to relax, to cope with the stress of living in today's world. One can conclude that health is important.

A second reason why industrial/organizational psychologists may have paid little attention to employee health in the past is the belief that employee health/illness is caused primarily by physical rather than social or psychological events. In response to this, it must be noted that there has been an evolution over the years in fundamental thinking relating to health and illness. Jenkins (1976) has provided an
excellent review of much of the research on psychosocial events that are related to coronary heart disease, for example. In earlier times, illness was thought to result from the presence of a single pathogenic agent—germ, toxin, endocrine imbalance, vitamin or nutritional deficiency, etc. New knowledge, however, has increased the recognition that the etiology of poor health is multifactorial. For example, the interaction of the mind and body in the production of health/illness is being recognized increasingly and medical research and practice are gradually taking this into account.

A second evolution in medical thought is the recognition of the broader, multidimensional environment as an important influence on health. For example, in addition to considering the interaction of psychological (mind) factors and physical (body) factors, there is increasing interest in the social environment as a very important determinant of health/illness (Jenkins, 1976). Many researchers are investigating stress as the primary social-psychological cause of heart attacks. Some, in fact, feel that stress may contribute to the development of all illnesses.

The Job as a Source of Stress

This review focuses only on stress processes occurring in conjunction with work—job stress. Job stress is very much within the domain of I/O psychology. Job stress has been studied, to some degree, in relation to job satisfaction, motivation, performance, and job withdrawal behavior. Unfortunately, the relationship of job stress to the physical and mental health of employees has not been studied extensively by many I/O psychologists. It is not surprising, therefore, to discover that most of the information regarding the effects of job stress on health is in non-I/O psychology journals (Newman and Beehr, Note 1).

Since many adults spend roughly half of their waking lives in work-related activities, it seems likely that social and psychological factors, in addition to physical factors on the job, may have important influences on their health. Employee health is important to the individual employee, to the organization, and to society; it is, however, beyond traditional concerns with employee motivation, attitudes, and job performance (all important concerns).

A Conceptual Overview

Thus far, the present authors have carefully avoided defining the term “stress,” primarily because there is no universally agreed upon meaning among behavioral scientists let alone among scientists in general. Some, for example, have used the term to describe the envi-
environmental characteristic thought to affect people adversely (e.g., Beehr, 1976; Kahn, et al., 1964; French and Caplan, 1973), while others have used it to mean the general bodily response to any demand (Selye, 1974). It is not the intention here to debate definitions, but rather to provide the reader with a general notion of the stress phenomenon.

McGrath (1976) said, "... there is a potential for stress when an environmental situation is perceived as presenting a demand which threatens to exceed the person's capabilities and resources for meeting it, under conditions where he expects a substantial differential in the rewards and costs from meeting the demand versus not meeting it" (p. 1352).

Caplan, Cobb, French, Van Harrison, and Pinneau (1975) said "stress" refers to "any characteristics of the job environment which pose a threat to the individual. Two types of job stress may threaten the person: either demands which he may not be able to meet or insufficient supplies to meet his needs" (p. 3). These two types of job stress have been explicated by the theory of person-environment fit (or misfit) developed by French, Rogers, and Cobb (1974). The extent to which the person's skills and abilities match the demands and requirements of the job represents one kind of fit. The extent to which the person's needs are supplied in the job environment is another kind of fit. Job stress, then, is conceptualized as a misfit of either of these relationships between employee and job environment. Also, when misfit of either kind threatens an individual's well-being, strains will occur. Caplan, et al., (1975) defined strain as "any deviation from normal responses in the person: (a) psychological strains such as job dissatisfaction, anxiety, and low self-esteem; (b) physiological strains such as high blood pressure and elevated serum cholesterol; and (c) behavioral symptoms of strain such as smoking and dispensary visits" (p. 3).

The latter conceptualization of stress is roughly consistent with that from engineering, where stress is viewed as a force that induces strain or deformation in that to which it is applied (McLean, 1974). The external load may cause overloading which produces irreversible strain or yielding. Such yielding may not prevent functioning although in time it may lead to rupture or breakdown. McLean (1974) noted that the engineering analogy has been considerably distorted and misapplied by many of its proponents.

Margolis and Kroes (1974) define job stress as a condition at work interacting with worker characteristics to disrupt psychological or physiological homeostasis. The causal, situational conditions are job stressors, and the disrupted homeostasis is job-related strain. Margolis
and Kroes suggested that there are at least five dimensions of job-related strain: short-term subjective states (e.g., anxiety, tension, and anger), long-term and more chronic psychological responses (e.g., depression, general malaise, and alienation), transient physiological changes (e.g., levels of catecholamine, blood pressure, etc.), physical health (e.g., gastro-intestinal disorders, coronary heart disease, and asthmatic attacks), and work performance decrement. Generally consistent with this approach, McLean (1974) indicated that for years he considered an occupational "stress" or "stressor" any work-related factor which produced a maladaptive response (included were adverse effects on work performance and on interpersonal relationships).

There is also a physiological concept of stress. In this sense, stress is a reaction to a stressor. Selye (1971) defines biological stress as a non-specific bodily response to any demand. Stress is not, therefore, necessarily a response to excessive demands. Selye's concept of the general adaptation syndrome is a set of specific responses that have many potential causes.

In addition to various conceptions of stressors and reactions to stressors, there are a host of intervening and conditioning variables believed to be important. These include: biochemical individuality, early lack of experiences, psychological set, cultural factors, conscious and unconscious mechanisms of defense, social support, etc.

Job Stress as a General Area of Study

In reviewing these various conceptions of stress, McLean (1974) concluded that stress is neither stimulus, response, nor intervening variable, but rather a collective term for an area of study—an area of study, which, in its broadest sense, is differentiated from other problem areas in that it deals with any demands which tax the system, whatever that system may be (a physiological system, a social system, or a psychological system) and the responses of that system to the taxing demands.

It is clear, then, that the job stress phenomenon involves complicated interactions between person and environment. It is also clear, after some consideration, that time plays an important role. For example, although an individual's job may be a stressor agent, his or her reaction to that stressor may occur immediately, tonight at home, or at any time (and place) in the future.

Based on the preceding, it seemed important that a definition of job stress (for this paper) not restrict potentially valuable contributions (e.g., physiological, psychological, behavioral) to our understanding of the job stress—employee health phenomenon. Therefore, the following general definition of job stress was used: job stress refers to a
situation wherein job-related factors interact with a worker to change (i.e., disrupt or enhance) his or her psychological and/or physiological condition such that the person (i.e., mind-body) is forced to deviate from normal functioning. This definition also serves to define what we mean by “employee health”; namely, a person's mental and physical condition. We are referring to health in its broadest sense—the complete continuum from superb mental and physical health all the way to death. Note that we are not excluding the possibility of beneficial effects of stress on health.

