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NATO SYMPOSIUM ON COPING AND HEALTH, BELLAGIO

J. VERNIKOS-DANELLIS *

22 June 1979

*Visiting Scientist, Dept. of Pharmacology, Royal Free Hospital School of Medicine, Univ. of London

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Highlights are discussed of papers presented at the NATO Symposium on Coping and Health, held 26-30 March 1979 at the Bellagio Study and Conference Center of the Rockefeller Foundation. This Symposium was a scholarly summary by 20 leading world authorities in the field of Stress and Coping techniques. Experimental data from animals and experimental and clinical data from humans formed the basis of the discussions.

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NATO SYMPOSIUM ON COPING AND HEALTH, BELLAGIO

A Symposium on Coping and Health, sponsored by NATO, was held during the week 26-30 March 1979 at the Bellagio Study and Conference Center of the Rockefeller Foundation in Italy. The setting was the beautiful Villa Serbelloni overlooking Lake Como, where the Foundation hosts small working conferences and short-term resident scholars. Dr. Neville Moray, the NATO Human Factors Committee observer, was among the 20 participants. Those attending included psychologists, psychiatrists, behavioral scientists, and endocrinologists from West Germany, Ireland, Turkey, Sweden, Norway, England, France, the US, and the Netherlands.

The Symposium was opened by Prof. Neal Miller (Rockefeller Univ., New York), who is probably the leading authority in psychology today. He presented a scholarly review of stress and the stress response, and coping in health and disease. He emphasized that the study of these formed part of the developing field of behavioral medicine, an area receiving increasing attention with the formation of the *Journal of Behavioral Medicine* and the Academy of Behavioral Medicine. It deals with the brain and the neurohumoral mechanisms it controls and covers areas of perceptions, emotions, and drives, along with metabolic processes.

Miller first reviewed the involvement of the endocrine system in the body's response to stress from the Selye concept of "Alarm Reaction, Exhaustion, Adaptation" involving the pituitary-adrenal negative feedback system, and Cannon's adrenal medulla-epinephrine "fright, flight" system, to more current information that high doses of epinephrine cause platelet aggregation which may block blood vessels in times of stress, or mobilize free fatty acids, which if not burned up by adequate exercise, can result in increased synthesis of low density lipoproteins that may lead to atherosclerosis. Miller underlined the need to investigate the effects of chronic psychological stress and the rebound phase after a stressful situation. He then considered the epidemiological and clinical evidence of the effects of stress.

There is no evidence that one specific type of stressful situation leads to one particular type of stress consequence; these can range from psychoses, suicides, accidents, susceptibility to disease, high blood pressure, diabetes, ulcers, and possibly others. Attempts to classify types of individuals that would be more likely to respond in one or another fashion, as in the Type A and Type B personalities and their tendency to develop cardiovascular disease, are biased in that other factors were not considered. Miller pointed out that there are many highly stressed people who do not develop cardiovascular disease and may simply be inherently tougher, just as some have a tendency to sprain their ankles while others do not. Stress and the stress response are not a simple cause and effect relationship. There is a balance

between psychological factors and the physiological condition or response. He supported Ursin's definition of Stress as Increased Activation, while Coping is Decreased Activation. Thus, coping is anything that reduces the consequences of a stress response. For example, heart patients who deny the severity of their condition (emotional blunting) apparently have a better chance of survival. Pavlov had shown in his dogs that they would not respond to pain if conditioned to be rewarded with food, and Beecher found that wounded soldiers being sent home were remarkably unfeeling of pain that would otherwise be excruciating.

On the other hand, the inability to cope worsens the consequences of the stress response. Miller raised the example of the myocardial infarction patients in intensive care, where there were five times more deaths when unfamiliar staff made ward rounds. Numerous such examples were presented throughout the conference. Miller's conclusion was that we should concentrate on developing ways of "toughening up" by education and training in dealing with social and emotional problems.

Results from studies with animals were discussed by Prof. Jeffrey Gray (Department of Experimental Psychology, University College, Oxford), Dr. Bruce Overmeier, (Univ. of Minnesota), and Dr. Joanne Weinberg and Dr. S. Levine (Stanford Univ. Medical School). The problems and limitations in finding appropriate experimental models to study emotional stress and coping behavior in animals were discussed as well as the difficulties in extrapolating to human conditions. Experiments using rats, dogs, or squirrel monkeys were described. In general, the environmental variables were the presence or absence of control and of prediction. The experimental conditions usually involved a situation in which the animal received electric shock with or without a signal and could jump over a barrier or run down a runway to avoid the shock or receive a food pellet. In all circumstances, the animals showed a preference for control and to a lesser extent, reward, and the ability to control a situation seemed to reduce deleterious consequences, measured by changes in corticosteroid levels. Where there was no control, predictability of the shock was helpful. The optimum condition was when both control and a signal were present, and, if given a choice, the animal would choose predictable shock to the unpredictable situation. More and greater physiological responses result in response to unpredictable shock. Thus, the extent of control and predictcbility of a situation appears to be inversely related to the magnitude of the physiological response. However, Weinberg described experiments showing that losing control may be more aversive than never having had it. The general discussion at this point raised the point that animals in fact prefer signalled shock because the signal denotes a period of safety or reinforces the knowledge that safety follows "shock-off." If the experiment is designed so that the animal is given a signal that a period of safety is coming or that shock is coming (a warning signal), the animal chooses the safety signal.

