

II. Theoretical framework of the study

CONCEPT OF STRESS

The term “stress” has been defined in many different ways by both behavioral scientists and other researchers in writings on the health aspects of people at work

(11, 152, 162). Even so, no generally accepted meaning has been produced in the literature. The most striking differences occur between those who define stress as an environmental characteristic with harmful effects on the individual (74, 130,

184) and those who consider stress as a response of the organism to any environmental demand (240). The definition of "stress" by Selye (240) as a stereotyped, nonspecific organismic response was primarily based on physiological criteria [reviewed by Mason (179)].

Spielberger (253) defines stress as the external forces that act on an individual, ie, the objective properties of environmental or other stimulus conditions that are characterized by some degree of objective danger.

Lazarus (152) has introduced the term "psychological stress" to show that the process starting from environmental effects and continuing to individual responses can be totally covered also by psychological terms. The main feature distinguishing psychological stress from physiological stress is that in the former the reaction depends on how the person interprets or appraises (consciously or unconsciously) the significance of a harmful, threatening or challenging event, while in the latter it is the condition of the tissues which directly determines noxiousness. The process of psychological stress is strongly determined by the cognitive processes of the individual, ie, the appraisal of the situation.

Miller (191) uses the concept "threat" in addition to the term "stress" when referring to the environmental conditions that affect the individual and thereby disturb his steady state. The term stress signifies those external factors that are currently affecting the individual, and the term threat those factors that an individual anticipates are affecting him. This distinction is not usually made by the other authors who have accepted the same terminology.

The most common recent definitions of job stress are apparently based on McGrath's view, which defines stress as a perceived substantial incongruence between environmental demands and individual response capability, under conditions in which failure of success in meeting the demands has important consequences (182, 183). To this definition, another aspect has been added (128); stress refers also to an imbalance between the expectation of the individual and the actual environment. The two viewpoints are also included

in the definition of Caplan et al (39) with, however, the crucial difference of reference to the environment instead of the incongruous relation. According to this definition stress refers to "... any characteristic 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]."

Definitions adopting the presented views and applied to the imbalanced relationship of the individual and the environment have been widely accepted by both behavioral and medical scientists. These two viewpoints are also presented in the increasingly popular person-environment fit theories refined by French et al (73). The fit is a function of the extent to which an individual's aptitudes, abilities, and skills correspond to environmental demands and, on the other hand, of the extent to which the individual's needs and expectations are satisfied in the environment.

An individual's behavior in a situation characterized by stress is often called an adjustment reaction or a coping process. It has also been simply called a response. Caplan et al (39) defined the reaction of the individual with the term "strain," which refers to "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]." Kagan & Levi (128) divide human reaction into two parts. One refers to the immediate psychological, physiological, and behavioral responses to stress called "stress mechanism." The other includes more long-term responses (eg, elevated serum cholesterol, hypertension and intensive psychological symptoms) which are covered by the term precursors of disease.

Margolis & Kroes (176) define job stress as a condition interacting with worker characteristics and work to disturb psychological or physiological homeostasis. The external causal factors are job stressors, and the disturbed individual homeostasis is called job-related strain.

According to Margolis & Kroes (176) there are at least five dimensions of job-related strain: short-term subjective states (anxiety, tension, and anger), long-term and more chronic psychological responses (eg, depression, general malaise, and alienation), transient physiological changes (eg, catecholamine excretion, blood pressure, etc), lowered physical health (eg, gastrointestinal disorders, coronary heart disease, and asthmatic attacks), and work performance decrement.

The distinction between the immediate effects and the adjustment process is, however, not always made. These two phases of the stress process are often combined together to be covered by such expressions as "occupational ill health" or "disturbances of well-being" (58). In these instances all types of reactions, immediate or long-term in a stressful situation or after experiencing it, are grouped together as equal; they include such variables as elevated blood pressure, increase of pulse rate, increased blood cholesterol level, smoking, escapist drinking, job dissatisfaction, alienation, etc.

