
Precursors and Possible Effects of Psychological Stress

The term stress can be used to refer to a generalised somatic response, involving hormonal activity, which renders an individual ready to react to a wide range of events. With continued stress there can result a wide range of pathological developments, including physical and psychological symptoms. This paper will review the social and psychological factors which appear to increase the stress response and will also examine some of the physical consequences of exposure to stress-inducing agents. Emphasis will be given to the possibilities that stress may result from common experiences of living in modern complex society. Individual differences need to be considered as moderators of stress, and also the means whereby people may be taught to cope with stress.

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This paper is concerned with the *psychological* and the *social* factors which have been posited as playing a role in the induction in an individual of the physiological state of stress. The impact of physical events, which may be encountered frequently in occupational settings and include noise, heat and noxious fumes will not be considered. Instead, a range of experiences, also encountered in occupational settings, to include social disharmonies, financial crises, competition, pressure to meet deadlines and unemployment, will be emphasized.

To an extent the kind of stress to be considered can be construed as arising in and from middle-class, white-collar types of occupation; it ignores, largely, the blue-collar types of stress which arise at the coal-face, at the production line or in the shipyard. This is not to imply that the latter type of occupational stress is

less important than the former. In terms of actual physical damage, objectively measured, such stress may be more pervasive. The measurement of the psychological stress agents which are prevalent is an important problem and one which is still, to some extent, neglected.

What may be the physical and psychological concomitants of the stress of employment and of unemployment will be examined, to show how many of our conceptions of stress have up to now ignored the *background* levels of stress experienced by people in our society, which has led to a somewhat narrow view of the means whereby stress may be induced within a person.

The Stress Reaction

Despite its ubiquity in scientific and common parlance, the term 'stress' has not been adequately defined; it is open-ended and given to almost any interpretation one wishes to put on it.

A large amount of empirical work is still needed to enumerate the environmental events, both physical and social, which elicit a stress response.

Selye (cited in Hinkle 1973) regarded stress as the reaction of an organism to a noxious event. The environmental event is better termed the stressor. Selye found, in animals, that exposure to a wide range of stressors resulted in a three stage response, termed by him the General Adaptation Syndrome (GAS). In the first stage, the alarm reaction, there was characteristically the release of catecholamines from the adrenal medulla. This was followed by the release of corticosteroids from the adrenal cortex, under the stimulus of ACTH (adreno-cortico-trophic hormone) from the anterior pituitary gland. This second stage, the stage of resistance, appeared to be a response by the organism to enable the utilization of stored resources of energy. In this second stage, however, there

also seemed to be an aggravation of the body's inflammatory reaction and a reduction of immunological responses. Thus there was an enhanced response to any infection and a reduced resistance to that infection. Following longer exposure to the stressor the pathology of the alarm reaction was irreversibly re-established, with death following.

The effects of exposure to stressor events, in summary, can be placed into two categories. Threat *increases* the *catabolic* bodily reactions; the production of catecholamines and corticosteroids increase energy mobilization, red blood cell production, decreased repair of cells with high turnover and decreased production of cells for the immune system. There is also a *decrease* in the *anabolic* reaction. Hormone production associated with the synthesis of energy resources is inhibited. The body utilizes its resource and fails to store further resources.

Selye pointed to the stereotyped nature of the GAS to any stimulus. More recent work has, however, shown that the reaction may vary in response to different stimuli (Frankenhaeuser 1976, Mason *et al* 1976). Where the organism is given the opportunity to respond *actively* to a stimulus threat, and not merely passively, there is a greater secretion of noradrenaline, where in the reverse case there is more adrenaline secretion (Frankenhaeuser 1976). Mason *et al* (1976) have shown that in humans strong, aversive stimulation, such as heat, noise and exertion, which stimulate catecholamine production, fails to produce cortisol, provided that any subjective feelings of evaluation and competition are minimized. Given the crucial role of cortisol production in the 'second stage' of the GAS, inhibiting the immunological reaction, the *psychological* factors involved in stressor presentation would seem to be highly important. In the study of stress in society there is almost certainly

some common factor of threat, or of the likelihood of evaluation or competition present. A potentially pathological stress syndrome is evoked by psychosocial stressors, which may not necessarily be the case with physical stimuli.

