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Stress-Our Friend, Our Foe
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Stress and the Family

2. *Stress—Our Friend, Our Foe*

COOPERATIVE EXTENSION SERVICE • MICHIGAN STATE UNIVERSITY

BY DONALD OKEN, M.D.

When she thought about it later, Jean could not remember what made her look out the window at just that moment. All she could recall was a surge of warmth toward Bobby, her five-year-old playing outside. As she watched, he strayed off the lawn, pulling his little red fire engine into the street. Her tender feelings became tinged with worry and annoyance.

Then came panic as she saw a delivery van rush around the corner toward her son—and swerve with a squeal of tires to miss him and crash into the light pole. Terror followed as she saw the broken pole falling . . . falling . . . to land with its end on Bobby's legs.

She barely heard his scream or noticed her own pounding heart and knotted stomach as she rushed to his side. Summoning unbelievable strength, she lifted the heavy pole a few inches and pushed it away from his bleeding legs. Bobby looked deathly pale as he panted for air. His scream was now a whimper.

As she comforted him, she kept him from moving around too much; she covered his coldness with her sweater; and when he said he was thirsty, she used the water brought by neighbors only to wet his lips. Miraculously, everything necessary was done. The ambulance arrived and she rode with him to University hospital. Her husband, Dan, arrived minutes after them at the emergency room.

There were some terrible moments waiting. Fortunately, the damage turned out not to be too great. Bobby was young and strong, and responded well to treatment.

The next few weeks were rough, too, but they all lived through them. The other kids were great. Friends pitched in to help. Everything necessary was taken care of while Jean and Dan spent as much time at the hospital as they could. Even after Bobby came home, it took a while before Jean or Dan slept or ate very well. And it seemed to take forever to get their energy back.

Now, four years later, everything is fine. Bobby's broken leg mended perfectly. He still boasts to his friends about his accident and hospitalization. Jean was pleased about having lost seven pounds after the accident, though five are now back and seem impossible to shed. For Dan, the pressures lasted longer. But his decision at that same time to change jobs paid off with a bonus; the job led to new skills and later, to a new, better position. Since his promotion 11 months ago, he

holds an impressive and responsible position in his engineering firm. As he says: "I'm a real executive now—and I've got an ulcer to prove it!"

Everyone will recognize what that family went through as *stress*. The word has become part of our vocabulary. Correctly, we label a large number of events as stressful: a death in the family, undergoing an operation, learning that the company one works for is going out of business, flunking an exam, having a serious illness, being stranded in the mountains by a blizzard. Some are mostly physical, like Bobby's broken leg. Others are more emotional, as was true for the strain on Jean and Dan. Some are sudden short-term crises, while others are more chronic.

But what is stress? How do doctors use the term, and what do we mean by it? To understand, we first must look at some basic ways in which the human body works.

Your body consists of a variety of parts and chemical substances. Each one keeps changing from moment to moment as you carry out the work of life: moving, breathing, sleeping, eating, etc. But the changes must be kept within bounds.

The great nineteenth-century French biologist, Claude Bernard, pointed out that the internal environment of our bodies must maintain a degree of consistency. Blood pressure constantly shifts to meet the demands of life. So do heart rate, oxygen level and the amount of foodstuffs in the blood. But if any of them changes too much, the body cannot take it. Death ensues. In fact, one description of "disease" is a condition in which bodily changes go beyond the limits of normal function, though not to the absolute limit the body can tolerate. The cause of such changes can be outside agents such as germs, injury or air pollution. Or they can result from a breakdown of any part of the body, such as that due to aging.

Doctor Bernard's work was extended by the Harvard physiologist, Walter B. Cannon. Doctor Cannon discovered that the "wisdom of the body" triggers general adjustments when any change threatens to go too far. Many minor changes are set in motion which serve to keep the original change from becoming too great.

When you donate blood, for example, the rest of the system makes up for the loss. There are small changes in the blood vessels all over your body and in heart rate, and fluid is transferred from the tissues to the bloodstream (and later made up by drinking coffee or fruit

juice). Thus, every part of your body continues to get an adequate blood supply.

Doctor Cannon was particularly interested in emergency reactions: how does the body deal with sudden, potentially life-endangering situations? In one of his classic experiments, he studied a cat's reactions when suddenly faced with a dog. Adrenaline was immediately poured into the bloodstream. Also there was an intense nervous reaction centered in what is called the "Sympathetic Nervous System." Cannon did not know it then, but this system operates by releasing an almost identical hormone called moradrenaline.