Cummings & Cooper (61) suggest grouping these responses in a hypothetical chronological order: (i) indicators of strain (eg, rapid pulse rate, job dissatisfaction), (ii) adjustment processes (eg, smoking, escapist drinking, reduced aspiration), (iii) secondary or long-term results of ineffective coping (eg, raised blood pressure, high cholesterol level). The division resembles that presented repeatedly by Kagan & Levi (128) and Levi (161), ie, if the difference in terminology is ignored. In spite of the seemingly theoretical elegance of the preceding presentation, many difficulties are inbedded in its interpretation and, especially, in its practical applications. It is very difficult in empirical research to make distinctions between the indicators grouped in the three categories. One of the crucial problems is probably based on the background of the stress researchers, either in the behavioral sciences or in the biological sciences. The difference in the use of the term adaptation is expectedly based on that fact. The term "adaptation," as defined by the presented characteristics, covers only psychological or behavioral responses to stress, while the definition of the concept in physiology and biology is

much broader, including, eg, in Selye's definition, the total complex of psychological and physiological responses defined as the "general adaptation syndrome." One could, of course, suggest that in behavioral sciences a specific classification of reactions and terms be applied (154). This type of application is not, however, possible at this point of multidisciplinary collaboration in the study of occupational health and well-being. Nevertheless, the terminology should be equalized as much as possible. Such an equalization has, in fact, been partly done in the Cummings & Cooper model (61), which includes physiological parameters in the first and second phases of the response chain. Only the second stage is defined by behavioral terms. In putting the terms in the language of a study design, Cummings & Cooper suggest the following: stress or threat (independent variable), strain (intervening variable) and adjustment process (dependent variable). This model represents a crucial difference from some of the earlier propositions. The adjustment process is seen as a response to strain and not directly to the stressors or the mismatch between the environment and the person.

Kagan & Levi (128) have added the term "precursor of disease" to indicate those changes at the psychological, behavioral, and physiological level which have not yet caused any structural damage or permanent mental disorder but include some necessary risk factors of these. In their model, it is, however, quite difficult, as the authors state themselves, to separate the phases of immediate stress responses, ie, the characteristics of activated stress mechanism and precursors of disease. In empirical studies, especially in surveys, the difficulty is aggravated.

The conceptualizations of "stress" as a relation (instead of as an environmental variable or a response) corresponds in one aspect of its definition to the concept of "stress" in the physical sciences, where stress is viewed as a situation in which a force induces strain or deformation in the agent to which it is applied. The external load may produce an irreversible deformation. The analogy in physical sciences does not, however, cover the need and expectation aspects on the part of the individual.

The environmental factors with which the individual is in discordance are called — if any special label is given — stressors or stress factors (128, 153). These terms have the weakness that they easily lead one to think of environmental factors as stressful as such without any reference to interaction with the individual. The terms have, however, practical usefulness.

Beehr & Newman (18) suggest the following definition with reference to occupational stress: "Job stress refers to a situation wherein job-related factors interact with a worker to change (ie, disrupt or enhance) his or her psychological and/or physiological condition such that the person (ie, mind-body) is forced to deviate from normal functioning [p 669]." This notion of stress has not excluded the possibility of beneficial effects of stress on health.

Some authors are hesitant in accepting the term "stress" at all and consider it useful mainly as a rubric of a wide field of research (184) or suggest abandoning the term completely (112). Suggestions for applying the term as a paradigm, "stress research," rather than "stress" as a separate concept have been made also by the more favorable authors (120, 154, 162, 182).

At the Institute of Occupational Health, Helsinki, stress terminology has been used with the following meanings. The concept of "stress" refers to an imbalanced relation between the environment and the individual. The environmental factors which are the ecological counterpart of this relationship are called "stress factors" or "stressors." The response of the individual is characterized by the general term "stress reaction" (135, 157, 208). The concepts are used in these meanings also in the present report.

STRESS THEORY

Various approaches

The first theories of stress are based on Cannon's (37) & Selye's (239) views of the reactions in the individual when subject to adaptation demanding situations. As indicated, Selye described stress as a "general adaptation syndrome" which is activated in a nonspecific, stereotyped form

by any environmental demand. This syndrome was explained as a rudiment of man's phylogenetically old "flight or fight response" in situations including danger. The intensity and duration of this reaction was thought to be closely related to the morbidity and mortality of a variety of diseases, ie, "diseases of adaptation." The process was characterized as a phenomenon with three phases, including stages of alarm, resistance, and exhaustion. In the individual's state these phases refer to an initial arousal due to the recognition of a demand on adaptation followed by an activation of bodily functions aiming towards the maintenance of organismic homeostasis. This state was characterized by an increased discharge of adrenaline, increased heart rate, elevation of blood pressure and muscle tone, etc. If prolonged, this state was thought to lead to a state of exhaustion of bodily resources and ensuing disease, eg, cardiovascular and renal diseases, ulcers, inflammatory diseases, etc. Important is that these diseases were thought to develop as a result of the body's own attempts to adapt to situations instead of being a result of a direct external physical pathogen.