Of course, many other variables of interest to industrial/organizational psychologists may be included in job stress studies. Some are reviewed in this paper in order to indicate probable links between job stress and more traditional areas of study in this field. An attempt was made, however, to review here only those studies for which job stress was a central focus.

**Perspectives for Viewing Job Stress—Employee Health Phenomena**

Three perspectives for viewing job stress—employee health phenomena are readily discernable. The first can be called the personal characteristics perspective. This orientation focuses on the characteristics of people which are thought to cause or contribute to ill health (or good health). The second perspective sees environmental factors as the causal agents in stress—health events. The third perspective for viewing job stress is the person-environmental interaction perspective. This views stress-health phenomena as an interaction of the characteristics of individuals and their environment. Implicit in this perspective is the concept of person-environment fit (or misfit).

With these three perspectives in mind, a facet analysis was used to indicate the potential elements of the job stress domain.

**Facet Analysis**

The purpose of a facet analysis, or more precisely a facet design, is to delimit and make explicit the phenomena one wishes to investigate. A facet, according to Foa (1968), is a conceptual dimension underlying a set of variables. It is important in the facet design to specify all the facets one considers relevant to the domain, regardless of whether all the properties involved are to be dealt with in the immediate empirical phase of the research. The meaning of present outcomes is enriched if the outcomes are assessed in the light of facets conceived as relevant but which remain as yet unexplored (Runkel and McGrath, 1972).

The facet design presented in Table 1 represents a conceptualization of the major facets (dimensions) of the job stress—employee health
TABLE 1
Facets of the Job Stress—Employee Health Research Domain

Facets and Types of Elements

1. ENVIRONMENTAL FACET
   a. job demands and task characteristics
      - weekly work schedule*
      - over- and under-utilization of skills*
      - variance in workload
      - pace of work
      - responsibility (for people or for things)
      - travel as part of the job
      - job characteristics thought to be intrinsically motivating
   b. role demands or expectations
      - role overload*
      - role conflict*
      - role ambiguity
      - formal and informal relationships among role set members
      - psychological contract perceived by the employee
   c. organizational characteristics and conditions
      - company size*
      - job security
      - hours of work (both total and time of day)
      - duration of work tasks
      - socio-technical changes
      - organizational structure (and job’s position within hierarchy)
      - communication system (and job’s position within system)
      - subsystem relations
      - staffing policies and procedures
      - management style (philosophical and operational)
      - evaluation, control, and reward systems
      - training programs
      - organizational climate
      - opportunity for advancement
      - required relocation
      - local union constraints
   d. organization’s external demands and conditions
      - route to and from work
      - number and nature of customers or clients
      - national or international unions
      - governmental laws and regulations
      - suppliers; providers of needed services
      - weather
      - technological and scientific developments
      - consumer movements
      - geographic location of organization

2. PERSONAL FACET
   a. psychological condition (personality traits and behavioral characteristics)
      - Type A*
      - ego needs*
      - need for clarity/intolerance of ambiguity*
      - introversion/extroversion
      - internal/externality
      - approval seeking
      - defensiveness
      - impatience
      - intrapersonal conflicts (e.g., between ego-ideal and reality)
      - self-esteem
Facets and Types of Elements

- motives/goals/aspirations (career, life)
- typical anxiety level
- perceptual style
- values (human, religious, etc.); personal work standards
- need for perfection
- intelligence
- abilities (especially task- and coping-related)
- previous experience with stress
- satisfaction with job and other major aspects of life

b. physical condition
   - physical fitness*/health
   - diet and eating habits
   - exercise, work, sleep, and relaxation patterns

c. life-stage characteristics
   - human development stages
   - family stages
   - career stages

d. demographics
   - age*
   - education (amount and type)*
   - sex
   - race
   - socio-economic status
   - occupation, avocation

3. PROCESS FACET
   a. psychological processes
      - perceptions* (of past, present and predicted future situations)
      - evaluation of situation
      - response selection
      - response execution
   b. physical processes*
      - physiological, biological
      - neurological
      - chemical

4. HUMAN CONSEQUENCES FACET
   a. psychological health consequences
      - anxiety, tension*
      - depression*
      - dissatisfaction, boredom*
      - somatic complaints*
      - psychological fatigue*
      - feelings of futility, inadequacy, low self-esteem*
      - feelings of alienation
      - psychoses
      - anger
      - repression, suppression of feelings and ideas
      - loss of concentration
   b. physical health consequences
      - cardiovascular disease*
      - gastrointestinal disorders*
      - respiratory problems
      - cancer
      - arthritis
      - headaches
TABLE 1 (Continued)

Facets and Types of Elements

- bodily injuries
- skin disorders
- physical/physiological fatigue or strain
- death

c. **behavioral consequences**
- dispensary visits*
- drug use and abuse (including alcohol, caffeine, nicotine)*
- over- or under-eating
- nervous gesturing, pacing
- risky behavior (e.g., reckless driving, gambling)
- aggression
- vandalism
- stealing
- poor interpersonal relations (with friends, family, coworkers)
- suicide or attempted suicide

5. **ORGANIZATIONAL CONSEQUENCES**
- changes in quantity, quality of job performance*
- increase or decrease in withdrawal behaviors (absenteeism, turnover, early retirement)*
- changes in profits, sales, earnings
- changes in ability to recruit and retain quality employees
- changes in ability to obtain raw materials
- increase or decrease in control over environment
- changes in innovation and creativity
- changes in quality of work life
- increase or decrease in employee strikes
- changes in level of influence of supervisors
- grievances

6. **ADAPTIVE RESPONSES FACET**
   a. **adaptive responses by the individual**
   - meditation
   - manage desires, ambitions, drives
   - attempts at increased self-understanding
   - vicarious stress reduction (audience activities for sports, drama)
   - relaxation techniques
   - acceptance of less than perfection
   - mastery of the environment (including stressors)
   - seeking sympathy or social support
   - tension release (laughing, crying, attacking)
   - leaving the stressful situation (permanently, temporarily)
   - adjusting work activities to biohythms
   - seeking medical, psychological, other professional help
   - attempts to alter behavioral, personality style
   - planning, organizing each day’s activities
   - use of biofeedback techniques
   - reduction of psychological importance of work
   - increased religious activity
   - quitting drug intake
   - find more suitable job
   - setting realistic goals
   - physical activity
   - diet
   - getting sufficient rest

   b. **adaptive responses by the organization**
Facets and Types of Elements

- redesigning jobs
- altering organizational structure
- changes in evaluation, reward systems
- changes in work schedules
- providing feedback to employees aimed at role clarification
- refine selection and placement procedures; include job stress as a validation criterion
- provision of human relations training
- marking career paths and promotion criteria clear
- communication improvement
- provide health services

c. adaptive responses by third parties
- attention to career guidance by school systems
- alcohol and drug abuse treatment programs
- legislation regarding quality of work life, health care, mandatory retirement
- social support by family and friends

7. TIME FACET
- time as a variable in development of stress
- time as a variable in response to stress
- time as a variable in relationships among facets 1-6
- sequential reactions (chain and cyclic)

*Facet elements that have been studied empirically within the context of job stress—employee health (at least to some extent).
facets to each other and to the consequences and adaptive response facets.