The two hormones led to a variety of changes. The cat's circulation speeded up. More energy-rich sugar appeared in its blood. Blood-clotting mechanisms were accelerated. Muscle functioning was strengthened. Breathing was speeded. Blood cells were released from storage depots into the circulation. The senses became keener. Meanwhile, the unneeded digestive system went into temporary inaction. All of this, Cannon noted, was supremely useful or, as doctors say, *adaptive*. The changes greatly enhanced the likelihood of survival. They geared up the body for effort and protected it from harm. They prepared the body for "fight or flight." Doctor Cannon noted that a variety of emergency situations triggered this pattern of adaptive responses. Among them were pain, physical injuries, starvation, intense emotion or an inadequate air supply.

It is easy to recognize that this emergency reaction was displayed by both Bobby and his mother. His paleness and chilliness reflected the shifts in circulation that made sure his heart and brain would get enough blood. His panting kept up his oxygen levels. His clotting mechanisms were readied to reduce his loss of blood. Meanwhile, his mother, galvanized by her own adrenaline, was able to move quickly and alertly. She found herself lifting a weight that ordinarily would have stymied even her husband.

There is more to the story of stress. Stress is a term coined in its medical usage by Austrian-born Hans Selye, a professor at the University of Montreal. By 1950, when he published a book with that title, Doctor Selye had pulled together the threads of literally tens of thousands of pieces of medical research. They were studies which described the bodily reactions to just about every conceivable type of severe injury, disease, poison, excessive stimulation or unusual work demand. Strikingly, Selye noted that there were certain common features to all of them. In addition to specific changes—the rash of measles, the local bruise of an injury—there were some "nonspecific" reactions found in all. To these he gave the name: stress.

The initial part of stress was the emergency "alarm" reaction described by Doctor Cannon. But there were many other responses that went on much longer. They represented the body's general response to damage of any type. Like Cannon, Selye noted that the stress response was generalized and adaptive. Changes occurred all over the body to mobilize its defenses and protect it against damage.

What is the mechanism of these changes? Surprisingly, the central role is played by the two tiny adrenal glands. Whereas the inside part of the glands manufactures adrenaline, the outer layer produces two other

types of important hormones. One type regulates the amount and distribution of body fluids and their dissolved mineral salts and plays a significant role in maintaining blood pressure. The other hormones build up stores of energy-supplying sugars and conserve the body's energy supplies. They also have strong anti-inflammatory effects (cortisone, used to treat certain forms of arthritis, is one of these hormones) and help the body cope with infection. Finally, they have the property of allowing many other hormones and drugs to work more effectively and safely throughout the body.

We now know that Selye erred slightly by overemphasizing the role of the adrenals. More recent research has shown that several other glands also play an important, if smaller, part. So do the nervous system and body immunity. But it is the adrenal hormones that are of most importance, especially in intense stress.

How remarkable the "wisdom of the body" truly is! The changes produced by the adrenals, and the rest of the stress reaction, mobilize the body's defenses and reduce damage to it.

Both Friend and Foe

We often tend to think of stress as harmful—as an enemy of health. In fact, the stress response is not only normal but essential. Without it, we could not live very long. Well before modern medicine existed, man was able to survive in a hostile world because of just this mechanism. Much of what doctors do now is designed to remove interferences so that it and other natural body defense mechanisms can work their healing forces. True, this beneficial process sometimes can go harmfully astray. Most of the time, however, it works to our great good.

Perhaps one reason why stress is mistaken for a foe lies in the difference between the commonplace use of the word and its medical meaning. Conversationally, stress is used both to label the outside causes of our reaction and the reaction itself. Medically, we make a distinction, applying the term only to the reaction. The reason is that what may be stressful to me may not affect you at all. "One man's meat is another man's poison." Also, anything can become stressful if it is strong enough, lasts too long or is repeated too often.

When doctors want to talk about causes—things that lead to stress—we call them *stressors*, or *stressful* events.

Making this distinction allows us to focus on how our bodies protect us from the damage of stressors: our resistance against disease. One of Selye's key findings was that the stress response raises the level of resistance to the agent that provoked it and to others like it. For example, infection causes the body to manufacture additional white blood cells, which destroy invading bacteria. Over time, the mechanism can become exhausted if stress persists. The patient succumbs to the inexorable pressures of his illness. And, as Selye noted, resistance to other types of stressors tends to decline even while the original resistance is raised. In a flu epidemic, for example, the people it carries off usually are those with chronic illnesses.

So far, we have been talking about stress as if it were strictly physical. But we know very well that emotional

events are stressful too. The only physical harm that involved Bobby's mother was that which occurred to her son. Her own reaction was set off by her fear and concern. Fear, or anxiety, is the usual sign that psychological stress has occurred. Other emotions can be involved too. When emotional upset is unusually severe or chronic, it may lead to psychiatric breakdown. But just about any emotional upheaval can trigger the stress response and the physical effects that go with it.