The main interest of the first views on stress at the physiological and organismic levels has since been completed and partially replaced by psychological views on the development of stress and related health disturbances. Lazarus (152) emphasized the cognitive and affective functions of the individual in both the perception and interpretation of the situation, and as levels of reactive changes due to stress. The idea of interindividual differences in adaptation and responses to stress at psychological, physiological, and behavioral levels was introduced by Lazarus.

A certain combination of these views is included in the theory of Kagan & Levi (128), although with less psychological emphasis than in the views of Lazarus; instead it has a wider ecological perspective than any of the previous theories.

Appley & Trumbull (11) have viewed stress phenomena as a process in which certain subjective thresholds can be separated on the basis of the strength of stress. The first threshold is called the "investigation threshold"; it can be compared to Selye's stage of alarm. Behavior aiming

towards the mastery of the perceived threat is mobilized. If the mobilization does not succeed or lasts too long, the "frustration threshold" is passed, the result being ego-oriented behavior instead of the task-oriented behavior of the preceding stage. If a situation is perceived as threatening, the whole psychological balance, ie, "stress threshold" is passed with concomitant reactions of despair and panic. Passing the next threshold, "exhaustion," leads to passive withdrawal and other behavioral disorders. Appley's thresholds, defined primarily in psychological terms, are comparable to the stages of Selye's stress process.

Several other writers have presented theories and models of stress on more or less general or specific levels, eg, Rahe et al (215), Cobb (46), and Cooper & Marshall (56).

In the following section a synthesis of the stress and illness process is made on the basis of various sources of literature. [In addition to those already mentioned, reviews by Levi (159, 160), Gunderson & Rahe (95), and House (115) are presented.]

The notion is adopted that stress is viewed "not merely as something exogenous, but as the product of a dynamic mismatch between the individual and his/her physical or social environment. This interactive view of stress holds that situations are not inherently stressful; rather, it is the combination of the particular situation and individual, with his specific personality, behavior pattern and life circumstances that result in a stress producing imbalance [p 128]" (185).

General characteristics of stress theories

Introduction

In spite of the differences in the definition of the stress concept, there are many similarities in the characterizations of the responses to stressful situations. In most of the models the three basic types of reactions are separated, and interpretations are given on their interrelationships. These reaction patterns are psychological, behavioral, and physiological. The level of differentiation of the chronological process varies from almost none to various

successive phases. Depending on the level of the differentiation of the chronologically successive phases in the process, the health outcomes are added in the models. In addition the emphasis put on possible intervening variables varies. A description of certain general views follows of the three characteristic reaction patterns and their effects on general health status.

Psychological stress reactions

Feelings of anger, irritation, anxiety, sadness, and depression are examples of the first responses to long-term or intensive stress. A separation of the typical response type in certain situations is sometimes made. A reaction pattern characterized primarily by anxiety is thought to be related to stress caused by feelings of threat, and a reaction pattern characterized by sadness or depression is regarded as a result of situations involving perceived loss. Especially important are situations involving threat to the most central motives and goals, ie, the maintenance of self-image, self-esteem and feelings of security.

These emotional reactions are sometimes regarded as the only type of psychological stress reactions, probably because of the hypothesis that the emotions are the mediators of the effects of stress on physiological functions. It has to be noted, however, that also other forms of psychological reactions are characteristic of stress. Changes in motivational states and cognitive functions are response categories with primarily secondary effects on the further progress of the responses to health disturbances.

Behavioral stress reactions

Differentiating behavioral stress reactions from psychological reactions is difficult, as they can at least partly be included also among the psychological responses. The differentiation is, however, made on the basis of their often observable nature, compared to the subjective nature of most psychological responses. Another basis for differentiation is the chronological progress of their reaction patterns. Behavioral responses usually appear after affective and other psychological reactions have developed as coping strategies.

Many behavioral stress reactions are often potential inducers of illness. The use and possible dependence on alcohol, nicotine, and drugs are examples of typical reaction types which are often efforts to escape situations provoking anxiety or other negative affects. Sometimes they are means of achieving social relationships and acceptance. Thus they have been used as self-treatment for mental and physical distress (161).