Work on such topics with human as against animal subjects, alerts one to the subjective reaction of the organism to the stimulus event. The manner in which the stimulus is categorized, and the nature of the response which is available to the organism to cope with the stimulus appear to be important mediating factors relating exposure to subsequent pathology.

In considering the paths whereby stress may result in some form of illness, there are at least two. The decreased immunological function may increase the susceptibility of the organism to any pathogen which is present. It seems unlikely that any *specific* illness will result from exposure to any specific stressor (Cassel 1974). The exposure of a population to a wide range of stressors will increase the probability of illness, in a variety of forms. To an extent this view renders the hypothesis that stress is related with illness virtually unfalsifiable. Any illness, however minor, which manifests itself can be seen to relate to any stressor exposure. There are recent suggestions, however, that *specific* conditions, particularly various forms of cancer, may be identified with exposure to specific stress conditions (Fox 1981).

Stress may be related to general somatic disorders, however, directly through the actions of bodily hormones. The action of the pituitary gland to increase the level of ACTH acts through a variety of pathways to increase blood pressure. Sodium and water retention is increased, with increases in vasoconstriction (itself also increased through the action of noradrenaline) and in blood volume (Sterling and Eyer 1981). Hypertension is a risk factor for a number of

ailments and there may not have to be any external, pathogenic triggering agent to produce the effect, other than the stressors themselves. Similarly, there are means whereby hormonal activity can reduce the capacity of the myocardium to function with low oxygen levels (Anderson 1978, Raab 1970) and increase the rate of deposition of atherosclerotic plaque (Steinberg 1979), both with implications for coronary heart disease.

Stressful events may also have direct influence upon the cardiovascular system, other than through the mediation of hormonal activity. Sudden death in humans, for example, need not be associated with coronary artery disease (Friedman *et al* 1973). The induction of tachycardia and subsequent arrhythmia has been shown to be induced by stressful events possibly through enhanced sympathetic nervous activity and the withdrawal of parasympathetic influences (Lown *et al*, 1978, Natelson and Cagin 1979). Repeated exposure to stress could lead to ventricular damage and possibly, eventually, death.

Whatever are the pathways, can we improve our understanding of the nature of the stressors? The reaction to a stimulus event may depend upon features of the organism and of the possible response to the stimulus. What may some of these features be?

Characteristics of the Stressors

Stimuli which are aversive may elicit a brief reaction, but have no long-term effects, provided that these stimuli are *predictable*. When their occurrence is unpredictable, however, then there may be debilitating short-term and long-term effects (Glass and Singer 1972). Even when the stimulus has been removed, there are measurable, deleterious effects upon behaviour and bodily function.

More importantly, perhaps, is the fact that a person's belief that he or she can have *control* over the stimulus can render a potentially stressful stim-

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ulus less so. Frankenhaeuser (1976) in her studies of occupational stressors showed that the opportunity for control lowered cortisol secretion, compared with exposure to an uncontrollable stimulus, objectively just as stressful. In view of the immunosuppressive role of cortisol, such effects seem to be especially important.

It may not even be the case that the person has to *exercise* the control. People will expose themselves to stressful stimuli, and will not show enhanced physiological reaction, provided that they believe that they can shut off the stimulus when they want to. This reaction may be due to the belief that one's own response is stable and reliable and can lead to relief. Therefore there is a minimization of the future danger that can occur (Miller 1979). Stress may be very much worse if *someone else* has control over the stressor.

Beliefs and expectations can affect stress, and can result from subtle influences. It has been demonstrated (eg Seligman 1975) that expectations concerning the probability of the relationship between an outcome and a response can play a large role in determining later behaviour. Seligman has shown that what may be akin to a state of *helplessness* can be induced in an organism; the organism will 'give up', cease trying to deal with aversive events, if there is induced in that organism the expectation that there is no correlation between what it does and what happens to it. There is then an elevated stress reaction to the events.