Not only are the general physiological responses and maladaptive consequences, such as the development of ulcers, reduced if an animal is provided with control and predictability, but brain mechanisms also

reflect similar differences. It was generally felt that hypothalamic norepinephrine (NE) was an important mechanism mediating these responses. Inescapable, but not escapable shock depleted brain NE. Gray proposed that NE is the critical neurotransmitter involved in the conditioning or "toughening up" of animals to stress. Animals trained with conditioned frustration or conditioned fear were more tolerant to stresses such as novel stimuli. If animals were conditioned while receiving anti-anxiety drugs such as barbiturates, benzodiazepines or alcohol, toughening up was less effective. The extrapolation of these observations to clinical behavioral therapy could be that the amount of time spent in therapy was an important factor and that drugs may hinder or delay its beneficial effects. This latter effect also seems to extend to β-blockers administered for hypertension, and Dr. Cullen (The Irish Foundation for Human Development, Dublin, Ireland) discussed a case of a truck driver receiving these drugs that showed similar results. Even in conditions of unavoidable and uncontrollable stress, it appears that the animal may instead of showing a physiological response, show a "behavioral strain" or may not respond behaviorally in the expected way. Overmeier's experiments with dogs, involved the application of such unavoidable electric shock to the hind feet for 1 to $1\frac{1}{2}$ hours. The next day, the dogs were put in a shuttle box and had to jump over a barrier in response to a tone signal to avoid an electric shock. Although normal dogs learned this process very quickly, these dogs did not learn to avoid or escape, and even if occasionally they did escape to safety, this did not reinforce their subsequent avoidance or escape. This abnormal behavior disappeared after 48 hours. Terms used to describe this effect included "learned helplessness" or "emotional blunting."

Another approach to studying coping mechanisms in animals was described by Dr. S. Levine, who studied the mother-infant interactions in squirrel monkeys, using both behavioral and plasma cortisol measures. Separation of the infant from the mother for a few minutes did not generate a stress response, whereas separation for 30 minutes produced a response in both mother and infant. Removing the mother and leaving the infant in its social group led to no apparent behavioral distress, agitation, or vocalization in the infant although there was a striking increase in its plasma cortisol levels. Levine concluded from this and other similar studies that the infant uses the mother to reduce its physiological response (plasma cortisol) and learns quickly that by being capable of making a safety response (clinging to mother), it can control its physiological state.

The majority of the Symposium dealt with recent human studies of coping mechanisms in infancy, adolescence, old age, and in the working environment. Dr. Megan Gunnar (Department of Psychology, Stanford Univ.) discussed the effects of response contingent experiences in early development. There is considerable evidence that how the child approaches life later on depends on the degree of control or helplessness it experiences in early life. Uncontrollable experiences are expected to

lead to reduced motivation in adulthood. The mother's responsiveness to the infant provide him with his first coping experiences. The first three months to a year are the most critical, with the second semester being the most important time for learning response contingency events. The mother's contingent responses affect the infant's behavior in two ways: by providing a source of security, and by developing its confidence and reducing fearfulness in being able to control the environment. The presence and availability of the mother has potent fear-reducing effects particularly after six or seven months of age. Exploration and handling of novel objects and environments, facilitate the development of competence in later years, (as measured by scores on various tests of mental and physical development). The mother's responsiveness to the child's plea also seems to facilitate exploration; however some data indicate that after the child is six months of age, mothers who are too responsive may have infants that are more fearful of uncontrollable events, although they may be less fearful of controllable events. Gunnar pointed out the dearth of objective information in this area, which is further restricted by the limited repertoire of voluntary responses of the human infant, as well as the possible long-lasting harmful effects that may result from some experimental conditions.