The phase of escape efforts is often preceded by active efforts to change the situation with concomitant complaints and perhaps aggressive behavior in the social settings (82).

Behavioral stress reactions can also include changes, usually negative, at work and in other performances caused by primary motivational, cognitive and affective disturbances. Heightened activation, restlessness and depression often lead to insomnia or other types of changes in the sleeping-wakefulness patterns.

Physiological stress reactions

The physiological components are as characteristic to the stress reaction as its psychological features. The pioneer of stress research, Selye (241) defined the whole concept "stress" primarily with physiological criteria. Psychological stress reactions lead to disturbed autonomic and hormonal states which in turn upset tissue regulatory functions reducing their resistance to other influences.

Only the two main physiological systems of stress reaction are described in this communication, the sympathetic adrenal medullary reaction and the pituitary adrenal-cortical system.

The sympatho-adrenomedullary system is the neurochemical mechanism that gives many of its typical bodily features to the stress reaction. The increased release of adrenaline and noradrenaline is the immediate response to situations which have been interpreted by the individual as alien in comparison to one's needs, goals, and abilities. Many functional changes can be registered in the body in these states, eg, palpitation of the heart muscle, increased rhythm of ventilation, dilatation of the pupil, elevation of blood pressure, etc.

The activation of the pituitary hormonal chain, which induces the peripheral effects

of adrenocortical hormones (eg, 17-hydroxycorticosteroids), is thought to be related to the response type characterized by passive withdrawal and social isolation.

The neuroendocrine reactions, in turn, have a direct or indirect effect on most other physiological functions of the body. Thus environmental factors may be mediated via the perceptive and interpretative functions of man by two main pathways to bodily reactions (111). According to common hypotheses, the neuroendocrine reaction pattern is a rudiment of a phylogenetically old adaptational process (239) preparing the organism for physical activity. Motor activity was generally the most adequate coping pattern of man's ancestors. In modern society these reaction patterns are not always appropriate, and the body's readiness for activity often becomes useless overcapacity which cannot be burned up simply for social reasons. Typical of this situation is a discordance between emotional experiences, the neuroendocrine concomitants of emotions, and psychomotor activity. In many instances man is normatively forced to behave in a manner incongruous with or even contradictory to his emotional and neuroendocrine state (161). Hypotheses have been formed about the stress-releasing function of motor activity (78).

It is suspected that the neuroendocrine reaction pattern is a potential risk factor of illness. Important aspects in the development of these reactions to disease is the duration and frequency of the state. Functional disturbances and related experiences in various organs are usually the initial result.

Pathological end states

The development of mental and psychosomatic illnesses is preceded by a state characterized by the malfunction of mental and physiological systems without definite disability or structural damage. Examples of this stage are mild anxiety or depressive reactions and mild hypertension or elevation of the cholesterol level. At the social level the symptoms may be seen, eg, as a diminution of interest in social activities and problems in interpersonal relations.

If a psychological and physiological dysfunction lasts long enough or is repeated

often enough, it may be pathogenic. There is empirical evidence indicating that these types of processes are highly significantly related to psychoneurosis (24, 217) and constitute an important etiologic factor of several somatic diseases [reviewed by, eg, Cassel (40) and Levi (161)].

Psychosomatic (or psychophysiological) disorders refer to these perceived or observed disturbances, in which no external, identifiable physical cause can be shown. Usually they become manifest in organs controlled by the autonomic nervous system and related neurohormonal control. The central nervous system plays a crucial role in mediating the experiences of the individual to body function. The mechanism that connects these functional levels and the effects of various intervening variables has not yet been completely defined (274). Theories which cover the mechanism more or less thoroughly have been presented from different viewpoints, from psychoanalytic theories (5, 66) to those based primarily on behavioral physiology (276). The scope of illnesses as possible outcomes of long-term or intense stress has recently been regarded as increasingly broad. Still the whole term psychosomatic disease or illness has been regarded as questionable (167). Stress has been defined as a state that increases an individual's susceptibility to any disease (115).

In the present study the emphasis is on the concept of stress rather than on health status. Although conceptually a line is drawn between stress and health status, the view was adopted that, in empirical data, it is difficult to differentiate between stress reactions and health disturbances, ie, symptoms of illness.

The psychological, behavioral, and physiological stress reactions discussed correspond to the three kinds of concepts of health presented by Purola (213). Correspondingly, three kinds of evidence, ie, subjective, behavioral and clinical, can be obtained about health status (255).