This has been taken yet a stage further. What Seligman did was to create an expectancy that a response and an outcome were not correlated. As human beings we are continually trying to make sense of the causal relationships between the events which afflict us. If something happens, then we naturally try to explain why it happened. The level of our causal analysis need not be very sophisticated. We may simply say that luck

was not with us. But *some* causal analysis is made.

If events happen to us, then there is an attempt to understand why they happened. Did they happen because of our failure to control them? What seems to happen is that if a harmful or stressful event occurs then there is a better (*ie* stress reducing) reaction to that event if the person decides that that event occurred because of some failure on his or her part to control it. We are less stressed if we believe we have control. We are also less stressed if we believe that we could have had control, but we failed to avail ourselves of it. This seems to occur even to the extent that the victim of an accident, which has resulted in grave damage, even quadriplegia, will come to show less stress and show a better recovery if that person believes that the accident was their fault rather than due to someone or something else (Bulman and Wortman 1977). A belief that one can cause things to occur seems to be an important mediator in influencing the magnitude of a stress response.

Psychosocial Stressors

Physical stressors, difficult though it may be to define precisely their effects, nevertheless may be objectively measured by physical instruments. Psycho-social stressors are another matter. What can we consider as social events which may induce a stress reaction?

The bulk of work which has been done has been concerned with the measurement of 'life events' — changes in personal life which require an adjustment by an individual to new circumstances. Thus a new job, or the loss of a job, or marriage, or divorce, or the birth of a child, or death of a child, can all be conceived as significant life events.

We have all had some experience of some of these things, and it is plausible that an accumulation of minor events may have an eventual effect upon the well-being of an individual (Dohren-

wend and Dohrenwend 1974). The research to date mainly requires people to recall the number of such events experienced over a set period of time (eg six months or two years). The events are subjectively weighted by the judgments of a similar group of people, so that, in one of the most commonly used scales, the Social Readjustment Rating Scale (Holmes and Rahe 1967), the event of marriage is given an arbitrary value of 50 and death of a spouse the maximum value of 100. The figure for the individual, which summarises the *amount of change* experienced in the defined time period is then related to the number of illnesses and visits to the doctor experienced by that individual.

Note that this scale attempts to measure *change*, not whether the event was particularly pleasant or unpleasant. So marriage is rated at 50, loss of a job is rated 47. Given, however, that, intuitively, pleasant events are usually seen as being less likely to induce stress than unpleasant events and since it has been shown that pleasant and unpleasant events differ in the nature of the catecholamine activity they induce (adrenaline and noradrenaline secretion being different), then there is considerable debate about whether to construct different measures for different events.

A particular measure of such life events which has attempted to do this is that by Tennant and Andrews (1976), based upon an Australian sample. Two scores can be obtained from this scale, a measure of *change* and a measure of *distress*. These are correlated, but there is sufficient difference between the two to use them separately.

The measures have been shown to be associated with psychological and physical distress. Innes and Holubowycz (1982) have shown, for example, that life events are differentially associated with excessively heavy drinking in women, compared with a control group of non-drinkers. This is especially true when the *distress* scores

are compared rather than simply the change scores.

Life events and reported physical symptoms are also positively correlated in a sample of members of the fire service (Clarke and Innes, 1983). Those who report more events that are psychologically distressing also report more physical and psychological symptoms.

Psychological Hassles

While we have evidence that these fairly major life events induce a strain-like reaction, it is also intuitively known that much stress or, at least, subjective feelings of tension result from many, very minor upsets or 'hassles'. We may not lose a child every year, but every year most of us will worry about fixing the gutters, or a leaking pipe, or see yet another hole in the galvanised iron roof. These minor upsets may be a potent, and continual, source of tension.

Indeed, it has been demonstrated that such minor hassles are better predictors of physical and psychical complaints than are the life events depicted in the scales just mentioned. Our intuitive judgment about the problems of life being largely little ones seems empirically confirmed (Kanner, Coyne, Schaefer and Lazarus 1981).