The human consequences facet has as its elements all aspects (positive and negative) of physical and mental health. While some of these reactions may be construed as adaptive in the short run, they may be maladaptive in the long run, leading to other, more serious, or even fatal consequences. For this reason, we have used the space for this facet in Table 1 to list, for the most part, the (assumed) maladaptive or undesirable consequences of stress that are indices of or have implications for employee health and effectiveness. (A separate facet has been set aside for "adaptive responses").

It is important to remember, however, that we are leaving open the possibility of beneficial (i.e., healthy) human consequences of job stress.

The organizational consequences facet lists some of the key aspects of organizational effectiveness that may be affected (positively or negatively) by job stress. Although it may be possible to study the effects of stress on either the individual or the organization separately, it would seem most fruitful to study the effects of stress on both the individual and the organization simultaneously and diachronically.

The adaptive response facet contains elements which represent various approaches to handling stress. It indicates that various agents can attempt to alleviate the undesirable effects of stress in a manner that results in long-term health for the individual and the organization. The stressee, for example, may choose an adaptive response to stress from among a variety of psychological and behavioral coping mechanisms. The organization may redesign jobs or give special benefits such as earned time off for employees whose stressful jobs cannot be redesigned. Also in this facet are the adaptive responses by parties outside of the organization (e.g., governmental responses in terms of legislation regarding the quality of working life, psychological support provided by spouse).

The final facet, time, runs through all of the others. The elements of the personal facet require time for their development (e.g., development of needs and personality characteristics). Elements of the environmental facet require time to exhibit their effects. Also, one can speak of immediate, short-term, and long-term consequences of stress. Any causal linkages that exist between facets depend upon the passage of time (e.g., the long-term health effects of working in a bureaucratic organization). In many organizational phenomena, causal relations may be found in either direction, depending upon which segment of the time cycle is sampled. An example in regard to occupational stress is given in the Kahn, Wolfe, Quinn, Snoek, and Rosenthal (1964)
model, which indicates that stressful aspects of the environment may cause individual responses, but that those responses also change the environment, either directly or through intervening variables. Time is obviously an important dimension in stress-health phenomena. It follows, then, that the elements of any facet could serve as independent, dependent, intervening, or conditioning (moderator) variables—depending on which time period or segment of events is sampled and studied.

A General Model

The general model presented in Figure 1 indicates as simply as possible the general focal points of the job stress—employee health domain. It is based on the facets just discussed and suggests that elements of the personal facet and of the environmental facet interact via the process facet to produce human and organizational consequences. Various agents then undertake the task of adaptation (i.e., reducing undesirable effects of job stress and/or increasing the beneficial effects). The adaptive responses may, in turn, affect the personal and environmental facets.

A review of the empirical literature related to job stress and employee health, arranged according to the general model in Figure 1,
follows. The vast majority of the references were obtained via MED-LARS II Search and Retrieval System (which accesses the medical literature) and the Psychological Abstract’s Search and Retrieval System. An attempt has been made to review here only the research that is (1) methodologically sound and (2) closely related to job stress (and, hence, employee health) rather than to stress in general. Many studies were eliminated because they did not meet both criteria.

**Literature Review**

**Environmental Facet**

The environmental facet includes any aspect of the (objective) work environment that is perceived as stressful by the employee, and responded to accordingly, or sensed by the human organism and responded to (e.g., physiologically) without the employee being cognitively aware of the cause. The studies of the environmental facet have focused on social-psychological and organizational aspects of the work environment rather than on the physical work environment. This reflects, in part, those researchers’ interests and value judgments as to what aspects of the work environment are most important to study in relation to employee health. In fact, very few studies dealing with the physical environment were uncovered in the computerized literature searches using job stress and employee health-related key words. Although the study of physical working conditions, equipment design, etc. is a traditional area within I/O psychology (cf., McCormick, 1976), apparently that body of knowledge has not been construed, classified, or coded as stress/health-related.

Few studies have measured job (i.e., environmental) stressors in any objective manner and even fewer have studied the relationship between objectively measured environmental stressors and employee perceptions of them (the primary linkage for the environmental facet in Figure 1). Three studies stand out as exceptions to this latter observation. Sales (1970) found that objective workload, as manipulated in a laboratory study of male undergraduate students, was related to perceived workload as measured by a questionnaire. Coburn (1975) constructed a relatively objective index of job incongruence by comparing an employee’s education with an estimate of the educational requirements of the employee’s job. According to Coburn, this was a very limited index and was only weakly related to the employee’s perceived incongruence (a measure of workload) for a sample of male workers in a variety of jobs in British Columbia. Kahn, et al. (1964) with a sample of male workers, obtained an “objective” index of role conflict by asking a focal employee’s role senders what they would like
the employee to do that he was not already doing. This was objective only in the sense that it was a measure of the focal employee's job demands obtained via the perceptions of someone other than the focal employee. The assumption was that the role senders would apply pressure on the focal employee if he were not doing all that was expected of him on the job. Kahn, et al., found that this measure was insignificantly or weakly related to their measures of perceived role conflict and ambiguity, however.

The other studies that have measured environmental stressors relatively objectively but without relating them to employee perceptions of the pertinent environmental aspect have studied overload (e.g., phone calls, office visits, and meetings; in French and Caplan, 1973), the arrangement of working hours throughout the week (Ivanevich, 1974), company size (Snoek, 1966), jobs that required very little physical activity (Paffenbarger and Hale, 1975), and jobs that did not allow enough rest (Jacobson, 1972). Although these studies indicated that certain environmental stressors (measured objectively) were related to some individual health consequences (discussed later), they did not measure the environmental stressors subjectively, and therefore do not provide as much information on the model proposed here as they might have.

**Summary.** Table 1 indicates (via asterisk) which of the environmental elements have been studied empirically and shown to be related to health consequences. It is obvious that many elements in the environmental facet have been ignored. Therefore, one suggestion for research is to broaden the scope of work environment variables used in job stress research. A second suggestion is to measure the work environment variables objectively and subjectively. It should be noted that the three studies reviewed here which included both objective and subjective measures of the environment, used all-male samples. The environmental stressors experienced by females also need to be studied. A final suggestion for future research is to determine whether the linkage between the environmental facet and the process facet is causal. Only experimental studies are able to address this question with much certainty. While strong experimental manipulations in job stress research may be unethical, more limited experimental manipulations may illuminate the issue of causation. Sales' (1970) laboratory experiment is one such example.

**Personal Facet**

The personal facet includes any characteristic of the human being that influences an individual's perception of stressful events, interpretation of events as stressful, and/or reaction to stress.
Some researchers (e.g., Kahn, et al., 1964; House, 1974) believe that personal characteristics moderate the relationship between job stress and employee health (or behavior), but the number of published studies successfully finding such effects is modest. House (1974) maintains, however, that "evidence that a result does not generalize across major demographic groups suggest that there are important individual (physiological or psychological) or social environmental variables mediating the relationships in question" (p. 24).