A detailed analysis of health from the psychological viewpoint has been presented recently by Raitasalo (216).

Moderators of stress

The effects of environmental stimuli and the person-environment relationship do

not lead to a one-to-one correspondence in immediate reactions, and even less so in long-term ones. These effects are modified by a number of interacting variables which may be either predisposing or protective (41). Thus not only can moderating variables increase the experience of stress and its aftereffects, but they can also act beneficially as protective resources. The individual himself with his predisposition and the social environment in which he lives is therefore among the most important interacting variables modifying the results of the person-environment relationship with respect to health.

Characteristic to this group of variables is that they modify the stress reactions both qualitatively and quantitatively and lead to differences between individual reactions, even if subjected to the same situations. On the other hand, these variables may cause variation in the responses of a single individual at various points in time.

These factors could be theoretically called moderating or conditioning variables (39). The distinction is not made in this report because, in most studies, including the present one, the study designs and the methodological approaches have usually not allowed an opportunity for this distinction on the empirical level. The terms have therefore been used interchangeably.

Self concept. Self concept can be regarded as one possible interacting variable in the development and progress of stress at work.

The image a person has of himself, his self concept, is known to be related to his personality. In the phenomenological self theories of personality the term "self concept" is one of the basic notions, and it is closely related to or identical with the term "self."

In spite of certain differences in the definition of the term, an individual's evaluation of his behavior, characteristics, and values is a common component of all theories. The term self is often interpreted as a part of the total personality. The well-known self theory of Rogers (221) stresses the phenomenological nature of personality as one of its basic views. The theory underlines an individual's experiences, perceptions, and feelings of himself and the world. According to Rogers the

consciousness of a person includes all the relevant material needed for understanding a person's personality. An individual's behavior can be understood and predicted on the basis of his phenomenological world.

Thus the term self refers to the experience of an individual of himself as a separate, yet continuing, entity with certain physical, psychological, and behavioral qualities. The self includes both cognitive and evaluative components such as an image of one's abilities, goals and values. Arieti (14) divides the self concept into three parts, body image, self-identity and self-esteem. Different components of the self form an organized whole (34, 221, 279). The self is thought to contain not only a person's perception of his actual characteristics but also an ideal self which refers to a person's perception of himself such as he would like to be (279, 280).

The basis of the self is formed in childhood from an individual's inner or outer perceptions, which are later connected to more abstract, generalized ideas of one's perceived qualities.

A person gradually learns, during his development, to know himself, his abilities, potentialities, and restrictions in various situations. The social norms of the environment modify one's self concept continuously. In general one strengthens the behavior that is reinforced by the environment and avoids behavior that is not accepted, is punished, or is not valued by the surrounding social environment (278). Wylie thus stresses the importance of learning in the formation of the self concept. It is largely based on the observation of others' reactions to one's self. The reinforcing and punishing functions of the surroundings, and generally any type of feedback from the environment, the comparison of oneself with others, and the evaluations and characterizations by others are modifiers of the development of the self image (100, 101). A person's self image also modifies his attitudes towards and behavior with other people (260) and the way he perceives his environment (33).

A positive self concept is, at least partially, a function of a stimulation which creates hope, feelings of mastery of a situation and things, and feelings of well-

being. On the other hand, life experiences which evoke negative experiences, eg, anxiety, may lead to a negative image of the self during the primary phases of development and in later phases break the developed and stabilized self concept (260).

According to the self theorists a person's self concept has a certain stability after its full development. It may, however, change during maturation and learning and as a result of less cognitive mechanisms like introjection and projection (1).

Under normal conditions an individual's behavior is usually congruent with his self concept. A basic individual tendency is to maintain the stability and consistency of the self concept. Experiences and behavior that conflict with the self are perceived as disturbances, and they are denied and avoided. An individual is also inclined to seek environments which correspond as much as possible to his basic qualities. Depending on the strength of the self, an individual can rationally modify his self concept to adapt to a situation (102).

To cover the potentialities of the self for development and change during maturity, a concept of multiple self has been suggested (87). This view is based on the notion of a person's ability towards a varying, adaptable behavior, which can also include contradictory tendencies. On the basis of the adaptive capacity of the self, situational incongruencies between a person's self concept and the environment can be tolerated without serious psychological conflicts (89).