Hassles may also be the means whereby the major life events come to have their impact. It is not so much that having a baby in itself is stressful. It is the subsequent demands upon time, of having too much to do, that eats away to change a positive, uplifting event into a drudge. Since there are very little data on the physiological changes that occur subsequent to any major life events, it is not known what mediates any relationship. Continual monitoring of reactions to hassles may be a fruitful approach to the study of stress and illness.

It may be worth pointing out here that the nature of the hassles that are identified as such may depend upon some psychological factors. Continual

hassles from colleagues, or the telephone, or house repairs, may tell us a great deal by the strengths or weaknesses of the individual. Hassles are psychologically loaded. There may be some psychodynamic meaning in some idiosyncratic reactions to particular hassles, although there is a broad consensus about the stress of some particular uses, such as doing jobs around the house (DeLongis, Coyne, Dakof, Folkman and Lazarus 1982).

Cultural and Cohort Differences

At this point we should consider what has been the major underlying approach to the study of stress. Specifically, there is an emphasis upon the experiences and responses of the *individual*. We measure a person's reports about his or her life experiences. In doing so we take the characteristic approach of the medical sciences that an individual's experiences do not vary with time or space. But in so doing we are ignoring the general background that pervades all of our experiences but which, by being so pervasive, may not be subjectively reported.

By this we mean two things. The first is that we may have a tendency to ignore cultural differences. People raised in different societies may react to various stimuli in different ways, their categorization of events may enable them to define stimuli as less or more stress-inducing. For some, predictability or control may be extremely important factors to enable stress reduction. For others the perception of control may not be nearly as important. A general approach, seeing the events in life as controlled by others, may be a much more appropriate one to help cope with events.

The second consideration is the possibility of differences *within* a culture which occur over time. We are all aware of cultural differences when they are pointed out to us. But we are

not as aware of the likelihood of *generational* or *cohort* differences. Marital crises, financial crises, death and bereavement happen to us all, and have been happening since time immemorial. But the general background of expectations, of good and bad times, changes and the relative meaning or consequence of an event can thereby change. The way in which a financial crisis or any life event will be defined will be at least partially dependent upon the prevailing world view which accompanies a particular cohort of people.

Long term studies (eg Eyer and Sterling 1977) have suggested that stress-related illness can be related to growth in economic factors, with more work leading to more hours of work, overtime and poorer working conditions. If there is surplus labour, dependent upon the size of cohort into which a person is born, then there is greater stress in employment, due to greater power of the employers and lower power of the unions, and greater stress from the threat of unemployment. The particular relationship between economic stressors and individual illness will be partially mediated by the size of the cohort into which one is born: it will be possible to make precise predictions only with that information to hand.

That such a variable is important is suggested by information which suggests a rise, since the 1960s, in the age-specific mortality rate for people in the age ranges 15-24 and 25-34, although there is a slight decline for people 55-64. These former age groups are under increasingly heavy stress due to economic factors. It remains to be seen what happens to them in later years, but there is certainly a case to be made that they will continue to be under stress throughout their life-span and therefore we may see an increase in stress-related illness rather than a decline.

We can further explicate this picture by looking at particular life-span events in various cohorts, and relating

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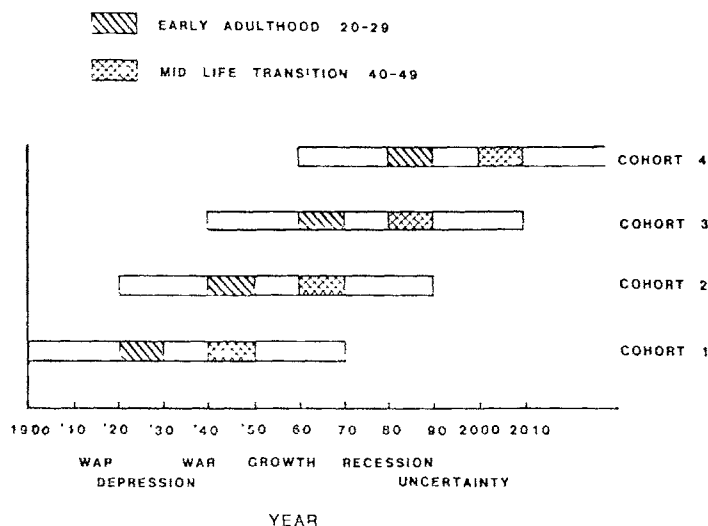


Figure 1: Life-span events in relation to external social and economic events

them to external social and economic events.