Cohen and Margolis (1973) report that individual differences (especially in stress tolerance) is one category of research funded by the National Institute of Occupational Safety and Health (NIOSH), reflecting their belief that characteristics of the person are important in job stress—employee health phenomena.

The following types of personal characteristics have been studied in job stress research: age, ability, personality/needs, and physical condition.

**Age.** Theorell (1976), in a study of middle-aged construction workers in Stockholm, found that groups of employees with high scores on a measure of "discord" (unfortunately, this was a combination of job stressors, non-job stressors, personality and demographics) and on a life-changes scale had higher blood pressure than other groups, and that this observation was "more striking" for employees age 41–56 than among employees age 56–65. Tests of the statistical significance of this difference were not reported, however. This is, therefore, only suggestive evidence that age may perform a moderating role in job stress—employee health phenomena.

**Ability.** Published reports of employees' abilities as moderators are also scarce. The research on role overload may be interpreted in this context, however. One part of the role conflict index in the early study by Kahn, et al. (1964) was overload (i.e., too much work to do in the time available). Such "quantitative" (French and Caplan, 1973) overload may, however, be interpreted in terms of the ability of the employee as well as in terms of time available. An employee with more ability can accomplish more work in less time than an employee with less ability for the job. In this light, Sales (1970) has shown that objective quantitative overload is related negatively to self-esteem and positively to tension and heart rate. Others have reported results consistent with these using subjective measures of overload (e.g., French and Caplan, 1973; Caplan, et al., 1975).

French and Caplan (1973) have also proposed that there exists "qualitative" role overload for some employees (those who do not have the required skills to do their jobs). These employees, therefore, could not complete their work successfully regardless of the time
available. A study by French, Tupper, and Mueller (in French and Caplan, 1973) found that quantitative overload was related to low self-esteem in administrators but not in professors, while qualitative overload was related to low self-esteem in professors, but not in administrators.

**Personality/Needs.** The most active area of research in the personal facet has been personality or needs. Kahn, et al. (1964) and Lyons (1971), for example, found that need for clarity appeared to moderate the relationship between perceived role ambiguity and job-related tension. In the Lyons’ study, however, the moderating effects were stronger for voluntary turnover, propensity to leave and dissatisfaction.

Some studies have examined employees’ higher order or ego needs as potential moderators. In field studies (using subjective measures of stressors), Beehr, et al. (1976) found only a significant trend for the relationship between three stressors (non-participation, role ambiguity, and role overload), and three human consequences (dissatisfaction, tension, and fatigue). Brief and Aldag (1976) found no moderating effect, however, for the relationship between (1) role conflict and ambiguity, and (2) tension, anxiety, and satisfaction. In the laboratory (utilizing objectively manipulated stressors), Sales (1970) found an interaction between workload and test anxiety in predicting heart rate.

Type A behavior has been of great interest to researchers studying stress and coronary heart disease. Examples of behaviors in the Type A pattern include excessive competitiveness, aggressiveness, sense of time urgency, explosiveness of speech amplitude, and tenseness of facial musculature (Jenkins, Rosenman, and Zysanski; 1974). Although Jenkins (1971b) clearly states that Type A refers to a behavior pattern rather than a personality trait, he also states that it is “a deeply ingrained, enduring trait” (Jenkins, 1976, p. 1034). He has also developed a paper-and-pencil, self-report test to replace the original behavioral observation Type A measure, thus measuring Type A behavior in a manner similar to the typical measurement of personality. Type A behavior has been shown to be positively and consistently related to the incidence of coronary heart disease itself (Jenkins, et al., 1974; Jenkins, 1976). However, the interpretation that Type A behavior causes physiological changes is over-simple.

More consistent with the proposed job stress model, two studies have attempted to use their own paper-and-pencil measures of Type A “personality” as a moderator of the relationship between stressors and personal consequences. Caplan and Jones (1975) found that Type A personality moderated the relationship between perceived workload
and anxiety for college students; but Caplan, Cobb, and French (1975) found no moderating effect for Type A personality on the relationship between quantitative workload and quitting smoking.

Physical Condition. Physical condition is a logical predictor of illness. Hennigan and Wortham (1975) have shown that men in good physical condition and non-smokers are able to maintain a low heart rate during the normal stresses of the workday, whereas stress is more likely to increase the heart rate of other people.

Summary. It can be seen in Table 1 that many elements of the personal facet remain to be studied. Even the elements that have been studied are in need of replication, due to the small number of studies and (especially regarding ego needs) the inconsistency of the results. Second, as mentioned in the preceding section, most of the studies have been of all male samples. Employee gender as a moderator in the job stress research, therefore, may be a particularly important variable in need of study. Third, most of the studies of this facet have been correlational, leaving unanswered the question of the direction of causality. Experimental manipulation of personal characteristics would be especially difficult, however. Fourth, the studies reviewed did not attempt to link the elements of the personal facet with the elements of the process facet, as the general model in Figure 1 suggests. Instead, they attempted to show direct relationships between the personal facet and the human consequences facet, or to show moderating effects of personal characteristics on the relationship between the environmental facet and human consequences or between the process facet (e.g., perceptions) and human consequences. Therefore, it is suggested that future research be directed at the proposed linkage between personal characteristics and elements of the process facet.

Process Facet

The process facet refers to those events within the human organism which transform input (stimuli) and produce output (human and organizational consequences and responses). Both physical and psychological processes are included.

Physical Processes. The physical processes would include any physical, physiological, chemical or neurological events in the human organism that intervene between the onset of the stressful environmental stimulus and the final human or organizational consequence.

Over 20 years ago, Selye suggested the existence of "first mediators" of stress, which transmit the stress message to the organs affected in the stress process (Mason, 1975); he suggested that they could operate either via the blood stream or the nervous system. Selye (1975) has recently noted, however, that the specific chemical nature of this agent
is still unknown today. Mason (1975) has suggested that the “first mediator” may be the emotional arousal accompanying many stressful events, indicating that the nervous system may play an important role. Selye (1975) believes that the messengers or “first mediators” may not always be the same. The controversy is not resolved.

**Psychological Processes.** Among the psychological processes, it is possible to discern the following activities: perception of the situation, appraisal of the situation, decision-making regarding an appropriate response, and perception of the outcomes of one’s responses. McGrath (1976) has influenced the authors’ thinking regarding these psychological activities, although the following discussion departs somewhat from his treatment of the topic.

The first of these, the *perception of the situation*, is prominent in the literature. Levine and Scotch (1970) indicate that whether a stimulus is stressful often depends upon its meaning to the person perceiving it. Others explicitly proposing that the stressor must be perceived (as stressful) in order for it to have aversive health consequences include Kahn, et al. (1964) and House (1974). The finding that perceptions of stressful situations are related to employee health and well-being (i.e., elements of the human consequences facet) has been replicated consistently (e.g., Beehr, et al., 1976; Caplan, Cobb, and French, 1975; Kahn, et al., 1964; Lyons, 1971).