Some stressors are obvious, like a fight, anticipated surgery or talking over serious personal problems. But exacting and over-routine work, college tests or even automobile driving can do it, too. So can an X-rated movie!

Many psychological stressors do little more than set off a mild reaction. Often it is so mild as to operate silently, entirely below the surface. Only when you think about it—perhaps not until later—do you realize that your heart was beating fast or that you were sweating. This is true of physical stresses too. Most of Selye's studies involved quite severe body damage. But milder, and more selective reactions of the same type occur every time you cut a finger or have a bad cold.

Even in situations that seem entirely physical, the emotions play a part too. Pain, for example, is not only a physical reaction. It has tremendous psychological meanings which depend on the person and how he interprets the cause of the pain and its consequences. You can fool a fasting dog in the laboratory by giving it regular feedings of artificially flavored sawdust, and prevent a stress response: the idea of food is as potent as its nutrition in this case. Our minds are always involved in anything that happens to us.

That makes sense in several ways. Your brain serves not only thought and emotion, but regulates the body organs, just as the hormones do. In fact, the two systems have many links with one another. Adrenaline is released by messages that travel down nerves from the brain. The particular part of the brain involved in that is the hypothalamus, where your emotional reactions are organized. It also triggers "the master gland," the pituitary, to produce hormones that act on the thyroid, the sex glands, the breast and the adrenal gland.

It is not surprising that the expectation of any stressful event can be every bit as potent a stressor as the event itself. Here we can identify a new type of stressor: uncertainty and strangeness. Anything which happens for the first time, or which you cannot make sense out of, triggers stress. Inside, you experience a silent startle. Usually, you quickly figure out what has happened, or at least recognize that it is not dangerous. Then the reaction shuts off right away. There are brain mechanisms for flipping this "off switch" so that the stress reaction can stop before it has barely begun. If you decide there is real danger, the reaction proceeds: full-blown stress develops.

Even if you can't fully understand a situation, usually you can figure out some constructive ways to handle it. This, too, is enough to shut off the stress reaction. But continuing uncertainty and doubt are like a smoldering fuse. A subdued chronic state of stress goes on and on just under the surface. And that can lead to serious consequences for physical, no less than mental health.

Coping with Stress

Most of us have learned a variety of skills for handling social situations, the demands of our jobs, the illness or death of loved ones, economic pressures, physical disabilities and the like. They include ways of solving the practical problem itself, like acquiring new skills to get a better job. They also include more "psychological" methods. We learn how to blow off steam in recreation and to ignore more trivial difficulties "philosophically." We lose ourselves in work to forget other troubles. We put off having it out with a competitor until the kids' measles are better. These familiar methods usually work silently and effectively.

If the going gets rougher, they may not work quite so well. You begin to worry that the situation is becoming "dangerous." This triggers the stress response which continues until the problem disappears or you find a way to master it.

None of us is invulnerable. We all have emotional "allergies." One person may be sensitive to things people say about him. Another may feel sickened by rivalry with a competitor. Another may find disorder and disorganization upsetting. Then stress is triggered.

Complications Related to Stress

Our bodies have vulnerable spots too. Diseases and old injuries leave their impact. When such a weakened body part is put under stress, it may fail. One of my patients, Harry, was struggling to decide whether to turn his successful business over to his ambitious but less able son. One evening he watched a prize fight between a veteran champion and an aggressive, young challenger. As the fight reached its climax, he suddenly felt an intense, crushing pain across his chest. He had had a heart attack. His TV "relaxation" produced a stress his heart could not take.

Here we see how stress can, indeed, be our foe. Even if Harry had not suffered his heart attack, it was useless for him to develop a stress response in this situation. The only danger he faced was inside his own head. At worst, he would have sharp words with his son. Harry's preparation for "fight or flight" and for possible body harm made no real sense.

For primitive man in a world of physical dangers, the stress response was immensely useful. For modern man, it is much less so. Many of the dangers we face are like Harry's: strictly mental. Bobby's reaction to physical injury helped him to deal with its consequences. His mother's emergency mobilization also was helpful: keyed up and strengthened, she handled the acute situation more ably than would have been possible at an average level of function. But what about her later sleeplessness and lack of pep, and that of her husband? And what about Dan's ulcer? Those were far from useful.

Selye's animal experiments showed that severe stress resulted in serious physical damage to vital organs. These abnormalities looked remarkably similar to those of several important human diseases. To produce them, Selye usually had to magnify the stress response (for example, by injecting excess hormones) and put extra strain on the organs. He concluded that chronic stress might be the cause of similar human diseases, especially

if the involved organ had been damaged or overloaded. Among these diseases are high blood pressure (hypertension), kidney disease, peptic ulcer, several endocrine-gland disorders and the family of diseases to which rheumatic fever and rheumatoid arthritis belong. He called these "stress diseases" or "diseases of adaptation."