Figure 1 depicts some of the interactions which may affect particular individuals. One can readily conceive the years 20-30 being important for an individual in establishing economic and social independence. Rather than say that such years are static in their effect, however, one must relate them to external events. Being in the work force in the years 1920-30 and trying to establish independence was a very different experience from doing the same thing in the years 1960-70.

Just to emphasise the point, consider the years of the so-called 'mid-life crisis', circa 40-50. The generation having that in the 1960s had both the financial opportunity to indulge and the past experience of greater security and fewer earlier challenges. A cohort born in the years 1940-50, may not have the same period of economic stability to react to the mid-life crisis in the same way.

Elder and Liker (1982) examined the impact upon women of the experience

of economic hardship during the Great Depression in America. There were clear effects of economic hardship upon health and adjustment forty years later in a cohort of women entering the year 1930 as young mothers. As one would expect, however, adding further complications, the effects were greater upon the women who entered the years of the Depression in lower socio-economic groups. Personal economic resource will mitigate some effects of general economic changes. But as times get harder, and as things seem not to be under personal control, then stress is likely to increase and can manifest itself in a wide variety of somatic disorders.

Individual Differences in Reaction

Mention of personal resources leads us to the last factor to be considered here, namely the extent to which individuals may differ in their susceptibility to stressors. In doing so we will consider the possibility that people vary in their degree of hardiness or

stamina with respect to a range of stressors, as well as a more specific responsiveness to particular forms of stress. We will also briefly consider how people may be trained to cope with stress rather than rely simply upon their own resources.

Psychologists have always been interested in the extent to which people differentially react to stress. Emphasis has usually been on how people breakdown under stress. At the beginning of World War II psychiatrists were unanimous in their predictions that bombing raids would produce mass hysteria and general mental breakdown. The subsequent failure of such outcomes to eventuate, with indeed a decline in general psychiatric admissions, was surprising to many. It was also largely ignored and psychology continued to look for evidence of the ravages of fear upon susceptible individuals, rather than for evidence of courage to cope (Rachman 1978).

The characteristic manner of psychological investigation into susceptibility to stress is to identify a particular set of psychological characteristics which, when in combination with the external stimulus event, produce an elevated reaction to that event.

Probably the most well-known factor which has been related to a stress-related physical illness is the Type A coronary-heart disease (CHD) behaviour pattern (eg Innes 1981). Early intuitions that a person who manifested heart disease showed a particular syndrome of behaviour were supported in a number of studies, best exemplified by the Western Collaborative Group Study (Roseman *et al* 1975). In this study, followed up over a period of eight and a half years, a group of men were interviewed to establish their characteristic behaviour pattern, and their health status was subsequently examined. Men showing the Type A pattern were twice as likely to die of myocardial infarction and report symptoms of angina than were men who did not show the pattern, even when other risk factors such as

hypertension, serum cholesterol level, cigarette consumption *etc.*, were all controlled for. It is well known that the accepted risk factors will only account for half of the variation in CHD. So it is certainly plausible that psycho-social factors play a part.

The Type A pattern has been characterised by the combination of a strong tendency to be competitive, with feelings of time urgency and a need to strive hard to achieve. The Type A person can be characterised as being *self-stressed*: people and events are seen as providing problems and impediments which must be overcome, quickly. A number of psychological studies (eg Glass 1977) have related the Type A pattern to an overly strong need to control stimulus events. As we said earlier in this talk, a feeling of control can help to alleviate stress. The Type A individual, however, can appear to require a degree of control over everything and will work towards that end. Stress can thus be induced in at least two ways. First, the strong need to achieve control can lead to a persistence to gain control when it is clear that such control cannot be achieved. Since people are the most uncontrollable events with which we normally have to engage, it is not surprising that the Type A person does not like working with other people (Dembrowski and MacDougall 1978), and will attempt to do all jobs himself rather than waste time having other people do them, perhaps wrongly.