The use of survey items to measure stressors is typical in these works and this use is often justified by the argument that a stressor must be perceived in order to be stressful. Researchers employing survey methodology, however, have often been concerned only with the type of stressor which is not easily measured objectively (e.g., ambiguity, overload, conflict).

As noted in the discussion of the environmental facet, some studies have sought to obtain more objective measures of overload or conflict in addition to measures of employee perceptions. Kahn, et al., (1964), French and Caplan (1973), and Sales (1970) all took this approach. From these studies, it is clear that the perceptions of stress are indeed related to objectively stressful situations and that these perceptions are related to individual and/or organizational consequences. Except for Sales (1970), these researchers take the view that perceptions are likely to be the prime determinant of the outcomes (consistent with the model in Figure 1). Sales indicated that some outcomes (i.e., productivity, self-esteem, task enjoyment, and heart rate) seemed to be dependent on objective overload rather than on perceived overload.

The empirical relationship between objective and perceived job stressors is not perfect, however. There is evidence that the perception of the situation is influenced by elements of the personal characteristics facet. Porter, Lawler, and Hackman (1975) indicate that employ-
ees' needs and values can influence their perceptions of the task and its environment. Caplan, Cobb, and French (1975) and Gemill and Heisler (1972) found that people with certain personality characteristics (Machiavelianism and Type A, respectively) are more likely to perceive stressors in their environments than are other people.

Appraisal of the situation. Appraisal of the situation is closely related to the perception of the situation. However, the initial perceptual process is primarily descriptive in nature, while the appraisal process is primarily evaluative in nature and involves a comparison of the perceived situation with some relevant aspects of the person (e.g., values, needs, abilities). French (1973) maintains that stress is often a function of person-environment fit, implying that the person's perception of his or her abilities, personality, and resources interact with his or her perception of the situation to determine the amount of stress in that situation. The perception of work overload as a stressor is a case in point. With respect to the experience of work overload, the perception process would result in a perceived amount of workload (e.g., this is a heavy workload) and the appraisal process would result in the evaluation that the workload is "over" the workload that the person is capable of or desirous of doing (e.g., this workload is too heavy). This distinction between the perceptual and appraisal processes has not been a topic of much research. It may be important, however, to determine how each of these processes occur for different types of stressors and different types of people.

It should be noted that the temporal aspects of the perceptual and evaluative processes are not clear. That is, it may be that one's perception and evaluation of the situation are so interdependent that they occur simultaneously. In other situations, one might perceive a situation as it develops over time and then at a later time arrive at an evaluation of that situation as stressful.

The decision process refers to the employee's selection of a response to the stressful situation. The process of choosing a response to stress has received little attention from stress researchers, although a substantial body of knowledge regarding decision-making processes is available in the psychological literature and would seem applicable. House (1974), in his review article, indicated that responses follow directly from the perception of stress. Miller (1960), and Katz and Kahn (1966) have proposed that employee responses to stress include queueing, filtering, or ignoring parts of the messages from role senders, or approximating the required role behavior rather than performing it precisely and completely. Job stress researchers have, however, generally ignored the decision-making or response selection process of employees who have experienced a stressful situation.

Another aspect of the psychological process is the perception of the
outcome or consequences of one's response to stress, bringing the cognitive process full circle. It is at this point that the person observes what effect his or her response to stress has had on the "stress situation." As McGrath (1976) has indicated, this response-to-stress-outcome-of-response link (i.e., feedback process) is often overlooked.

It is at this point in the stress situation, which McGrath (1976) describes as a four-stage, closed-loop cycle, where the cognitive activities begin to recycle. That is, the stressee again perceives and evaluates the current state of the stress situation and based on that information, may decide that no further action is necessary or may select a new response and observe its effect on the stressful situation.

Job stress researchers have paid little attention to the employee's attribution of responsibility for the stressful situation and for the outcomes of attempts to alleviate stress. Perhaps the application of theories of attribution of causality (Heider, 1958; Jones and Davis, 1965) and locus of control (Rotter, 1966) to the job stress research domain would prove fruitful.

Another area that needs study is the link between the physical processes and the psychological processes (i.e., psychosomatic processes in the very broadest sense). How are specific physical events related to the use of specific decision-making strategies (e.g., does high blood pressure lead to irrational decision-making, or vice versa)? Do employees experiencing physiological distress perceive their reinforcements as more (or less) externally controlled? How do the mind and body interact in the realm of job stress—employee health phenomena? Such questions have not been addressed within the context of job stress. Mason (1975), approaching the general topic of stress from the medical standpoint, has noted the relationship between emotional and physiological changes during stress, however.

Summary. With the exception of perceptual processes, the elements of the process facet are among the most unexplored or uncertain elements of the entire facet analysis (Table 1). With respect to the psychological processes, this is part of the research domain where I/O psychologists could contribute a great deal. Various areas of cognitive and social psychology have approaches that are well-suited for the study of these psychological processes (e.g., areas of decision-making, learning, motivation, attribution, personality, and perception).

A major criticism of the studies of the perceptual processes (the most studied of the psychological processes) is that it has been popular to measure both perceptions of the situation and psychological outcomes with self-report instruments. Because of the potential response biases inherent in this methodology, future studies should be of the following nature: (1) the self-reported perceptions are linked with non-
self-reported consequences; (2) these perceptions are linked with objective measures of the situation; (3) the perceptions are linked with physical processes, or (4) other variables are shown to moderate the relationship between perceptions and other self-reported data.

**Human Consequences Facet**

The human consequences facet consists of health-related conditions that are primarily important to the individual and less important to the organization. It must be emphasized that it is the relative importance that is assessed here; employee deaths due to heart attacks, for example, are of concern and importance to employers, but not nearly so important as they are to the victims themselves. The human consequences of stress may be divided into three categories: physical or physiological, psychological, and behavioral.

**Physical Consequences.** Of the physiological correlates of job stressors, the literature has focused primarily on those relating to the cardiovascular system. Studies using heart attacks as the physical consequence are usually done retrospectively because of the relative infrequency of heart attacks among the population as a whole. A huge sample and/or a long period of time would be needed for enough people to have heart attacks in order to use inferential statistics effectively in a predictive study.

Paffenbarger and Hale (1975), in a 22-year study of coronary mortality among longshoremen, concluded that those longshoremen whose jobs required repeated bursts of high energy were actually less likely to die from a heart attack; this was found even when controlling for age. In this study, there was no variable conceptualized as a job stressor (causal variable). Instead the energy level required by the job was considered a protective or conditioning variable, preventing something else (unspecified) from causing a fatal heart attack. Obviously, it could be that those employees who were doing the heaviest physical labor were selected into those jobs because of their good physical health, in effect rendering Paffenbarger and Hale’s conclusions invalid. Those authors address that issue and argue that this alternative exploration is unlikely because (1) under union agreement, the jobs are ordinarily assigned primarily on a seniority system, and (2) the job category of the stricken employee was the job the employee held the previous June rather than his current category (on the average, this would be the job of the victim six months prior to the heart attack). Of course, it is not known for certain whether this effectively ruled out selection effects as an explanation for the results.