Social support. The knowledge of clinical practitioners concerning the importance of social relations supportive to an individual's well-being has recently been recognized in theoretical discussions of the moderators of stress.

Social support has been defined as "support accessible to an individual through social ties to other individuals, groups and the large community [p 109]" (166). Social support creates feelings of being loved and cared for and of being approved and regarded favorably in social groups (47).

Depending on its source, social support can be classified as institutional or interpersonal. Institutional support comes from global, social and communal systems, while interpersonal support is based on interin-

dividual relations. The terms tangible and emotional support have been used correspondingly by other writers (39).

According to the theory on the effects of social support and various empirical findings, support increases the individual's coping abilities. The feelings of attachment and security created by perceived support is one key to the feelings of mastery over situations (137).

In work life, social support from superiors, subordinates, and peers improves the ability of people to cope with job stress. Thus it acts as a buffer against stress-mediated health problems (164).

The mechanism by which social support mediates its buffering effects is not known. This action may take place at at least four levels. It may reduce the objective environmental stress factors, affect only the perceived stress factors, perceived stress reactions, or increase the coping resources of an individual (71).

Jenkins' model of stress

General aspects of the model

Recently Jenkins (122) proposed a model of the stress process which differentiates the characteristics of the stress reaction at the various levels of the human organism and its function with reference to the chronological progress of stress.

It is obvious that Jenkins' conceptual model is not completely new. It applies certain of the basic views of Selye's theory on stress with its three phases, ie, the stage of alarm, the stage of resistance, and the stage of exhaustion. Jenkins has somewhat redefined these stages, but he underlines the differentiation of immediate responses to stress such as acute discomfort with related affects, the heightened mobilization of defensive functions, and finally a chronic long-term pathology (table 1).

The stage of alarm is characterized by acute anxiety and fear if the stressor is a threat and by grief and depressive mood if the stressor is a loss. In this respect the views presented by psychoanalytically oriented authors and applied to primary developmental phases (66) and the views of researchers concerned with animal behavior (108) coincide. Jenkins indicates that many of the alarm reactions are self-

correcting if the duration of the stressor is brief; thus a third dimension, time, is added to the stress paradigm; this dimension has been strongly stressed in other models. If the stimulus condition evoking an alarm reaction continues, the individual develops the next reaction pattern, resistance, characterized by the activation of ego defenses and problem-solving behavior. The latter functions have recently been a focus of much writing on stress research as so-called coping functions. It should be noted that as one of the determining factors of the development of the defensive stage not only the duration of the stressor but also its frequency, repeated appearance even if of short duration, is apt to evoke the defensive reaction pattern.

If an individual's defensive and problem-solving behaviors are adequate and can help diminish the experienced stress, the normal state of the individual is approached and no chronic psychic or biological disorders or structural damage develop.

A pathological end state with mental and physical chronic disorders will develop if the defensive and coping strategies of the person are overwhelmed by the strength of the stimuli, their duration, or repeated occurrence. It is noteworthy that not only does long lasting and thus continuing stressors which brake the defensive capacities lead to a pathological end state, but a defensive state continuing too long after the stressor situation ceases does too. Adult neuroses as a result of childhood traumas is an example. It is still a matter of discussion of whether the stressor situation has ceased in these neuroses or if the memories, perhaps unconscious, are a continuous stressor. Pathological end states develop also as a result of defensive responses which are inadequate from the viewpoint of the situational stressor, eg, peptic ulcer or asthma, as a response in an interpersonal conflict situation. The question could be put forward again as to whether reference is being made to the response specificity-unspecificity problem or to the response stereotype argument proposed by Selye (240) on the basis of Cannon's (37) views.

An important aspect in the present paradigm is that individuals differ in their

Table 1. A model of the interaction of stress and the organism (122). [Reproduced by permission of the *Journal of Human Stress* from *J Hum Stress* 5 (1979): 4, 3—15]