There is a moderating factor here. People in organizational settings obviously cannot do all the jobs they are responsible for. But here is where the need for control experienced by the Type A person can enter. When a person has the power to control outcomes to another person, then there will be less stress than where one is under another person's control. So Type A individuals who are in positions of power in organizations may be expected to show less stress than those who are in positions where they are under control. Such an outcome

has been shown to exist (Howard, Cunningham and Rechnittzer 1977). There is a greater risk of experiencing a cardiovascular event if you are a Type A person in the middle levels of an organization than if you are at the top. Supervisors and foremen who are Type A are the people likely to suffer from CHD.

A second pathway to increased stress for the Type A individuals is when the continual expression of a need for control is followed by clear evidence that control has been lost or cannot be achieved. The evidence that what one wishes to achieve is not possible seems to induce extremely strong stress responses. Glass (1977) has shown, for example, that Type A sufferers from CHD are far more likely than other sufferers to have experienced some event which indicates that control has not been achieved. The 'giving up' syndrome has been implicated in several cases of sudden death.

There has been considerable recent debate regarding the primary factor which leads to increased risk for CHD. The early workers emphasised the totality of the syndrome (Jenkins *et al* 1978). More recent work, however, points to the centrality of the *aggressiveness* associated with the competitiveness and achievement. Mere achievement motivation, or job involvement, do not seem to be significant predictors of CHD (Dembrowski *et al* 1978). What is, however, is aggression which follows from the frustration of such attempts to achieve or gain control. It is known that Type A individuals will show generalized aggression, not only to those who frustrated their attempts, but also to anyone who happens to be standing by (Carver and Glass 1978). The extreme Type A person prefers to work alone and is apparently also somewhat difficult to get along with as a spouse (Burke *et al* 1979). Just whether aggression, with the associated arousal of the autonomic nervous system, or the need for control are the factors

predictive of CHD remains to be seen. That some form of the Type A pattern is associated with CHD does, however, seem clear.

We might just mention here that there are other explanations of how CHD occurs more frequently for the Type A person. Since the Type A person is more job-involved and thereby is more concerned with aspects of work, then there may be a lesser amount of attention given to one's bodily processes. So although symptoms of stress may be present, the Type A person is less likely to be aware of them. Type A individuals do attend more to central features of a task and, when on a job, are less aware of any bodily symptoms (Matthews and Brunson 1979), so there is the possibility of a less complicated link than is the case with the loss of control hypothesis.

Another individual characteristic implicated in stress-related illness, is that of the *arousal-seeking personality*. People differ in the extent to which they seek out and engage in excitement-generating activities. It has been hypothesized that people who are high on this dimension, that is they seek excitement, may be less prone to illness than those low on the dimension (eg Cooley and Keesey 1981). The reason for this is that when they characteristically meet arousing situations then they are likely to react less strongly physiologically; they will be more stable in their physiological reaction and hence experience less damage as a result.

Support for this effect has been forthcoming, but it has come from the study of young people. If a person is seeking arousal, and succeeds, then there may be a succession of strong physiological reactions and, over time, the cumulative effect of this could be an increased risk of damage. Clarke and Innes (1983) found that life events were positively associated with illness, but also found that those who were high in arousal-seeking had *stronger*, not weaker, relationships between life

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events and physical and psychological symptoms. In a sample of older people in the work-force we get a different relationship. So there may be other personality characteristics which may make a person liable to suffer from stressful events.

But resistance to illness may be related to the presence of characteristics rather than merely due to the absence of features. A belief of one's own work, that one's skills and values and feelings are important, has been shown to be a powerful predictor of an absence of illness (Kobasa, Maddi and Puccetti 1982). Too much of such a belief, however, could lead to the same compulsion and challenge which leads to CHD in the Type A person. What is more to the point is a knowledge of when it is worth giving up. When one's resources can be seen to be incapable of dealing with a problem and that retirement from the problem is the most sensible way to deal with it, that is the sign of the personality that may deal with a stressful event.