Russek and Russek (1972) review some studies indicating that heart attack patients can be differentiated from healthy controls by many
variables including geographic location, age, and occupation. Unfortunately, such data are open to many alternative explanations (e.g., selection into the occupations, climate, and hereditary characteristics).

Most job stress–heart attack research has focused on "risk factors" rather than heart attacks themselves, however, simply because the rate of heart attacks among any employee sample of practical size is too low to permit efficient study in any but relatively crude retrospective designs. Risk factors are variables that medical researchers have identified as contributors to coronary heart disease. At present, there is evidence that the following risk factors are related to at least some type of job stressor: blood pressure (Cobb and Kasl, 1972; Kasl and Cobb, 1970; Shirom, Eden, Silberwasser, and Kellermann, 1973), cholesterol level (Cobb and Kasl, 1972; Schar, Reeder, and Dirken, 1973; Shirom, Eden, Silberwasser, and Kellermann, 1973), pulse rate (Hennigan and Wortham, 1975, Sales, Shirom, Eden, Silberwasser, and Kellermann, 1973), and electrocardiogram abnormalities (Reeder, Schrama, and Dirken, 1973).

Other physical consequences of job stress have been studied with less intensity. A relationship between job stressors and general health has been shown by Rahe, Gunderson, Pugh, Rubin, and Arthur (1972) in a naval study. Sailors in jobs that were judged a priori to be more stressful tended to report for sick call and require more medical treatment than those in jobs judged to be less stressful. Neither the job stressors nor the health consequences were specified in much detail, however. In addition, levels of uric acid, a factor in gout (Cobb and Kasl, 1972; Shirom, et al., 1973), blood sugar (Schar, Reeder, and Dirken, 1973), and incidence of peptic ulcer (Cobb and Kasl, 1972) are related to stressful events.

Unfortunately, nearly all of these studies also have serious flaws which make the interpretations of the results tentative. All except the two studies by Cobb and Kasl and the one by Hennigan and Wortham compared incidence of physiological problems across occupations; therefore, selection processes may have operated to place healthy people into specific types of jobs and unhealthy people into other jobs.

The Hennigan and Wortham (1975) study focused on engineering managers and found that non-physical work activities identified by the participants as stressful were related to higher heart rates than non-stressful, non-physical work activities. Unfortunately, inferential statistics were not reported. Also, there is the possibility that participants were reporting stressful work activities based on their reactions (e.g., heart beat cues) rather than on type of work or any other variable. If so, the results simply mean that people realize when their heart rates change. The studies by Cobb and Kasl were of male employees of a
factory during the plant's termination. Changes in physiological indices were noted during the company's process of closing, but no control groups were reported for comparison (e.g., employees in a similar company in the same geographic location during the same period of time).

There have been many more studies of the physical consequences of job stress, but most of them have employed less objective measures of the physical or physiological variables, (viz. self-report measures). The best of these measures are probably those asking the person to report only illnesses that were diagnosed and treated by a medical doctor, but even with these, there is some opportunity for faulty memories, misperceptions, and even lying to introduce error into the data. For checklists of self-diagnosed symptoms, these problems are multiplied. The studies that have found a self-reported measure of physical illness to be related to work include those by Caplan, et al., (1975), Coburn (1975), House and Harkins (1975), Jacobson (1972), Margolis, Kroes, and Quinn (1974), Mettlin and Woelfel (1974), Patkai, Frankenhaeuser, Rissler, and Bjorkvall (1967), and Powell (1973). These self-reported measures may be related to actual incidence of physical illness, but it is safer to rely primarily upon the studies using the more objective measures. At a minimum, however, it is probable that these self-reported illnesses are related to the person's psychological well-being, the second type of human consequence.

**Psychological Consequences.** Studies investigating the relationship between employees' psychological well-being and job stressors have usually depended upon paper and pencil, self-report measures, and this presents the methodological problem mentioned earlier. According to the model presented in Figure 1, perceived job stressors (part of the process facet) should be closely related to the human consequences. Both perceptions and psychological consequences are routinely assessed via self-reports; correlating two self-report measures, however, is likely to lead to over-estimates of the strength of the relationships between constructs, due to this common method variance. Therefore, interpretation of the results of such studies must be guarded.

The simplest and most obvious psychological effect of job stressors is dissatisfaction with the job. Studies in which this is the only psychological consequence of working conditions are not reviewed here, however, as this consequence alone is usually not sufficient (i.e., not noxious enough) for researchers to consider their work to be in the job stress-employee health research domain. Many job stress researchers have included job dissatisfaction as one of many consequences, however. Such studies have usually found that perceived job stressors are
positively related to dissatisfaction with the job (Beehr, 1976; Beehr, et al., 1976; Caplan, et al., 1975; Coburn, 1975; House and Rizzo, 1972; Ivancevich, 1974; Lyons, 1971; Margolis et al., 1974; Schar, Reeder, and Dirken, 1973), but a possible exception is a laboratory study by Sales (1970) in which subjects who were overloaded on an anagram task had greater task liking than those who were underloaded. If one takes the person-environment fit approach, however, both underloaded and overloaded subjects have poor fit with their tasks (i.e., are experiencing stress) and therefore, both should be dissatisfied relative to a group of people with a good fit. Such a control group was not included in that study.

Job stress researchers using psychological health measures have used many different labels for the psychological health variables, but it is unlikely that all of the measures in the studies reviewed were of different types of psychological health. A category comprising general measures of poor mental health would include neuroticism, tension, depression, irritation, and anxiety. Several studies have shown that perceived job stressors are related to one or more of these (Beehr, 1976; Beehr, et al., 1976; Caplan, et al., 1975; Coburn, 1975; Gemmil and Heisler, 1972; House and Harkins, 1975; House and Rizzo, 1972; Ivancevich, 1974; Lyons, 1971; Margolis, et al., 1974; Patkai, et al., 1967; Sales, 1970; Schar, et al., 1973; Shirom, et al., 1973).

Other types of psychological consequences related to perceived job stressors include low self-esteem (Beehr, 1976; Margolis, et al., 1974), boredom (Caplan, et al., 1975), psychological fatigue (Beehr, et al., 1976; Cameron, 1971), and resentment (House and Harkins, 1975).

Of the studies reviewed in this section, only Ivancevich (length of workday, 1974), Patkai, et al., (activity on a discrimination task; 1967), Sales (workload; 1970), and Schar, et al. (occupational status, 1973) included an objective or non-self-reported measure of the stressor. It is encouraging, therefore, that these studies also found significant results, without the potential confound of a method bias.