The next period of stress in life, early adolescence (10-15), was discussed by Dr. Betty Hamburg (Senior Research Psychiatrist, Laboratory of Developmental Psychology, National Institutes of Health, Bethesda, MD). She proposed that this is a great time of stress because the adolescent is basically a "horrified spectator of events occuring to him." He must cope with a change in the level of difficulty of school work and social pressures which form his "work-world," as well as the uncontrollable changes of undetermined outcome occuring in his body. The adolescent is not happy with his body image. Boys would like to be taller and girls would like to be thinner. It is a time of great concern about the outcome of their growth and development particularly when there are discrepancies from the norm. Fastest growing girls have the lowest self-esteem as do the slower-developing boys. During this age pediatricians report more medical conditions. Approximately 20% of adolescents show an increased amount of worry about their health, and an additional 15-25% show symptoms such as increased blood pressure, neuromuscular and joint problems, ulcers, skin diseases, and juvenile diabetes. Hamburg discussed the statistics that suggest that adolescents who are alcohol abusers are also the ones who are likely to indulge in all the other distress behaviors evidenced in poor school performance, attendance, relationships with parents, depression, and use of various drugs. She described preliminary results of success in schools where adolescents were taught coping skills, provided with peer counsellors, and nonparental adults as mentors or sources of information. The criteria used were health indices, school absences and grades, staying in school, and various measures of self-esteem. Hamburg urged the more widespread teaching of coping skills to adolescents for the prevention of health damaging behaviors.

Dr. Judith Rodin (Department of Psychology, YaleUniversity, New Haven, CT) followed with a discussion of her work with the problems of coping in old age. She pointed out that the aged feel they have little control or have lost control over events in their lives, and that this may be compounded by an altered perception of the situation. In addition, old age is accompanied by such factors as retirement, relocation, and the loss of contemporaries. She described a series of ingenious studies she and her associates conducted in an old peoples' convalescent home. The subjects were of the same average health and ranged in age from 67 to 98. Two thirds were female and one third male. Two groups housed on different floors were used, and both groups were moved into these quarters before the beginning of the study. The one group (experimental) was given a talk by the hospital administrator emphasizing their responsibility for themselves. The other group (control) also was given a talk for the same length of time but was told it was the staff's responsibility to take care of them. Whereas the latter group, for instance, was shown films or other activities at predetermined times, the experimental group was given the choice of a day on which they wished to see a film. Both groups were tested at 3 weeks and 18 months after the beginning of the study using interviews and rating by nurses. The experimental group showed their responses on happiness and activity were improved, they were rated more alert by the interviewer, and nurses reported better health in general. They showed a decrease in passive activity and an increase in active participation. The most striking data were in the death rate incidence which was 25% before the beginning of the study and 18 months later was 7/47 (15%) in the experimental group and 13/47 (30%) in the comparison group. Rodin pointed out the importance of the nurse-subject interaction to the well-being of these subjects. Strong tension between nurses and patients occured when nurses imposed helplessness on them by doing everything for them and then complaining that they did not do enough for themselves. The investigators tested an approach to overcome this by assigning a set period of nurse-time to each patient every day and measuring the frequency of calls in that time as compared to the usual procedure. The frequency of calls, considered here as a measure of perceived stress, was reduced and was correlated with beneficial effects through the exercise of control.

In a more recent study, subjects were divided into three groups randomly and interviewed one week after entry into the nursing home. One group was untreated, the second was given information arguing that age was not a handicap, and the third group was given causative explanations for some of their physical symptoms, such as slippery floors slowed down their movements, and so on. When tested over seven days, the third group showed remarkable improvement as a result of this attributional manipulation. Rodin suggested that coping refers to behavior that helps people protect themselves, and can involve changing the problem, changing one's perception of the problem, changing the emotional response to the problem, and eliminating or modifying the conditions causing the problem. She and her colleagues proceeded to

apply these principles by teaching coping skills to a group of aged patients, taking advantage of their habit of self-talk and converting it to self-instruction. They devoted two 20hour sessions of instruction each week for four weeks to these patients (experimental group). Two other groups received either no treatment (no treatment controls) or an equal time with the psychologist but no instruction (attention control). During the first week, the experimental group were taught how to use self-talk to role play. It was suggested to them that negative self-statements could be detrimental, and they were encouraged to reinforce the belief that they were active contributors to their own experiences. During the second week they worked at a memory task and learned positive self-statements, and during the last weeks they learned to use techniques to cope with specific situations and solve let-down problems such as expecting a visitor who does not come or calling a nurse who does not come. The results showed that the self-instruction group had better memory, were better in activities and participation, and experienced reduced feelings of stress. However, the attention control group also benefitted though to a lesser extent. Measurement of 24-hour urinary cortisol levels were initially very high in all groups (100 µg/24 hr as compared to 20-30 µg/24 hr in normals). All treated groups were reduced at the end of the 4 week treatment, but only the self-instruction group remained low one year later. This exceptionally well-done and -presented work led to an active discussion and suggestions for institutional changes in old peoples' homes.