Selye's idea makes a lot of sense. These diseases are ones that doctors have observed often occur at stressful times. For example, the frequency of thyroid disease has increased greatly during several different wars. Because these stressful situations seem to be primarily psychological, Selye and others have concluded that many stress diseases are "psychosomatic."

Like stress, the word psychosomatic has become part of our everyday vocabulary. It is hard to give a simple definition for the term. Doctors use it in different, although related, ways. Generally, we use it merely to indicate the fact that every illness involves psychological (and social) as well as physical problems. Every good doctor takes into account his patient's personal concerns and living situation.

But doctors have a much more specific usage too. We refer to a few particular diseases as being psychosomatic. By this we mean that emotional reactions seem to play a major role in causing them, not just in making them better or worse. These "psychosomatic diseases" include high blood pressure, ulcer, rheumatoid arthritis, asthma and an overactive thyroid gland. The idea here is that many people seem to get them only when they are psychologically stressed.

Ah, but why did Dan get an ulcer, whereas Harry had a heart attack and Jean stayed well? Part of the explanation may be that the affected organ was previously damaged or weak. We all seem to have some inherited weaknesses, diseases tend to run in families. Perhaps Dan was born with a stomach that makes too much acid.

But there seems to be a further cause—one that involves a more modern understanding of stress. Selye concentrated on how reactions to all stressors are alike. But we know now that they are not exactly alike. Research has shown that each response is partly tailored specifically to the stressor. This involves not just the local reaction of the body part involved (or to mental functioning, with psychological stress) but the general body response as well.

Very cold weather causes special reactions in the skin and also stimulates the thyroid gland to increase body metabolism, along with the general stress response. Infections, unlike many other stressors, produce fever. Indeed, each infection stimulates a very specific antibody to fight it so that you develop an immunity to that infection.

Psychologically, the same is true. Some situations are depressing. Others may make you scared, embarrassed or angry. Even in the same situation, some people will get one feeling, others another. And each feeling has its own special physical features. You blush with embarrassment, for example, but feel sick to your stomach when disgusted.

That's what seems to happen in the "psychosomatic diseases." Psychological stress develops because of unusual life pressures and your individual sensitivities. You react with a particular emotion. That emotional state affects certain body organs more than others. If the organ is a vulnerable one and the stress goes on and on, eventually it will break down. Then you develop a disease in that organ, such as a stomach ulcer.

Fortunately, there are many ways you can protect yourself from psychosomatic diseases and other harmful effects of stress. By seeking prompt medical care for illness, you can prevent extra damage to the body part involved. Thus, you reduce the vulnerability of that part to stress. You can also do a great deal to raise your general physical resistance. This is what is meant by being "fit" or in good condition. By exercising, by getting enough rest and by eating well (though not too well!), you improve your overall strength and general resistance. You enhance your ability to handle any stressors that come along and still have plenty of reserve.

There is no better example of this than astronauts. Not only are they in top physical condition, but they are just as fit mentally, too. Their training prepares them to solve the kinds of problems that might arise in space. When some unanticipated difficulty does occur, they come up with constructive solutions without developing more than a slight, brief stress response. If one technique fails, they can quickly shift to another; their mental "back-up-systems" are as varied as those of their equipment.

We apply the same principles in bringing up our children. We try to give them a variety of stimulating experiences as well as a good education. We try to create situations and challenges just tough enough to stimulate them to learn new ways to solve life's problems. Each new demanding situation leads to some stress. If it is within the child's ability to master it, the stress soon disappears. The next time around, he experiences less stress and learns the solution better. With further learning, he has that solution available for other problems and they become less stressful.

Overall, we try to keep the number and severity of stressful situations within limits. We want our kids to develop the self-confidence that occurs from having mostly successes, and from experiencing just enough failures so that failure itself doesn't lead to stress. Usually it works out pretty well.

It can work for adults too. You can use the same techniques to build up your own mental fitness and stress resistance.

Things will turn out very differently if you keep fit and learn to master the pressures. Stress will quickly abate. This brief successful exposure to stress will further strengthen your general resistance. Your subsequent capacity to deal with that and similar pressures, without developing a stress reaction, will be enhanced. Stress will have been a friend which has made you stronger.

It is said that the Chinese word for crisis is written by combining the symbols for the words danger and opportunity. Stress is just that: a danger and an opportunity; a friend and a foe. If you use it well, stress can be a good friend, indeed.

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