Behavioral Consequences. Of the three types of human consequences, the behavioral consequences are the least often studied. This may well be because it takes a psychologist more time, effort and ingenuity to measure behavior than to measure psychological consequences. The behaviors offered in this review are better considered as potential consequences of stress than as confirmed consequences. The behavioral human consequences studied most is smoking. Smoking is considered an aversive behavior to the individual because of the presumed relationship it has with illnesses such as cardiovascular disease and cancer. Schar, Reeder, and Dirken (1973) found that occupational status is negatively related to smoking, and Shirom, et al.
(1973) found occupational differences in smoking among kibbutz members suggesting that job characteristics may affect smoking. As with most of the studies cited in the physiological consequences facet, these studies may be confounded by selection processes, however.

Caplan, Cobb, and French (1975) reported that quitting smoking is related negatively to some job stressors, but Caplan, et al. (1975) found no differences among smoker, ex-smoker, and never-smoked groups in the amount of stress present in their jobs.

Margolis, et al. (1974) found that several stressful aspects of jobs were related to escapist drinking, although they used a self-report measure of drinking. Selzer and Vinokur (1974) found a weak relationship between job pressure and traffic accidents among alcoholic drivers, although the same relationship for drivers in general was not significant.

Poor job performance, absenteeism, tardiness, etc., can be viewed as both personal and organizational consequences. We have chosen to review these in the next section as organizational consequences, because they are traditional dependent variables in I/O psychology of interest to organizations. Since these behaviors may lead to further stress-related events (e.g., loss of pay, promotions, and self-esteem), they are also important to individuals, however.

Summary. In Table 1, it can be seen that more of the elements of the psychological consequences have been studied than the behavioral or physiological consequences. Nearly all of the studies of the elements of this facet have some methodological flaw, as mentioned previously. The most common problems have been (1) the use of self-report data for measuring both “cause” and “effect” variables (especially in studying the psychological consequences), and (2) the use of correlational rather than experimental designs (thus disallowing strong inference regarding direction of causation). The behavioral human consequences suffer most from sheer lack of study. Studies that avoid the major problems listed here are greatly needed. Also needed are investigations of possible beneficial human consequences of stress.

Organizational Consequences Facet

Separation of the consequences that are most directly relevant to the individual from those that are most directly relevant to the organization implies that these two parties may value events independently. Consequences of stress in which the organization presumably has more direct interest than the individual employee are primarily those (e.g., an employee’s job performance) presumed to be linked directly with the organization’s effectiveness.

Job performance. Many studies have been compiled in which vari-
ables labeled stress are shown related to job performance-type variables (e.g., Andrews and Farris, 1972; Drabek and Haas, 1969; McGrath, 1976). Since most of these studies did not simultaneously include human consequences (employee health) and job performance variables, the "job stress" variables in such studies did not fit the definition of job stress used to guide this review and, therefore, those studies were not reviewed.

Conversely, the stress articles reviewed in conjunction with the human consequences facet tended to ignore worker's job performance as a dependent variable. Since high performance may be gained at the expense of employee health (at least in the short run), a more balanced approach, combining both performance and health measures in a longitudinal study, is sorely needed if we are to get a more comprehensive understanding of the sequential consequences of job stress.

Several hypothetical relationships (e.g., positive linear, inverted U-shape) between stress and performance need to be tested rigorously in the field. It seems likely that the relationship may vary by type of stressor and/or by the type of performance measured and it may be moderated by various personal and situational factors.

One laboratory experiment (Sales, 1970) has studied both performance (on an anagrams task) and some human consequences (tension and heart rate). Sales found that overloaded subjects decoded more anagrams but they made more errors and decoded a smaller percentage of the anagrams given them. Thus, depending on the definition of job performance, overload led to either better or worse performance.

Employee suggestions. The frequency of suggestions submitted by employees regarding potential work improvements may also be taken as an organizationally relevant consequence. Margolis, et al. (1974) have shown that two perceived job stressors (resource inadequacy and overload) are positively correlated, while three others (underutilization of skills, insecurity, and nonparticipation in decision-making) are negatively correlated with frequency of suggestions among a national sample of workers. Here again, more research needs to be done. It is unknown, for example, whether most of the suggestions regard the alleviation of the stress itself, or whether the presence of stress was related to suggestions regarding work in general. Since no coding of the suggestions was undertaken, it cannot even be guessed whether this behavior is consistent with or contrary to the concept of organizational effectiveness.

Employee withdrawal. Employee withdrawal from work may at times be an attempt to cope with job stress. Types of employee withdrawal include absenteeism, turnover, and psychological withdrawal (e.g., lower job involvement, less identification with the organi-
zation). Along these lines, Lyons (1971) has shown that perceived role ambiguity (which was also correlated with job-related tension) among registered nurses is related to voluntary turnover. Absenteeism and turnover have costs for the organization, and are therefore, negative organizational consequences. Psychological withdrawal may also be linked to undesirable organizational consequences.

Summary. The whole organizational consequences facet has been the subject of very little inquiry within the context of job stress research (see Table 1). Many industrial/organizational psychologists study these consequences, but not in relation to job stress. The few I/O researchers who have focused on job stress and employee health have often ignored the organizational consequences of stress. Both human and organizational consequences need to be studied in relationship to the same job stressors in the same study.

The Adaptive Responses Facets

Table 1 indicates the potential elements of the adaptive response facet. The literature regarding adaptive responses made by the individual, the organization, or by third parties is reviewed in detail in a forthcoming article (Newman and Beehr, Note 2) in order to focus special and comprehensive attention on means for handling job stress. The potential consequences of stress are serious enough to warrant such emphasis on preventive and curative stress management programs.

Time Facet

The purpose of including a time facet in this review is to make the issue of longitudinal, field research an explicit focus. As in most research domains in industrial/organizational psychology, researchers have usually employed cross-sectional designs, in part, no doubt, because of convenience. Field studies employing measurements at several points in time would greatly benefit the understanding of job stress–employee health in two ways.

First, managers are extremely interested in determining causal relationships. Cross-sectional studies cannot shed much light on the direction of causality. Laboratory experiments, which are the most useful in dealing with the direction of causality issue, also have problems when used to study job stress. Their weaknesses are (1) the difficulty of faithfully replicating real job conditions, (2) the ethical issue of purposely placing people in stressful and potentially unhealthy situations, and (3) their short duration.

The second reason is that time or duration of stress may be a crucial factor in determining the consequences of stressful events. A certain
amount of stress occurring occasionally in one's job may be quite harmless to the employee. Indeed, it may even be beneficial if it causes the employee to work a little harder and achieve a little more than usual. The organization could benefit from extraordinary job performance, and the employee may feel a special pride of accomplishment. Acute stress at the wrong time or chronic stress over a number of years, however, could be detrimental to the individual and/or the organization. At present, all of this is speculation, however, as longitudinal studies designed to test these hypotheses are extremely rare.