For a time psychological research emphasised the training of coping responses to deal actively with a stressor. Either through action, or by some kind of re-evaluation or re-definition of a response, it was believed stress could be reduced. We are not denying that such reactions can be beneficial. But more recently it can be seen that positive denial or avoidance of a problem can be beneficial. The benefits of denial may be seen to reside in two types of response to a problem. There is dealing with the problem itself, or there is dealing with the emotional response to the problem. Distancing oneself from the emotional arousal, thinking about something else, having a drink, can in some respects reduce the arousal and alleviate the stress. Not always, not for every problem, but it can help (Lazarus and Launier 1978).

One of the side-benefits of exercise in helping to alleviate stress may provide such a mechanism. Exercise can act to improve body tone, so that

there is a greater capacity to deal with problems and also, in a sense, keep a body in a chronically higher level of arousal, so that rapid swings and shifts are less likely. Exercise, however, also directs attention away from the immediate problem and hence there is a reduction of the immediate emotional significance of a problem.

Action as well as passivity, denial as well as attack, these are coping responses which may help to alleviate the dysphoric aspects of stress and render less likely the negative physical consequences. The events which are stressful and the factors which govern a response to them are complex and our grasp upon their inter-relationships is at present very tenuous and superficial. Investigations into the nature of stressors, the bodily characteristics of people, their culture and into the means whereby reactions to stressors may be modified all need to be made before we can begin to have an image of what stress is and how it may be alleviated.

A person who is ill, or who is at risk of illness, may be so because of chronic and acute exposure to a variety of physical and psycho-social stressors. The capacity of a person may be such that stress may not be debilitating, but even in the hardy person a continual build-up of stress may eventually precipitate a problem. In the treatment of ailments which have a psychosomatic, or psycho-social component, an exploration of the range of stresses experienced may be an important adjunct to a standard case history. If we believe stress to be a part of modern living, then perhaps in our treatment of patients an acceptance of its role in illness may benefit that treatment.

References

- Anderson T (1978), A new view of heart disease, *New Scientist*, 77 (1089), 374-376
- Bulman RJ and Wortman CB (1977), Attributions of blame and coping in the 'real world'. Severe accident victims react to their lot *Journal of Personality and Social Psychology*, 35, 351-363
- Burke RJ, Weir T, and DuWars RE (1979), Type A behavior of administrators and wives' report of marital satisfaction and well-being, *Journal of Applied Psychology*, 64, 57-65
- Cassel J (1976), The contribution of the social environment to host resistance, *American Journal of Epidemiology*, 104, 107-123.
- Carver CS and Glass DC (1978), Coronary-prone behavior pattern and inter-personal aggression, *Journal of Personality and Social Psychology*, 38, 361-366
- Clarke A and Innes JM (1983), Sensation-seeking motivation as a moderator of the life stress/illness relationship, *Personality and Individual Differences*, 4, 547-550
- Cooley EJ and Keesey JC (1981), Moderator variables in life stress and illness relationship, *Journal of Human Stress*, 7 (3), 35-40
- DeLongis A, Coyne JC, Dakof G, Folkman S and Lazarus RS (1982), Relationships of daily hassles, uplifts and major life events to health status, *Health Psychology*, 1, 119-136
- Dembroski TM and MacDougall JM (1978), Stress effects as affiliation preferences among subjects possessing the Type A coronary-prone behaviour pattern, *Journal of Personality and Social Psychology*, 36, 23-33
- Dembroski TM *et al* (1978), Components of the Type A coronary-prone behaviour pattern and cardiovascular responses to psychomotor performance challenge, *Journal of Behavioral Medicine*, 1, 159-176
- Elder GH and Liker JK (1982), Hard times in women's lives: Historical influences across forty years, *American Journal of Sociology*, 88, 241-269
- Eyer J and Sterling P (1977), Stress-related mortality and social organization, *Review of Radical Political Economics*, 9, 1-44.
- Fox BH (1981), In R. Ader (Ed), *Psychoneuroimmunology*, Academic Press, New York
- Frankenhaeuser M (1976), The role of peripheral catecholamines in adaptation to under-stimulation and over-stimulation In G. Serbau (Ed), *Psychopathology of human adaptation*, Plenum, New York.
- Friedman M *et al* (1973), Instantaneous and sudden deaths: Clinical and pathological differentiation in coronary artery disease, *Journal of American Medical Association*, 225, 1319-1328
- Glass DC (1977), *Behaviour patterns, stress and coronary disease*, Erlbaum, Hillsdale, New Jersey.
- Glass DC and Singer JE (1972), *Urban stress*, Academic Press, New York
- Hinkle LE (1973), The concept of 'stress' in the biological and social sciences, *Science, Medicine and Man*, 1, 31-48.
- Holmes, TH and Rahe RH (1967), The Social Readjustment Rating Scale, *Journal of Psychosomatic Research*, 11, 213-218
- Howard JH, Cunningham DA and Rechnittzer PA (1977), Work patterns associated with Type A behavior: A managerial population, *Human Relations*, 30, 825-836
- Innes JM (1981), Social psychological approaches to the study of the induction and alleviation of stress In G.M. Stephenson & J.H. Davis (Eds), *Progress in applied social psychology*, Vol. 1, Wiley, London