	Adaptive capacity	Stressors	Alarm reaction	Defensive reaction	Pathological end state
Biological level	State of physique, nutrition, vigor Natural or acquired immunities	Deprivation of biological needs Excess inputs of physical or biological agents	Arousal — hunger, thirst, pain, fatigue Changes in physiological function	General adaptation syndrome Physiological compensation Shifts in metabolism Changes in pain threshold	Deficiency diseases “Exhaustion” Addictions Chronic dysfunction Structural damage
Psychological level	Resourcefulness, problem-solving ability Ego strength Flexibility Social skills	Perceptions and interpretations of danger, threat, loss, disappointment, frustration, or sense of failure or hopelessness Loss of self-acceptance Threat to security	Feeling of deprivation — boredom, grief, sadness Feelings of anxiety, pressure, guilt Fear of danger	Ego defenses — denial, repression, projection Defensive neuroses Perceptual defenses — wishes, fantasies, motives Planning Problem solving	Despair, apathy Chronic personality pattern disturbances Psychoses Chronic affective disorders Meaninglessness
Interpersonal level	Primary relationships including family Network of social supports	Social isolation Lack of acceptance Insults, punishments, rejections Changes in social groups, especially losses	Antagonism, conflict, suspicion Feelings of rejection, punishment	Defensive, rigid social relating Avoidance Assuming sick role Aggressiveness “Acting out” Enlisting social supports	Chronic exploitation Becoming an outcast Imprisonment Permanent disruption of interpersonal ties Chronic failure to fulfill roles
Socio-cultural level	Values Norms and practices “Therapeutic” social institutions Systems of knowledge and technology	Cultural change Role conflict Status incongruity Value conflicts with important others Forced change in life situation	Communication of concern and alarm Expressive behavior of crowds Mobilization of social structures	Culturally prescribed defenses — scapegoating prejudice Explanatory ideologies Legal and moral system Use of curers and institutions	Alienation, anomie Breakdown of social order Disintegration of the cultural systems of values and norms

responses to stress. Some persons defend successfully under exposure to the same stressors against which others must mobilize their whole defensive and coping resources, the result being signs of the resistance stage. An inherent difference already exists within the individual differences of the adaptive resources evoked in various situations involving stress. At the biological level the defensive differences may be in the constitution (eg, biochemical or neural individuality). At the psychological and social levels adaptive capacities regulate the strength and scope of the alarm and defense evoked. According to Jenkins' theory the psychological “host resistance” includes such factors as ego strength, problem-solving ability, flexibility, and social skills. Positive primary relationships and the reserve of social supports are sources of adaptive resources of the interpersonal level.

Jenkins considers this entire array as

copied resources, a concept used in more or less the same context as in some other recent views on resistance to stress (52). Persons with a wide and strong complex of individual adaptive resources are more likely to resist noxious situations with holding defensive reactions and coping and are less likely to develop chronic pathological, psychological or somatic states (155).

The marked differences in the organismic responses at the various stages of the stress process proposed by Selye are thus recognized as one of the central aspects of Jenkins' conceptual model. The scope of the responses are, however, also widened to cover systematically psychological, ie, cognitive and affective, functions and social aspects, while Selye's focus was more on the biological structures and functions of the organism. The importance of psychological functions has already been proposed by other authors,

particularly Lazarus (152), and also Kagan & Levi (128) and other authors applying stress models in the study of occupational health.

The other crucial dimension of Jenkins' model is the presentation of individual adaptive resources. This dimension also covers the various levels at which all phenomena from adaptive capacities to pathological end states take place. These levels are psychological, biological, interpersonal, and sociocultural. This viewpoint adequately recognizes the "many levels on which the human life is lived [p 5]" (122). The interaction of these levels is constant and determines the level and quality of human health.

The proposition of this view is not a new development in the general discussion of the levels of health and illness and of their determinants. Models presenting these views have been proposed holistically, covering the psychological, biological, and social aspects of health and disease (213). In stress theories these levels have been mentioned more or less superficially in various models, but empirical testing and verifications have been much more fragmentary.

The interaction of these levels is concrete in situations where an interpersonal conflict may appear as an alarm reaction at the psychological level via a cognitive interpretation of its meaning by the individual. On the other hand, a sociocultural context, eg, low social status with biological or psychological stresses embedded, may lead to an increased risk of disease at the biological level. These examples are presented to give a rough impression of the intertwined phenomena.

Evaluation of the model

The conceptual model by Jenkins proposes a comprehensive view on the components of stress, health, and disease development. The model gives its best conceptualization from the moment at which the person is already in a situation characterized by the presence of stress. Less complete is the scope of the environmental factors and the active, goal-oriented approach of the individual, the interaction of which with the individual either does or does not lead to a situation characterized by stress. The concept of this interaction coincides well

with the definitions of stress as applied most commonly in job stress research.

Important determinants of the development of stress are the satisfaction of the most important needs of the person, the achievement of the goals, and the capability to respond to the demands of the environment as discussed in connection with the definition of the concept. This additional aspect must be accounted for in contexts in which the stressfulness of environmental or experiential factors is unknown.