The study by Cobb and Kasl (1972) is a notable exception. In a study of married male employees 45-59 years old in a plant that was closing, they obtained physiological measures as unemployment (the stressful event) approached, and they kept obtaining these measures after unemployment occurred, in some cases even until subsequent reemployment. In general, they found that the uric acid and blood pressure levels increased before the actual plant closing (during anticipation), while cholesterol level did not increase until unemployment occurred. Some time after reemployment, these physiological measures returned to normal. The present authors recommend more such longitudinal field studies.

A Sequential Model

The sequential model (Figure 2) is consistent with the general model but deals directly with the time facet. It is seen that some of the facets may normally follow each other and also that there may be cycles of events involving certain facets. Thus, some of the facets (i.e., the consequences and adaptive response facets) appear more than once in the time sequence. Since the chain or cycle of events can vary (probably infinitely) from time to time and situation to situation, the sequence pictured in Figure 2 should be considered as only one logical possibility.

An illustration of the manner in which the facets may be related over a period of time is offered in the following example. One of the first job stressors to appear in the organizational literature was role ambiguity, the uncertainty regarding the expectations of an employee in his or her work role (Kahn, et al., 1964). In the case of role ambiguity, ineffective communication from the supervisor is a likely environmental antecedent. Tolerance for ambiguity (Kahn, et al., 1964; Lyons, 1971) is an element from the personal facet affecting the influence of ambiguity. In the process facet, the environmental ambiguity (regarding role demands) is perceived, “compared” to the employee's level of tolerance for ambiguity, and appraised as excessive. This state of person-environment misfit results in the perception
of or experience of stress (i.e., a psychological and/or physiological disruption).

This state may result in immediate (initial) human consequences such as loss of self-esteem (Beehr, 1976) or high blood pressure (French and Caplan, 1973).

The initial personal adaptive responses begin next. Possibilities enumerated by Kahn and Quinn (1970) include: autistic redefinition of the situation, trying to comply with the ambiguous demands by doing as much work as possible in order to be sure enough has been done, or attempting to seek clarification of the work role. No adaptive action is taken by the organization at this point in time, because it has not yet detected the problem.

The immediate adaptive responses by the stressee are aimed at alleviating the stress problem. If, as time goes on, these adaptive responses are not successful, the individual may suffer more severe (secondary) consequences, perhaps requiring medical attention. The organization may also begin to experience secondary consequences of the stress (e.g., increased absenteeism). Thus, the next round of adaptive responses are likely to include action by both the individual and the organization. The individual may persist with the coping responses used earlier, or may try to handle the stress in some other way. Concurrently, the organization may make its initial adaptive response: incentive bonuses for productivity and attendance, redesign of the job so that it is less ambiguous, or attempting to improve the communication between supervisor and focal person.

If the stress remains unchecked, the next step in the sequence indicates that there may be long-term human and organizational consequences. If the stress is extreme enough and/or persistent enough, permanent effects on the physiological and psychological welfare of the employee could result. There may also be long-term effects on the organization and on others who associate with the stressed person. Cobb and Kasl (1972), for example, provided some anecdotal evidence that the wives of workers who have been laid off develop ulcers.

The final step in the sequence presented in Figure 2 refers to long-term adaptive responses. It indicates that relatively permanent stress management programs may be developed to deal with the causes and effects of job stress. These could be personal and/or organizational programs. Even government may be tempted to enter the adaptation process at this point in the sequence as evidenced by OSHA regulations and the current debate regarding the possibility of legislating the quality of work life (e.g., Lawler, 1976; Locke, 1976).

The possible interactions among the facets (or sequence of events) are, of course, more than those outlined in Figure 2 and discussed
FIGURE 2. A Sequential Model

above. A sequence that seems logical and common has been selected to illustrate the main thrust of the sequential model; namely, the important role that time plays in job stress-employee health phenomena. If adaptive responses are not successful or are not even initiated, the consequences may increase in severity and/or frequency. For practitioners, it is important that the elapsed time from onset of stress to successful adaptive response be minimized. For researchers, it is important to be aware of the time frame when investigating job stress, particularly, when examining causal relations.

Concluding Observations

Several general conclusions emerge from this review. First, conceptual ambiguity and terminological confusion is a major problem. There are no conceptual definitions of terms such as stress and strain that are common to all researchers in the area (even among subsets of researchers such as I/O psychologists). Operational definitions of the various elements of the job stress domain are often not rigorous and are inconsistent. For example, a questionnaire measure of a single variable, often just labeled "stress," may include items regarding personal characteristics, organizational characteristics, perceptions, ill health, and organizational consequences.

A related observation is that strong methodology in this domain is rare relative to the amount of rigorous research in other, more tradi-
tional areas of I/O psychology (e.g., job satisfaction, performance evaluation, absenteeism/turnover). In fact, an attempt was made in this review to report only the more convincing studies in each facet. Other studies were reviewed, found to be severely deficient in method or design and hence, were not included in this review. Specific improvements suggested for many of the studies (even those reported here) include: collection of more objective data (i.e., not all self-report), collection of longitudinal data, utilization of experimental research designs, the use of 'natural changes' (e.g., reorganization, plant shutdowns) in field settings, and the avoidance of methods that allow for the alternative interpretation of systematic selection of healthy employees into jobs with certain characteristics.

Another observation is that relative to the number of potentially important elements enumerated in the facet analysis, the number of elements that have been studied empirically (even with relatively weak methodology) are few. The systematic study of relationships among facets is needed. A few such efforts have been evident in the past, particularly by researchers at the Institute for Social Research (e.g., Caplan, et al. 1975; Cobb and Kasl, 1972; Kahn, et al. 1964), and these are laudable.

Much of the research on job stress and employee health was found in journals not normally read by I/O psychologists, and unfortu-
nately, no one journal seems to be devoted to job stress in particular. Therefore, most I/O psychology researchers and practitioners are likely to be uninformed on this topic. The reader is urged to correct this situation by seeking out the other, pertinent journals and by submitting future research findings in this domain to the traditional I/O psychology journals. A list of non-I/O journals in which material regarding job stress can be located can be compiled from the references listed at the end of this article. This problem arises from the fact that researchers in many different disciplines study topics related to some facet of job stress. Unfortunately, their approaches are often very different from each other, or each discipline's efforts are only partially relevant to job stress. For example, there is a great number of medical studies of stress, but few of job stress. There is a small but growing number of I/O studies of job stress, but few of these adequately cover the medical aspects of stress. The need for an interdisciplinary approach is clear. Again, the Caplan, et al (1975) study has set a good example.

Finally, another approach to increasing the knowledge about job stress would be for I/O psychologists to look at their specialty, be it job design, organizational development, leadership, organizational design, work motivation, job satisfaction, or whatever, and view it from a stress–health perspective. The results may be most interesting and worthwhile. This entire effort would fit under the general rubric of research on the quality of working life.

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