- Innes JM and Holubowycz OT (1982), Stressful life events in the development of alcohol dependence in women, Anzaas Conference, Macquarie University
- Jenkins CD, Zyzanski SJ and Rosenman RH (1978), Coronary-prone behavior One pattern or several? *Psychosomatic Medicine*, **40**, 25-43.
- Jenkins CD *et al* (1977), Social insecurity and coronary-prone Type A responses as identifiers of severe atherosclerosis, *Journal of Consulting and Clinical Psychology*, **45**, 1060-1067
- Kanner AD, Coyne JC, Schaefer C and Lazarus RS (1981), Comparison of two modes of stress measurement: Daily hassles and uplifts versus major life events, *Journal of Behavioral Medicine*, **4**, 1-39
- Kobasa, SC, Maddi SR and Puccetti MC (1982), Personality and exercise as buffers in the stress-illness relationship, *Journal of Behavioral Medicine*, **5**, 391-404
- Lazarus RS and Launier R (1978), Stress-related transactions between person and environment
- In G A Pervin & M Lewis (Ed), *Perspectives in interactional psychology*, Plenum, New York
- Lown B, DeSilva RA and Renson R (1978), Roles of psychological stress and autonomic nervous system changes in Provocation of ventricular premature complexes, *American Journal of Cardiology*, **41**, 979-985
- Mason JW *et al* (1976), Selectivity of corticosteroid and catecholamine responses to various natural stimuli In G. Serban (Ed), *Psychopathology of human adaptation* Plenum Press, New York.
- Matthews KA and Brunson BI (1979), Allocation of attention and the Type A coronary-prone behavior pattern, *Journal of Personality and Social Psychology*, **37**, 2081-2090
- Miller SM (1979), Controllability and human stress, *Behavior Research and Therapy*, **17**, 287-304
- Natelson BH and Cagin NA (1979), Stress-induced ventricular arrhythmias, *Psychosomatic Medicine*, **41**, 259-262
- Raab W (1970), *Preventive myocardology*, Charles C Thomas, Illinois
- Rachman S (1978), *Fear and courage*, Freeman, San Francisco
- Rosenman, RH *et al* (1975), Coronary heart disease in the Western Collaborative Group Study, *Journal of the American Medical Association*, **233**, 872-877
- Seligman, MEP (1975), *Helplessness*, Freeman, San Francisco
- Steinberg D (1979), Research related to underlying mechanisms in atherosclerosis, *Circulation*, **60**, 1559-1565.
- Sterling P and Eyer J (1981), Biological basis of stress-related mortality, *Social Science and Medicine*, **15E**, 3-42
- Tennant C and Andrews G (1976), A scale to measure the stress of life events, *Australian and New Zealand Journal of Psychiatry*, **10**, 27-32
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