It is known from previous studies, and usually already inherent in the definition of, eg, the life changes which the author studies in testing the model, that the changes are more or less stressful. The model is applicable from the initiation of stress onward, and it acts as a frame of reference for studying the way individuals with varying adaptive capacities and defensive resources respond to the stressors evoked by these life changes. The situation is different when one studies, eg, the effects of an individual's position in the organization or the effects of varying types of information at the workplace. Previous findings do not give enough evidence to state what environmental characteristics interact with all or most individuals so that they produce stress and could thus be called stress factors. On this basis, the application of the model should include, eg, the needs to be satisfied at the physiological, psychological and interpersonal levels, the goals to be reached on the psychological level, and the norms to be followed, on the sociocultural level, if applied in studies of persons in situations whose stressfulness is not known. It depends on the duration, strength, and other characteristics of the environmental factors, on individual need and strength, on the relative importance of the goals, eg, in reference to feelings of identity, and on the conformity to norms, if a situation involves stressors in the sense of Jenkins' model.

One problem embedded in the model is the possible difficulty of its empirical testing. The differentiation of the alarm, defensive, and pathological stages is perhaps not possible in other than intensive clinical studies. In field studies, epidemiologic surveys especially, the alarm and de-

fensive reactions are at least hard to differentiate. The continuation of the reactions activated at the alarm stage is not clearly indicated at the phase of defensive reactions, even in the model. It is, however, obvious that the responses evoked as alarm reactions continue and are diminished according to the successfulness of the defensive reactions. This type of overlapping takes place at any change of phase.

In spite of certain weaknesses Jenkins' model demonstrates the fact that the stress reaction will not become fully understood and explained as long as it is viewed as one global reaction pattern. Its differentiation also provides a basis for the study of the possibly different determinants of various levels, ie, psychological, biological, interpersonal, and sociocultural.

This type of general conceptual model can never be covered in one single study. Only accumulating evidence from studies covering certain partial aspects of it can finally test its applicability.

POSITIVE ASPECTS OF MENTAL HEALTH

In the study of work and health the main emphasis has been on the study of the presence or absence of symptoms and health problems in general. Very little attention has been paid to the positive aspects of health. The World Health Organization's definition of health as a complete state of general well-being is often cited but rarely included in the theoretical models, and studies on the positive aspects of health and their determinants are not many.

Problems in the study of the positive aspects of, especially, mental health are at least partly definitional. Variation in both the definition and measurement of mental health is common. One generally applicable classification system is the following, which includes indicators of both the positive aspects of mental health and its disturbances (139). Mental health first covers the indices of functional effectiveness. The basic idea is to regard health and illness as the capacity of the person to perform in social relations and fulfill institutionalized roles. Other characteristics of mental health are indices of well-being. This

category contains the affective states (eg, depression, resentment, anxiety) and "the various content areas of evaluation and satisfaction [p 509]" (eg, job satisfaction, life satisfaction, need satisfaction, self-esteem). A third group of mental health indicators is the indices of mastery and competence. Growth and self-actualization, coping resources, and the attainment of valued goals are some of the functions belonging to this category. The fourth group of mental health indicators is psychiatric signs and symptoms. Kasl (139) considers this category as residual. It includes states which are not included in the other three categories and which have clinical significance.

The first three categories at least partly reflect the central aspects of positive mental health, as characterized by several earlier writers [eg, Jahoda (118)].

The dimensions of positive mental health have not been found to correlate strongly with psychological and physiological symptoms such as anxiety, worry, and dissatisfaction. The psychological resources have thus been found to be a dimension separate and somewhat independent of health disturbances, which is something other than only a state without illness (26, 271).

In empirical research the following features have been measured as indicators of positive mental health: positive state of mind, lack of neurotic symptoms (219), life satisfaction, wish to live, and social activity (142). Closely related and partly overlapping indicators have been used under the heading of social well-being, such indicators as marital satisfaction, social participation, and work ability (219).

The techniques for measuring the positive aspects of mental health have not received as stable a position in health research as the measurement methods of illness have. Thus, both the indicators studied and their measurements vary strongly (271).

STRESSORS AT WORK

Introduction

Work is one of the fields of life in which adult persons spend a large part of their time. It is comprised of obligations and challenges, opportunities for the use of