Another aspect of human coping was introduced by Dr. Suzanne Miller (Department of Psychiatry, Univ. of Pennsylvania, School of Medicine, Philadelphia, PA). Will the person who receives information before a surgical procedure, dental procedure, a fatal disease or hazardous treatment, experience less or more stress before, during, or after the actual procedure? She described a study of patients going into an aversive gynecological situation (a test for possible cervical cancer). During a 20-minute preparatory slide show, it was emphasized that the procedure was basically benign. Various psychophysiological measures were used to measure the response. The conclusion of these investigators was that information may be deleterious. In a subsequent study, patients were preselected by questionnaire according to whether they sought/or did not want information about the test that they were going to undergo. Half of each type was given no information and the other half had information imposed on them. The test, a colpostomy, in general resulted in hand-clenching and increased distress during the exam in the group that had no information, whereas considerably less distress was evinced by the high information group. MAACL depression scores were increased in the high information group and sustained even after the test, whereas the no-information group showed no depression. Being a "monitor" (one seeking information) was emotionally more costly. Such individuals when they came in were more edgy, tended to be more educated, used more pain medication with discomfort, and showed greater muscular tension of the vaginal area as rated by the examining physician. They also took longer to recover. On the other hand, "blunters" (not seeking information) who did not get information did better than those that did. Pulse rate data and self-ratings of tension supported these con-

clusions. Miller suggested that these findings bear on the issue of informed consent. An individual's right to know should be balanced against his desire to know or ability to handle that information.

Attention was then focused to coping in the work environment. Dr. Marianne Frankenhauser (Department of Psychology, Univ. of Stockholm, Sweden), a pioneer in this field, has done extensive work both in the laboratory and in work conditions relating to job demands, job satisfaction and health. She has more recently been asking the question: Do physiological measures differentiate between effort with distress, effort without distress, and distress without effort? Her experiments suggest that in the first case both epinephrine (E) and cortisol levels are increased, in the second case only E is increased, and in the third case only cortisol is increased. In conditions involving complex decision making, where an individual had to find his own pace, she reported that effort, interest and positive feelings were high as were E and norepinephrine (NE), whereas cortisol excretion was in fact reduced. She also used the Jenkins questionnaire to identify Type A and Type B personalities, who were then placed in a situation in which they could select their own work pace. Type A persons subjected themselves to a higher pace, worked faster and made less errors, and showed no difference in physiological measures to Type B individuals, although epidemiological data have shown that high job involvement Type A individuals had less incidence of coronary disease. Her more recent studies with working females in which she measured daytime and evening E excretion show that during the evening household duties and responsibilities, and during the weekend, there is a greater increase in E excretion. However, she pointed out that this measure may not be useful in assessing female work-related responses as it is in males. On the other hand, females who have adopted male work roles, such as engineering students, bus drivers or lawyers, respond with an increase in E just like males and also show a trend towards increased coronary disease.

Dr. John H. Cullen (The Irish Foundation for Human Development, Dublin, Ireland) has been studying truck-drivers on four successive 11-hour days. Performance was measured by quantitating tail-gating, braking, and steering-wheel handling. He found cortisol levels were decreased on the driving days. Older drivers suppressed more during the day and less at night than younger drivers. He suggested that their higher cortisol levels at night may be due to slightly poorer night vision making the task harder. Poor performance correlated with high extroversion scores. Allen measured personality characteristics and extroversion against their level of anxiety in tilt table tests. Extroverts showed high anxiety levels and a large increase in heart rate only during tilt. Introverts showed lower anxiety, but pulse pressure seemed narrower. Neurotics showed higher diastolic pressure and higher heart rate during tilt.

Dr. Holger Ursin (Department of Psychology, Univ. of Bergen, Norway) directed his attention to how disease is produced in response to psychological stress. He proposed that the difference between man and

machines is that biological "load" has a training effect and that strain occurs when some kind of balance is surpassed. He described experiments with parachute jumpers during training, measuring numerous physiological parameters. As the fear score decreased, so did cortisol and free fatty acids, whereas testosterone increased. Epinephine showed an increase every time they jumped, whereas NE decreased with successive jumps. He suggested that E is coping-resistant, whereas NE is coping-sensitive and may be a better index of somatic risk. Sustained activation is conducive to pathology, but most people subjected to life changes survive most often without damage. Ursin also proposed that personality must be taken into account and that effective coping can reduce pathological damage.

The Symposium was closed by Dr. David Hamburg, President of the Institute of Medicine of the National Academy of Science, Washington, DC. He began by reviewing the history of developments coupling psychology and medicine and the resistance over the years of physicians to accept that the central nervous system had anything to do with peripheral disease. He emphasized that this conference formed a cornerstone in the development of awareness of the implications of behavioral aspects of coping to health and disease in the course of living and working.

The proceedings of this excellent Symposium will be published shortly by Plenum Press. The organizers, Drs. Levine and Ursin, are to be heartily congratulated.